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Assignment #5 Literature Review:

Universal Design in Online Environments for the Diverse Learner

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Universal Design In Online Environments For the Diverse Learner

After enactment of the educational reform legislation of No Child Left Behind (NCLB) in 2001, academic expectations and assessment requirements increased for all students, placing great pressure on educators to include students with disabilities, especially those with cognitive disabilities, in general education accountability measures. This pressure came to bear when the U.S. Department of Education ruled in 2004 that only 2% of students may take an alternative assessment due to special needs. In order to facilitate the inclusion of students with disabilities, Congress included the National Instructional Materials Accessibility Standard (NIMAS) as a mandate in the reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA) of 2004. NIMAS requires state and local education agencies to purchase materials designed so that students with disabilities have the freedom to gain access to instruction rather than merely having it modified. This mandate has been touted as a major step towards the framework of instructional design called universal design (UD), where materials for instruction and the instruction itself is designed to meet the needs of all students (those in general and special education) (Pisha & Stahl, 2005).

The need for UD has become more apparent with the growth of the special needs population, including physical and cognitive disabilities, multicultural backgrounds, and English language learners. The number of students enrolled in special education programs accounts for about 15% of all students. The number of students with cognitive disabilities (e.g., learning disabilities, developmental delays, other health impairments and emotional disabilities) accounts for nearly half of all students in special education (Keeler & Horney, 2007). This growing trend is even more evident in higher education, where nearly two-thirds of all students with disabilities enroll in college and close to 30% of the population will be of multicultural background and/or

English language learners. However, the strategies used to accommodate needs (i.e., extra testing time, shortened homework assignments, or translated materials) have not positively affected achievement (Scott, McGuire, & Shaw, 2003). This has been exasperated by the plethora of online instructional materials, which are not subject to the NIMAS mandate and have been shown to create new barriers for students with special needs (Keeler & Horney, 2007), and the call for instructional materials and methods to become digital. Thus, the need for a clear, concise, and effective model of UD is paramount in the current forum of educational reform.

Topic

The initial focus of the literature search was on UD and how it applies to the development of K-16 curriculum for students with learning disabilities. The database search subsequently defined this focus to four factors: students with learning disabilities, learning environments and multicultural populations, online learning environments for students in special education and UD for students with developmental disabilities. Thus, the literature search refocused the topic to UD of curriculum development for various K-16 learning environments and how it applies to students with special needs.

Database Search

The following databases (Academic Search Complete, Communication & Mass Media Complete, Computer Source, Education Full Text, ERIC, Information Science & Technology Abstracts (ISTA), Internet and Personal Computing Abstracts and Library, and Psychology and Behavioral Sciences Collection) were searched with the conditions that the article is in a peer-reviewed journal, published from 2000 to 2008, and has a full-text PDF available online. These limits were chosen to ensure that the research is current, seminal, and fully available online. It

should be noted that subsequent searches conducted without the full-text PDF availability limit did not provide any additional relevant resources.

Education Full Text. The Education Full Text database gave the most return in terms of the number of articles. *Universal design* was used as the broad search, with 160 results, and helped identify the areas of UD in educational literature. *Disabilities* was the next keyword used and yielded 32 results. This narrowed the search to *learning*, with 21 results. The articles from this search also identified *learning environments* as a phrase commonly used to describe classroom or online settings.

ERIC. The ERIC database had less of a return than the Education Full Text database, but it provided articles with a broader sense of UD. The keywords *universal design* yielded only 17 results. Nevertheless, when adding the keywords *learning*, with 10 results, and *environment*, with 4 results, the ERIC database provided several articles that broadly define the practice of UD in educational publishing for traditional and online classroom environments and for students with multicultural backgrounds. Yet, this search and that of the Education Full Text database provided little in terms of UD and online environments for special education students.

Multiple databases: Academic Search Complete, Communication & Mass Media Complete, Computer Source, Information Science & Technology Abstracts (ISTA), Internet and Personal Computing Abstracts and Library. A search in multiple databases was needed to find this specific area of UD. The search yielded 115 results for *universal design*, 9 results for *online*, and 2 results for *special* (i.e., needs, education, etc.). Even though this was not a very high number of articles, those that were found provided specific literature on the rarely researched topic of special education students' performance in online learning environments.

Psychology and Behavioral Sciences Collection. This could have been chosen in the multiple database search, but the Psychology and Behavioral Sciences Collection database was needed for the specialized field of developmental disabilities. *Universal design* as a key phrase yielded 27 results and provided articles that focused on UD and cognitive development.

Disabilities as a keyword, with 18 results, narrowed the focused to both physical and learning disabilities. Using *developmental* as the final keyword provided 3 results that focused on how UD assists students with cognitive disabilities.

