Chapter 25
Universal Design for Learning and Assistive Technology:
Promising Developments

Brian R. Bryant
University of Texas – Austin, USA

Kavita Rao
University of Hawai'i – Mānoa, USA

Min Wook Ok
The University of Texas – Austin, USA

ABSTRACT

Universal Design for Learning (UDL) has become a popular and effective way to help all students access what is taught in the classroom. Modeled after universal design, which enabled people with disabilities to access multiple physical environments, UDL provides access to the curriculum via three guiding principles: (a) multiple means of representation, (b) multiple means of expression, and (c) multiple means of engagement. This chapter looks at UDL and Assistive Technology (AT) for students who have specific Learning Disabilities (LD). Further, the authors examine AT research that has been conducted with students who have LD in reading, writing, and mathematics, and they provide case studies wherein UDL and AT are used to enhance accessibility in U.S. schools, specifically Grades 1 and 6 as well as high school.

INTRODUCTION

Universal Design for Learning (UDL) has gained popularity in the past decade as a framework for designing curriculum and instruction that is accessible to diverse learners, including students who have learning disabilities (LD). The concept of universal design (UD) comes from the work of Ron Mace in the 1980s. The original focus was on proactively reducing environmental barriers and providing increased access to the physical environment (Center for Universal Design, 2010). In the past two decades, researchers and educators have begun to apply the principles of UDL

to curriculum and instruction, modifying the original principles and applying them to learning environments (Rose, Harbour, Johnston, Daley, & Abarbanell, 2006). The UDL principles focus on designing flexible curriculum and instructional environments that provide a range of options for the learner and reduce barriers to accessing the curriculum. The three UDL principles involve providing:

1. Multiple means of representation,
2. Multiple means of expression, and
3. Multiple means of engagement.

Each of the three principles has three additional guidelines associated with it, defining how multiple options and choices can be built into curriculum and instruction (National Center on Universal Design for Learning, 2010).

Technology plays a key role in universally designed curriculum by naturally providing flexibility and customization. Digital media inherently supports the development of flexible curricula, allowing information to be represented in various ways. For example, digital text can easily be modified to meet different needs and preferences. No longer immutably set on the page in printed format, text can be digitized and converted and listened to or modified visually to suit an individual's needs and preferences. In this way, digital text can be made accessible to an individual who has a visual impairment or an individual with LD who may have trouble reading. The modified text can also be helpful to individuals who are learning the language of instruction (such as English language learners) and those whose comprehension of text is enhanced if they can review it in multiple formats (e.g., listening and reading at the same time.) Once the domain of assistive technology (AT) devices, these flexible features are now readily available on the technology tools (e.g., laptops, tablets, smartphones) that are accessed daily.

This chapter looks at UDL and AT for students who have specific LD. Further, we examine AT research that has been conducted with students who have LD in reading, writing, and mathematics,

and we provide case studies wherein UDL and AT are used to enhance accessibility in U.S. schools, specifically Grades 1 and 6 as well as high school.

ASSISTIVE TECHNOLOGY DEVICES AND SERVICES IN UNIVERSAL DESIGN FOR LEARNING

Although UDL lessons can reduce barriers, increase access, and build in supports for a range of learners, accommodations may still need to be made for individual learners who have specific needs. Such accommodations often include the use of AT devices and services. Years ago, an International Business Machine (IBM) training program for AT stated, "For people without disabilities, technology makes things easier. For people with disabilities, technology makes things possible" (1991, p. 2). In this case, "things possible" means having access to the general education curriculum.

The role of AT and UDL has been discussed at length by, among others, Rose et al. (2006), Edyburn (2010), and Bryant, Bryant, and Ok (in press). Edyburn correctly argued that UDL is not AT, but he also noted that AT and UDL may co-exist, and there is a possibility that UDL may pre-empt the need for certain AT devices, depending on the student and the lesson. Many times, the technology used during instruction is helpful technology for students without disabilities, yet AT for students with disabilities (Bryant & Bryant, 2011). In this section, AT and UDL are explored further by presenting an overview of AT and discussing how research has validated its use for students with LD.

Defining Assistive Technology

Interestingly, AT is not defined in U. S. legislation. Assistive technology devices and AT services are defined, both in the Technology-Related Assistance for People with Disabilities (better known as the Tech Act of 1988) and the Individuals

Related Content

Including Dyslexic Users in the Early Design of the LITERACY Portal

Renate Motschnig, Domink Hagelkruys, Ján Struhárand Kamila Balharová (2014). *Human-Computer Interfaces and Interactivity: Emergent Research and Applications (pp. 102-117).*

www.irma-international.org/chapter/including-dyslexic-users-in-the-early-design-of-the-literacy-portal/111750

A Study of Using VR Game in Teaching Tajweed for Teenagers

Haya Hasan AlKhatib, Evi Indriasari Mansor, Zainab Alsameland Joud Allam AlBarazi (2020). *Interactivity and the Future of the Human-Computer Interface (pp. 244-260).*

www.irma-international.org/chapter/a-study-of-using-vr-game-in-teaching-tajweed-for-teenagers/250756

Mobile Technology and Learner Autonomy in Language Learning

Zineb Djoub (2016). *Human-Computer Interaction: Concepts, Methodologies, Tools, and Applications (pp. 291-309).*

www.irma-international.org/chapter/mobile-technology-and-learner-autonomy-in-language-learning/139039

Towards an Interdisciplinary Socio-Technical Definition of Virtual Communities

Umar Ruhi (2019). *Advanced Methodologies and Technologies in Artificial Intelligence, Computer Simulation, and Human-Computer Interaction (pp. 612-632).*

www.irma-international.org/chapter/towards-an-interdisciplinary-socio-technical-definition-of-virtual-communities/213163

The Evolving Nature of International Collaboration and Partnership

Amanpreet Singh Chopra, Sridhar Manohar, Artur Zawadskiand Mayank Jain (2024). *Digital Technologies, Ethics, and Decentralization in the Digital Era (pp. 1-21).*

www.irma-international.org/chapter/the-evolving-nature-of-international-collaboration-and-partnership/338863