CIDDL Research and Practice Brief 9: Assistive Technology and Universal Design for Learning: Past Lessons and Future Opportunities

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OUR COLLECTIVE WHY**"**

Dear stakeholder,

Thank you for engaging with the Center for Innovation, Design, and Digital Learning (CIDDL). The work that you are about to access is supported with funding from the Office of Special Education Programs at the U.S. Department of Education.

The CIDDL Center is striving to impact the use of educational technologies into preparation programs, including special education, early intervention, and related services personnel preparation and leadership personnel preparation programs that prepare professionals serving students with disabilities.

CIDDL Research and Practice Briefs

CIDDL Research and Practice Briefs is a series of reports on research and practices regarding the innovative use of technology in special education, early childhood, related services personnel preparation and leadership personnel preparation programs as well as K-12 educational settings. For each brief, an expert or practitioner in the field is invited to discuss their research and practices. In addition, experts and practitioners will share their insights into opportunities and challenges about applying their research and practices to professional preparation programs.

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Topic: Where We've Been and Where We Need to Go: AT and UDL

The problem highlighted in this brief

Research has consistently demonstrated that students with disabilities do not have adequate access to assistive technologies (AT) and features they need to support their learning (Bouck & Long, 2020; Edyburn, 2020a). Teachers often express uncertainty in how to incorporate these tools into the classroom (Okolo & Diedrich, 2014), suggesting that preservice teacher education does not do enough to prepare teachers in this regard. At the same time, teachers express misunderstanding about Universal Design for Learning (UDL) and sometimes believe AT and UDL are words used interchangeably.

Why does this matter to teacher preparation?

AT was initially defined as tools specifically intended for students with disabilities; however, as AT features become embedded in more products, they become an increasingly ubiquitous tool for all students. UDL, on the other hand, is an educational framework intended to help teachers design for the natural variability in student needs and abilities found in any classroom (Meyer et al., 2014). To better prepare pre-service teachers for implementing AT and UDL, teacher educators will benefit from a better understanding of how AT and UDL are positioned in education policies and research. In this brief, CIDDL invites Dr. Dave Edyburn to share his insights into the past and future of AT and UDL as well as connections between the two concepts. Dr. Edyburn also offers suggestions on supporting teachers in building UDL buffets with a variety of AT options for all students.

Guest Expert: Dr. Dave Edyburn

Dr. [Dave Edyburn](#) is Senior Research Scientist and Professor Emeritus in the [Rehabilitation Research Design and Disability](#) (R2D2) Center at the University of Wisconsin – Milwaukee and Associate Graduate Faculty in the [Department of Learning Technologies](#) at the University of North Texas. His research focuses on the application of technology to enhance teaching, learning, and performance, with a focus on special education technology. Dr. Edyburn has also written extensively regarding AT and UDL over the past 20 years.

What Will You Learn from This Brief?

This brief first provides policy and research context in which AT and UDL were positioned as tools that support learning for students with and without disabilities. As a researcher in both areas, Dr. Dave Edyburn discusses the history of AT and UDL, especially the challenges facing the field of special education around their implementation. Despite these challenges, Dr. Edyburn provides insight into strategies to improve educational outcomes for students, especially by approaching teaching as a research and development activity. Edyburn suggests some of the ways we might better prepare preservice teachers to take advantage of technologies that may not have existed when they themselves were students.

Policy and Research Context

[The Individuals with Disabilities Education Act (2004)](#) defines AT as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a

disability." IDEA requires that AT be considered for every student with disabilities when developing their individualized education plan (IEP). Additionally, IDEA highlights the needs of using technology, including technology with universal design principles and AT devices, to maximize accessibility to general education curricula for students with disabilities.

According to a [review of literature from 2005-2019](#) concerning AT, it remains difficult to describe AT application as an evidenced-based intervention due to the limited number of research studies demonstrating outcomes (Edyburn, 2020a). What is clear, however, is that AT remains an underutilized intervention for providing students with disabilities access to educational curricula. For example, Edyburn (2021a) pointed out that, while every technology platform has universal accessibility features that support reading and writing, American schools have not recognized the need to provide students with instruction in the use of these features. Students with disabilities continue to face three challenges, which include (1) barriers in learning management systems; (2) inaccessible documents, media, and webpages; and (3) barriers within teaching activities due to a lack of appropriate supportive devices and services (Edyburn, 2021b).