Summary of Literature Search

Using different database searches with the same keywords at first did not provide a great number of results. For instance, using *universal design, disabilities, and learning* for both Education Full Text and ERIC yielded very similar results, and, thus, not a very deep body of literature. The topic chosen is specialized and not vastly researched, even at the broad idea of UD. Using different databases for different areas of the broad topic of UD did result in multiple articles that together provide a more complete picture of how UD applies to different learning environments and diverse learners.

The collection of articles due to the literature search will provide a multi-perspective definition of UD in educational publishing and instructional design. It will provide evidence of how UD affects students with developmental and learning disabilities, English language learners, and those with multicultural backgrounds. The literature will provide evidence of how UD is and is not implemented in online learning environments. And a new standard of the UD framework will emerge and be redefined to include both online and classroom settings: universally accessible learning environments. See Figure 1. This will assist in the exploration of the

question: Do online learning environments, designed within the framework of UD, significantly increase academic performance for students with special needs?

Universal Design

Originally developed for architectural design to provide access for those with physical disabilities to buildings, parking, and other physical spaces open to the general public, UD became a cornerstone to the principle of assistive technology (AT) in education, where students are given technology-based tools for accommodating success in the general education setting (Elder-Hindshaw, Nelson, Manset-Williamson, & Dunn, 2006; Crow, 2008). The AT and accommodation model provided only modifications to curriculum and instruction for students with cognitive disabilities as a way to succeed in general education. This proved to be not only controversial, but also unsuccessful and, in some cases, detrimental to achievement. Now as educational reform moves towards an inclusion model for all students in special education, UD has changed to a framework for the pedagogical development of instructional materials and environments that provides access to all learners (Scott et al., 2003).

UD means more than just providing access. The ideal of full access as it applies to architecture is the same as it applies to learning. As Scott et al. (2003) found in qualitatively studying how it is implemented in higher education, there are 9 principles to achieving this ideal in UD.

1. Instructional materials and any design modifications that assist a student with special needs should be *provided to all students*.
2. Students should be *given the choice* in using AT or instructional modifications.
3. The format and method of instruction and its materials should *not create a barrier* to any student.

4. *Multiple strategies* should be used and available for students to access information, including for those who are English language learners.
5. Instruction should allow for individual learning styles and pace. In other words, instruction should allow for the time to make *mistakes and corrections*.
6. *Low physical activity* should be a core method of instruction, unless it is required to meet standards.
7. Students should be given the *space* for physical movement in the learning environment, and there should be made available the appropriate *size* of materials for each student.
8. The environment should facilitate *collaborative learning*, where teachers and peers become invaluable resources to the process, not individual isolation or competition.
9. Instruction and the materials should be *friendly*. In other words, students should not be frightened into learning. However, this positive, supportive environment should not come at the sacrifice of high standards.

Throughout the 1980s and 1990s, curriculum standards were modified until students with special needs succeeded. This became known as “lowering the bar” for the sake of access. Not only controversial, the modification framework turned disastrous for students in special education as accountability standards were raised by NCLB. School administrators and teachers soon realized that students learning under modifications were failing standardized tests, thus affecting their school ratings, because of those modifications (McGuire, Scott, & Shaw, 2006; Pisha & Stahl, 2005). A call for a shift in instructional approach and design of materials was answered by the NIMAS mandate. In essence, NIMAS calls for publishers to “raise the ground” on which all students “walk” in order to reach the high bar of expectations that is NCLB. Meo (2008) has attempted to address this call by outlining a process of instructional design coined

PAL (planning for all learners). Based on classic principles of instructional design, PAL asks designers of materials to implement the following steps.

1. Launch development with goals that align to standards and focus the content.
2. Establish pedagogically sound methods, materials, and assessment tools, and analyze possible barriers to learning.
3. Develop materials within the framework of UD and the established goals and pedagogy.
4. Implement the materials within the framework of UD and the established goals and pedagogy.

If instructional design follows the preceding process, Meo contends that the instruction will give students multiple access points to learning. And in the end, all students will become flexible in their expression, engagement, and overall understanding of the curriculum.

Special Needs

The principle reason for UD in education is to meet the needs of students with disabilities as mandated by IDEA, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) of 1990. However, the following AT tools and instructional methods help all students succeed. In fact, UD has enabled educators to address the needs of students with disabilities at the same time addressing the needs of students from different cultures or English language learners, and many others (Scott et al., 2003).

Physical disabilities. Students with physical disabilities require access to AT that complements the diminished ability. For instance, a student who has a visual impairment may use a Braille terminal to display notes for a presentation. Yet, this tool is static and incapable of displaying notes for those with no visual impairment. Inclusion into the general education setting requires that the tools and materials be flexible and dynamic to instruction. Sapp (2007) studied

the use of online schedulers by 12 high school students (10 with blindness and 2 with low vision). The results of this study show the platforms that have compatibility for screen-reading software, easy to locate links, choice in color and contrast, adjustable font sizes, drop-down menus, and self-completing entries (e.g., typing “F” for “February”) are used more successfully than other platforms mainly designed for students with no visual impairments.

