ARTICLE

UNIVERSAL DESIGN FOR LEARNING AND SCHOOL LIBRARIES

A Logical Partnership

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School library programs have historically provided information literacy services to a range of students, including those with physical and cognitive disabilities (Hill 2012). School library multimedia production activities have facilitated opportunities for learners to be engaged and to express their knowledge in nontraditional modes. In my roles as an elementary, middle, and high school librarian, I recognized that many of the frequent student library patrons and student library assistants demonstrated strong technical aptitude. These same students were often not successful in traditional learning environments. It became evident that these students were able to express their knowledge in forms other than customary paper-and-pencil tasks. The most dedicated student library assistants were often not strong academic performers but *were* adept at wiring a computer lab, videotaping a school event, or editing video productions.

School library technology-integrated activities delivered a lens through which it was apparent to my instructional partners and myself that learning could be tailored to permit all learners to express their knowledge and abilities. Without the knowledge of a pedagogical framework for this phenomenon, we were experiencing the world of Universal Design for Learning (UDL) within the framework of the school library program. UDL and school libraries form a natural partnership. This article will explore the basic tenets of UDL in relation to collaborative curriculum development and implementation; provide a case study examination of UDL principles in action; and suggest school library curricular activities that provide opportunities for multiple means of representation, action, and expression.

Universal Design for Learning

Universal Design for Learning (UDL) began to evolve in the 1950s in Europe, Japan, and the United States with the emphasis on removing physical barriers in building construction. Kelly D. Roberts et al. (2011) noted that, in the 1960s and the 1970s, the UDL concept further evolved to integrating all people in architectural and environmental designs. The Higher Education Opportunity Act (2008) defined 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.

The Center for Applied Special Technology (CAST) defines UDL as a "framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn" (2017). According to the National Center on Universal Design for Learning, "UDL provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone—not a single one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs" (2014). UDL supports the needs of diverse learners, including learning-disabled students from diverse cultural backgrounds (King-Sears 2009).

Universal Design for Learning and Neuroscience

The foundations of UDL are based around guiding principles for three

primary brain networks (Meyer, Rose, and Gordon 2014). These brain networks are the Recognition Networks, Strategic Networks, and Affective Networks. The Recognition Networks encompass the "what" of teaching and learning; "how we gather facts and categorize what we see, hear, and read, identify letters, words, or an author's style are recognition tasks" (CAST 2017). Different students process and comprehend information differently. The Recognition Networks are best supported in learning environments that include multiple representations of concepts and provide flexibility in modality, explanations, and examples (CAST 2017). Optimally, school library programs are the center of this Recognition Networks' flexibility in Pre-K–12 schools.

The "how" of learning occurs within the Strategic Networks. Action and expression are the guiding principles of the Strategic Networks. Planning and performance tasks, the organization of ideas, and the ways in which students demonstrate knowledge are examples of the Strategic Networks' "how" of learning (CAST 2017). This student demonstration of knowledge is best supported in environments that include multiple ways for presenting and expressing materials, for developing meta-skills, and for demonstrating knowledge and understanding (CAST 2017).

The "why" of learning occurs within the Affective Networks. Supporting the Affective Networks is facilitated by the guiding principles of motivation, challenging students to provide examples of the "why" of learning, and providing students with options for how they learn course content and information (CAST 2017). Students' natural learning differences affect engagement with course content. Providing options via meaningful interactions and multiple modes of learning supports learning via the Affective Networks (CAST 2017).

The National Center on Universal Design for Learning (NCUDL) (2011) provided UDL guidelines that are organized according to the three main principles of UDL (Representation, Action and Expression, and Engagement). The three main principles are:

- Principle I. Provide Multiple Means of Representation
- Principle II. Provide Multiple Means of Action and Expression
- Principle III. Provide Multiple Means of Engagement (NCUDL 2013)

The three main principles and supporting guidelines are illustrated via an excellent graphic at <www.udlcenter.org/aboutudl/udlguidelines/udlguidelines_graphicorganizer>.

