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### Stephen Hawking as accidental ambassador for assistive technologies

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## THE CONVERSATION

Academic rigor, journalistic flair

# Stephen Hawking as accidental ambassador for assistive technologies

March 14, 2018 2:40pm EDT

A computer-generated voice was essential to Hawking's participation in the world around him. AP Photo/John Raoux

# Stephen Hawking as accidental ambassador for assistive technologies

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Imagine you've contemplated the great scientific theories of the past and arrived at new insights based on your own observations. Imagine you've organized these thoughts into compelling arguments. Imagine that what you have to say will likely advance humanity's understanding of its existence. Now imagine your frustration if you were unable to use your physical voice or hands to speak or write the thoughts coalescing in your mind.

Such was the situation for Stephen Hawking, the great explainer of the universe, who died on March 14. He was a brilliant physicist who published more than 230 scientific articles, papers, books, book chapters and children's books. He gave countless lectures and stretched humankind's understanding of the nature of our existence. Hawking was well-regarded by his scientific peers but also explained his thoughts in ways that make sense to everyone else. This is an unparalleled contribution for anyone, but especially for someone whose communication was severely limited by ALS, or amyotrophic lateral sclerosis.

At age 21, Hawking was given the standard two to five years to live after his ALS diagnosis. He beat the predictions. Hawking lived with the physical effects of this neurodegenerative disease for more than half a century.

Fortunately, Hawking lived in a time when researchers were rapidly developing electronic technology to assist people with physical limitations in achieving increased independence. Here at Montana's University Center for Excellence on Developmental Disabilities, we investigate and promote services

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and supports that increase quality of life, independence and integration of people with disabilities. For us, Hawking was a valuable role model for more than the next generation of scientists. With his recognizable wheelchair and computer-generated voice, he demonstrated the value of technological solutions to liberating the voice of those with physical and communication disabilities.

## **Tech fills in for functional limitations**

So-called assistive technologies provide a means for people to move from place to place, to eat independently, to see and hear what they can't otherwise perceive. They include basic things like wheelchairs to help people move around, magnifiers that increase the size of text or images to make them easier to see, even nonelectronic items like large-handled kitchen utensils that are easier to hold; think about everyday things in your kitchen drawers such as can openers, spoons, spatulas and the like.

Assistive technologies range from the seemingly simple all the way to speech-generating devices (SGD) that provide a physical voice to those who don't have one. Stephen Hawking's SGD system combined relatively simple technology together in a unique and functional way. In his own words he described how he managed a tablet computer with an infrared switch that he controlled with cheek movements:

*"[An open source program] provides a software keyboard on the screen. A cursor automatically scans across this keyboard by row or by column. I can select a character by moving my cheek to stop the cursor. My cheek movement is detected by an infrared switch that is mounted on my spectacles. This switch is my only interface with the computer. [The open source program] includes a word prediction algorithm ... so I usually only have to type the first couple of characters before I can select the whole word. When I have built up a sentence, I can send it to my speech synthesizer. ... I can also control the mouse in Windows. This allows me to operate my whole computer. I can check my email... surf the internet ... or write lectures. My latest computer ... contains a webcam which I use with Skype."*

## Stephen Hawking's Voice and the Machine That Powers It



Stephen Hawking's voice and the machine that powers it.

### **Setting an example and normalizing SGDs**

Among his many accomplishments, one that might not be readily apparent was Hawking's role as a "spokesmodel" for the use of assistive technologies. In a way, he was like a brand ambassador – a person who made the connection between consumers and products. He demonstrated throughout his adult life that technology was simply a tool that enabled him, and others like him, to fully participate and contribute to the world around him. Rather than one particular keyboard or software system, the "product" that Hawking promoted was the concept that physical limitation cannot hamper the human mind.

Tech solutions, all of which are part of everyday 21st-century life, are used to overcome physical limitations imposed by functional disabilities. From complex solutions used by well-known people – such as the late Christopher Reeve's use of a high-tech wheelchair – to simpler ones like screen magnifiers on our computers and speech recognition "voice commands" on our smartphones, technology makes some tasks easier. In a very public way, Hawking demonstrated that it is OK – maybe even somewhat cool – to use technology to enhance or enable communication, to move around, work, play and fully participate in family and professional activities.

"Stephen Hawking is the most recognizable speech-generating device user in the world," said Julie Doerner, the former clinical coordinator of MonTECH, a program I oversee at the Rural Institute for Inclusive Communities. MonTECH, one of 56 statewide assistive technology programs in the U.S. and its territories, loans equipment for free to Montanans with disabilities to help them with the tasks of everyday life including reading, bathing, typing, eating, or simply getting from place to place. She

continued, “When I explain assistive technology devices to others, I use Stephen Hawking as an example. They all know who he is.” The response is usually, “ah, that’s cool!”

Hawking and other high-profile users show the world that technology is not strange, nor does it diminish or magnify them as human beings. The technology they use allows others to look past disability and focus their attention on who they are, on them as people. And Hawking’s fame raised the visibility of speech-generating technologies, helping them seem more commonplace than weird for people all over the world – both those who might need SGDs and those who might encounter others using them to communicate.

Advances in technology that help us interact with the world around us are limited only by our imagination. We now take for granted that we can ask our smartphone questions, that it can guide us to our next appointment, monitor our heart rate, measure our steps, help us find and communicate with others, and on and on. Smart technologies are being incorporated into our kitchen appliances, shoes, vehicles and eyeglasses. These and the world of robotics stretch our thinking about ways in which technology can enhance human independence, regardless of physical, and sometimes cognitive, limitations.

How these advances will benefit people with disabilities remains to be seen. One thing is certain though. The use of assistive technologies in our everyday world diminishes the differences between people with different abilities. We owe much to Professor Hawking’s example. Ah, that’s cool!

 [Disability support](#) [Stephen Hawking](#) [ALS](#) [Assistive technology](#) [Disability services](#)