Text-to-Speech & Speech-to-Text in Education

Overview

The invention of speech-to-text (STT) and text-to-speech (TTS) technology has revolutionized communication in education by increasing accessibility, enhancing comprehension and retention, and improving productivity and accuracy in note-taking and writing. They have had a profound impact on education, as they offer more inclusive and accessible ways of communicating and consuming written and spoken information.

Historical Development of Communication Technologies for Writing and Reading

Historical development of communication technologies for writing and reading
"Language has been with us since the human race began. By contrast, writing is not a fundamental aspect of human life despite the profound impact it has had on human history." (Gnanadesikan, 2009) The development of communication technologies for writing and reading has a long history, starting with the invention of cuneiform writing systems over 5,000 years ago, to the scroll and codex developed in ancient Greece and Rome. The invention of the printing press in the 15th century revolutionized the production and dissemination of written material, allowing for the spread of literacy and the democratization of knowledge. Digital technologies such as word processing software and e-books have continued to transform the way we read and write, enabling more efficient creation, editing, and distribution of written material, as well as the development of new formats for reading and accessing information. Each new technology has brought new possibilities and challenges for communication and education, shaping the way we interact with information and each other.

> "When a language dies, so much more than words are lost. Language is the dwelling place of ideas that do not exist anywhere else. It is a prism through which to see the world" (Kimmerer & Smith, 2022, p. 258).

Both text-to-speech and speech-to-text technologies have had a significant impact on reading and writing practices in communication and education by enhancing accessibility, inclusivity, and productivity.

Text to Speech (TTS)	Speech to Text (STT)
- Text-to-speech technology has transformed the way individuals consume written information. - TTS technology enables individuals with visual impairments, and earning disabilities, to access and consume written information in a way that is more accessible and inclusive. - Wood et al. (2018) concludes, "Text-to-speech/read-aloud presentation positively impacts reading comprehension for individuals with reading disabilities." Indicating this technology benefits students struggling with decoding and understanding printed words on the page. - TTS allows students to both see and hear text when reading, creating a multisensory reading experience. - TSS provides an alternative format for individuals who prefer to listen to information rather than read it themselves. - TSS enabled educators to provide more inclusive and accessible learning environments using multi-modal strategies.	- Speech-to-text technology has had a more significant impact on writing practices. - STT allows individuals to dictate their ideas and have them automatically transcribed into written text. - STT has improved productivity and accuracy in note-taking, writing, and other tasks that involve written communication. - STT technology has similarly enhanced accessibility and inclusivity in education by providing an alternative method of written communication for individuals with physical disabilities or those who struggle with traditional writing methods. - STT is an effective medium for teaching writing strategies to students with physical disabilities or learning difficulties that make transcription difficult. The value of this is apparent when one considers that poor transcription undermines motivation to complete writing tasks and affects the quality of any given text. (Haug & Klein, 2018) - STT has also improved productivity and efficiency in writing tasks, allowing students to focus more on the content of their ideas rather than the mechanics of writing.
Benefits (STT) - Improves word recognition - Increases the ability to pay attention and remember information while reading - Allows kids to focus on comprehension instead of sounding out words - Increases kids' staying power for reading assignments - Helps kids recognize and fix errors in their own writing	**Benefits of (TSS)** - Express themselves without physically typing or writing - Improve communication skills - Produce legible text - Demonstrate writing composition skills - Improve writing efficiency - Improve speaking/articulation skills - Improve English language proficiency - Organize ideas, develop paragraphs, edit, and revise writing
Challenges (TTS) - Naturalness of voice - Linguistic complexity: - Compatibility with different devices - Cost - Integration with existing systems - Availability of content	**Challenges (STT)** - Accuracy - Training - Privacy and Security - Cost - Integration with existing systems - Bias and cultural differences.
Tools - Device built-in text-to-speech - Web-based tools - Text-to-speech apps - Chrome tools - Text-to-speech software programs	**Tools** - Device built-in speech-to-text - Web-based tools - Speech to text apps - Software programs, applications, or extensions

Future Possibilities & Advancements

- Smart assistants
- Language translation devices
- Virtual and augmented reality
- Wearable accessibility devices