UDL and School Libraries

A consistent expectation of school librarians is the effective delivery of instruction to students with a range of learning needs. Ying Zhong, in a study of academic library instruction, noted that, in the design of library instruction, the simple adoption of UDL facilitates students' mastering of skills (2012). Clark Nall noted that the principles of (UDL), when incorporated in academic libraries, provide learning opportunities for a wide array of students, especially for students with learning disabilities (2015). Elfreda V. Blue and Darra Pace in "UD and UDL: Paving the Way toward Inclusion and Independence in the School Library" stated that UDL "can greatly enhance the library experiences of diverse students, leading to inclusion and independence for students with disabilities" (2011, 54).

In *Empowering Learners: Guidelines for School Library Programs* AASL described the teacher role of the school librarian as one that "empowers students to become critical thinkers, enthusiastic readers, skillful researchers and ethical users of information" (2009, 18). The role of "instructional partner" was identified by AASL, via a survey of select school librarians and administrators in 2009, as the most critical role in the future of the profession (2009, 16). In *Empowering Learners* the school librarian's interconnected teaching roles of instructional partner and teacher are evident when the instructional partner is described as one who "collaborates with classroom teachers" (AASL 2009, 17) and "understands the curriculum of the school thoroughly and can partner with teachers to create exciting learning experiences in an information- and media-rich environment" (AASL 2009, 19). These key roles of the school librarian, particularly the roles of instructional partner and information specialist, serve as a framework for modeling and infusing UDL principles and strategies throughout the entire school curriculum. The following case study illustrates how collaborative school library curriculum planning and coteaching can support students' accessing the UDL Recognition Networks, Strategies Networks, and Affective Networks to provide for optimal learning. The three main UDL principles (Representation, Action and Expression, and Engagement) are included in table 1 to denote their application in the following scenario.

Case Study and Connections to UDL

The focus of this case study is a group of five middle school students who collaborated on a research and multimedia project on the United States Civil War. The students were

Table 1. Case study research/production process and UDL.

Process	UDL Principles	UDL Indicators
The students took notes with varying levels of assistance based on their respective accommodations, including the use of assistive technologies.	**Representation** by providing options for language and options for comprehension. **Action and Expression** by optimizing access to tools and assistive technologies. **Engagement** by minimizing threats and distraction, and facilitating personal coping skills and strategies.	2.1–2.3, 3.2–3.4, 7.3, and 9.2
Students could choose from print materials, online resources, and audio and video resources from which to take notes.	**Representation** by providing options for perception and comprehension. **Action and Expression** by varying the methods for navigation and using multiple tools for construction. **Engagement** by optimizing individual choice, and varying demands and resources.	2.1-2.3, 2.5, 4.1, 5.2, 7.1–7.2, and 8.2
The classroom teacher provided significant assistance to the students in writing script.	**Representation** by providing options for language and comprehension. **Action and Expression** by providing options for expression and communication, and providing options for executive functions. **Engagement** by minimizing threats.	2.1–2.2, 3.1–3.3, and 7.3
A storyboard was developed, and the students were asked to find images to align with the text.	**Representation** by illustration through multimedia and highlighting patterns, critical feature, big ideas, and relationships. **Action and Expression** by providing options for expression and communication, and providing options for executive functions. **Engagement** by varying demands and resources, and fostering collaboration and community.	2.5, 3.2, 6.2–6.3 and 8.2–8.3
The soundtrack was recorded. Using a video copy stand, small groups of students recorded the video images, and incorporated some in-camera effects. Editing the final video was completed by small groups working in rotating pairs.	**Representation** by guiding information processing, visualization and manipulation, and maximizing transfer and generalization. **Action and Expression** by providing multiple media for communication, multiple tools for construction, and optimizing access to tools and assistive technologies. **Engagement** by fostering collaboration and community.	2.5 3.4, 4.2, 5.1, 5.2, and 8.3

special needs students, and only one student was reading on grade level. However, this group had a wide array of talents and abilities. Several students had served as library helpers and had previously displayed technical proficiencies. Their social studies teacher/special educator was a frequent library visitor and collaborator, and shared an interest in tapping into these students' unique talents and abilities. The teacher and I (school librarian at the time) agreed that preparing a traditional research paper was not going to be an effective mode of learning for these students. The classroom teacher and I discussed accommodations/modifications to the research process and having the students express their knowledge in a mode compatible with their talents and abilities (i.e., providing a range of opportunities for Representation, Action and Expression, and Engagement). We decided to ask the students to produce a video documentary in the spirit of Ken Burns's *The Civil War*. The process began by assigning each student a specific Civil War topic. The students took notes with varying levels of assistance. Based on their respective accommodations, the use of assistive technologies was provided in this process. The students could choose from print materials, online resources, and audio and video resources from which to take notes.