In an interesting parallel, reviews of research into UDL have presented similar problems in establishing a consistent research base (Edyburn, 2020b). The [Higher Education Opportunity Act of 2008](#) defines UDL as a scientifically valid framework for guiding educational practice that — (A) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and (B) reduces barriers in instruction, provides appropriate

accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient. This definition has been adopted and applied toward K-12 education in the most recent reauthorization of the Elementary and Secondary Education Act — The Every Student Succeeds Act of 2015. However, there is still confusion around the definition of UDL, which has made it difficult to accurately measure its presence in classrooms (Edyburn, 2020b).

More than 10 years have passed since Edyburn (2010) asked the research community if they would recognize UDL if they saw it. In his 2010 article, Edyburn highlighted a lack of sufficient direct evidence to establish UDL as a scientifically validated intervention. UDL ran the risk of becoming just another educational fad: a short-lived, fashionable movement that generates intense enthusiasm but is quickly abandoned (Edyburn, 2020b). Edyburn called for greater knowledge around what it means to implement UDL, how to measure the outcomes of UDL, and who is responsible for creating UDL products. The following are key insights gleaned from the interview with Edyburn and previous research. The interview focused on four questions around AT and UDL as well as implications for teacher education.

Key Insights

Q1: Could you talk about some of the changes you've seen in the area of AT?

Dr. Edyburn: "Assistive technology got started by saying it's a tool only for people with disabilities... It's kind of a 1980's perspective of

technology. The Federal definition of assistive technology has not really evolved…"

If an intervention, tool, or device is used only by primary beneficiaries (the students for whom it was initially intended), then it can be considered an AT. However, if that same intervention or device provides benefit to other students in the classroom, it may be considered to have universal design applications (Edyburn, 2021b). Accessibility is no longer focused exclusively on people with disabilities. Today, concepts around universal usability challenge product designers to improve the user experience for everyone.

Q2: How do we improve teacher education to better prepare future teachers to enter the classroom ready to use AT?

Dr. Edyburn: "If teacher educators don't model the use of technology to enhance teaching and learning, or provide meaningful experiences to explore innovative technologies, as well as how to integrate technology, the assumption is that future teachers will not be well prepared."

In his 2020 rapid literature review, Dr. Edyburn provided a number of considerations for the types of training pre-service and in-service teachers should receive in order to ensure successful AT implementation. To maximize the effectiveness of technology, teachers need knowledge around: 1) determining who may need AT; 2) how to evaluate AT interventions, and 3) the types of outcomes to anticipate from AT.

Q3: Could you talk to us briefly about the current state of UDL?

Dr. Edyburn: "We still haven't figured out how to define it."

Within the last ten years, UDL has captured the attention of stakeholders at all levels. The idea that good design can benefit everyone is a simple message that makes UDL an attractive option. Yet, researchers over the past decade have struggled to define UDL on paper and identify it in practice (Edyburn, 2020b). Edyburn and Edyburn (2021) highlighted the need for more guidance on how to help preservice teachers bridge the gap between "knowing about" and "implementing" UDL.

Q4: What should teacher preparation do to support UDL implementation and prevent it from fading away?

Dr. Edyburn: "I really think the issue of choice in UDL is about helping teachers make menus… My job as to set the buffet. So, there's three chairs, there's three porridges, there's three beds… As the students come in, I want to challenge them to behave like goldilocks, so that they try out each and determine what is just right."

Edyburn and Edyburn (2021) suggest two tactics for building out this UDL buffet. First, in order to discover resources to include on the menu, teachers can search for websites that compare products they are interested in using or search out curated guides compiled by other educators. Second, teachers require a management system for presenting the resources they plan to offer students. This can be in the form of a web list page on the class's learning management system, or by creating a tic-tac-toe board of options students must choose from.

Resources

In his interview, Dr. Edyburn refers to the following resources that may be of interest:

- [Assistive Technology: An Overview](#):
  This learning module from the IRIS Center provides an overview of assistive technology, especially for students with high-incidence disabilities and covers the process from initial consideration of AT through its implementation and evaluation.

The following resources can support UDL in the classroom:

- [Photomath](#)
  This app provides support with everything from elementary math problems through trigonometry and stats. Photomath provides step-by-step instructions to help users to master their math problems.
- [Text Compactor](#)
  This free online tool allows you to quickly summarize blocks of text by selecting what percentage you would like to keep.

Link to the Interview Video

This Research and Practice Brief can be viewed on video online at tinyurl.com/CIDDLResearchBrief9

Transcription of the Interview

Transcription of the interview can be found at https://ciddl.org/brief7-interview-transcript/

For More Information

More [CIDDL Research and Practice Briefs](#) can be found at the CIDDL website. Please visit [our website](#) for more resources and sign up for the updates from CIDDL.

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