Once the note-taking process was completed, the classroom teacher provided significant assistance to the students in writing a script. With the script completed, a storyboard was developed, and the students were assigned the task of finding images to align with the text. This assignment provided an opportunity to discuss copyright and fair use.

STUDENTS AT ALL LEVELS CAN PRODUCE A VARIETY OF RESEARCH-BASED PRODUCTS THAT CAN SERVE AS ALTERNATIVES TO TRADITIONAL RESEARCH PAPERS.

The next step was to record the narration and soundtrack. The oldest of the five students, who was the best reader, narrated the script. Using a video copy stand, small groups of students recorded the images from print and online sources, and incorporated some in-camera effects. Editing the final video was completed by my working with rotating pairs of students.

Table 1 outlines each phase of the research and production process, and the corollary UDL principles and indicators. The full list of checkpoints (indicators) associated with UDL can be viewed at <www.udlcenter.org/research/researchevidence>.

The entire research and production process took about three months. Some entire class sessions were dedicated to the process, particularly the note taking. Much of the production work was accomplished by working with the students individually or in teams. To celebrate these students' efforts, we arranged for a premier showing of the video and invited teachers, administrators, and central office supervisors to attend. The students shared with the audience the process of making the video and their knowledge acquired in the process.

We sensed the students learned more in this constructivist process than they would have by more traditional means. The most vivid example of this qualitative supposition was demonstrated by the narrator. As she was narrating a scene on the assassination of President Lincoln, she suddenly went off script and said, "Oh my god, they killed the man." This was a landmark moment for the classroom teacher and myself. We had been discussing the Lincoln assassination through the entire process, but it wasn't until the narrator read the script in conjunction with the images, that she correlated the assassination with the death of President Lincoln (consistent with multiple means of Representation, Action and Expression, and Engagement). In addition to the knowledge acquired on the United States Civil War, the students were provided with opportunities to engage with a variety of technologies. The students expressed motivation and satisfaction with the process.

Conclusion

The pairing of research and multimedia production has a rich history in school libraries (Lamb 2015). This case study illustrates how the principles of UDL are naturally rooted in school library curriculum and activities. School librarians may use information presented in table 1 as a template for other research and multimedia collaborative activities. As school librarians embark on instructional partnerships with co-educators, the following are some additional UDL-compliant curricular activities that provide for multiple means of Representation, Action and Expression, and Engagement.

At the elementary level, digital storytelling provides a vehicle to

collaborate with teachers in multiple content areas (language arts, social studies, art, and music). One variation is to have students create their own folktale, either individually or as a class. Each student can illustrate a scene from the folktale. The image can be scanned and incorporated into a digital movie or other type of presentation generated with software. Students can then record the audio narration for their respective illustrations and add a music soundtrack. Music and art teachers may prove willing partners on such endeavors.

Secondary students can create music videos to support research in the areas of language arts, social studies, art, and music. Ideally, students create their own compositions, but non-copyrighted music is an alternative. Teams of students develop a story based on their own research, produce a script, and create a video to accompany the soundtrack.

Students at all levels can produce a variety of research-based products that can serve as alternatives to traditional research papers. Wikis and websites provide modes of collaborative production. AASL's annual list of "Best Websites for Teaching and Learning" provides a list of websites compatible with the UDL framework. Among the categories of resources on the "Best Websites for Teaching and Learning" list (2016 and previous years) are media sharing, digital storytelling, and curriculum collaboration.

School librarians must meet the needs of all learners. UDL provides the ideal framework for collaborative curriculum planning and implementation to meet these needs.

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