Equally important is that the AT does not create new barriers. Keeler and Horney (2007) found that online platforms that use pop-up windows, have moving content, or lack embedded textual descriptions for visual content create new barriers for students with visual impairments. Barriers in the design of AT tools are not limited to students with visual impairments nor are they limited to the tools. The researchers also found that instructional activities designed for the use of online tools like synchronous group chats caused disadvantages to those students with mobility impairments. Allowing students to prepare for a topic and then copy and paste their discussion points into the chat forum as the discussion unfolds, as in academic debate formats, could lessen this disadvantage. Speech-to-text tools could provide these same students the ability to participate in an online discussion more so in real time. In addition, teachers could post the discussion on a blog and ask students to respond or comment with additional points in order to allow all students the opportunity to read, reflect, research, and engage in the conversation. These materials and methods follow the principles of UD in that they enable students to access the instruction autonomously with adaptable tools and pedagogy at their discretion without compromising the integrity of the curricular goals. Furthermore, research shows that these UD principles not only include students with physical disabilities into the learning environment, but they also address the unforeseen needs of all students, especially those considered at-risk or who have undiagnosed learning disabilities (Scott et al., 2003).

Cognitive disabilities. Differentiated instruction that addresses the needs of students with cognitive disabilities is virtually absent from educational settings. Teachers and professors lack the knowledge and staff development to identify the necessary pedagogical framework. Spooner, Dymond, Smith, and Kennedy (2006) determined that access to general education begins with peer cooperation and support. Scott et al. (2003) also found that peer collaboration at the college level provides access to instruction for students with cognitive disabilities in ways that the instructor alone cannot or refuses to provide (due to pedagogical beliefs). Spooner et al. (2006) also determined that a student's "self-determination" is crucial to his/her access to education. In order for these students to be most successful in the general educational setting, they must be active participants in setting learning objectives or goals, developing critical thinking and problem solving skills, and directing their learning experience. In addition, if the principles of UD are followed in the development of curriculum and execution, the needs of all learners can be addressed and the need for accommodations and modifications under the old model can be greatly reduced.

The research also indicates that addressing the needs of students with cognitive disabilities through access to AT, which is traditionally reserved for students with physical disabilities, is as important as pedagogical approach. Pisha and Stahl (2005) state that the idea that cognitive disabilities can be addressed using printed materials is outdated and incorrect. Because of accommodations and modifications to printed materials, these students cannot keep up with general education students, consequently they often have a lowered self-esteem, and rely more and more on "pull-out" situations for tutoring, additional time for assignment completion, or testing. This isolates, stigmatizes, and pulls them further away from the general education setting. Conversely, UD and instructional materials mandated by NIMAS can help educators

address special needs in the same environment of all students. Michael and Trezek (2006) find that students with cognitive disabilities also benefit from AT tools such as textual descriptions of graphics, audio versions of text, and video presentations. Another area of growth in access is the use of digital media to record and reference teacher demonstrations or student activities. For example, students can take digital pictures of a dissection for a biology lab, organize them into a presentation or pod cast, and post to a web site. Devices such as Smart Boards, which can digitally save notes and illustrations, also enhance the manipulation and reorganization of materials as a learning activity. A teacher can then post them to a web site for download, which students can use as a reference or reconstitute into outlines or graphic organizers. Elder-Hinshaw et al. (2006) found that engaging middle school students in nontraditional activities involving multi-media tools helps students with reading disabilities in finding research, focusing in on a research question, organizing their thoughts, and presenting concepts with graphics and sound that might be challenging for these students to present in the traditional written report format.

The instructional methods and AT tools used by students with cognitive disabilities to gain access is found to have benefit for all students. After interviewing administration, faculty, and staff from 5 high schools implementing an inclusion service-learning program, where both general education and special education students are taught under the same curriculum, Dymond et al. (2008) indentify 4 major pedagogical themes.

1. Students are more engaged when given choices in how they learn. This does not necessarily mean that overall goals are changed or altered, but the student owns the process in how they achieve them.
2. Instruction and its materials should be designed for student success. For instance, mathematics is notorious for using “tricky” problems as indicators of understanding.

Although this level of assessment and practice is important, it should not be the only focus, and the instruction should create stepping-stones to succeeding in those types of problems.

3. Instruction should be individualized to the student's ability level, but at the same time all students should be held to common high expectations.
4. Students should be paired or grouped by varying ability, disability and no disability, and diverse backgrounds. This diversity in collaboration, when appropriately and actively guided by the teacher, is shown to be effective for all students.

This research finds that these same methods thought to benefit exclusively students with disabilities benefit those without disabilities, which appears to support the framework of UD. Furthermore, studies have shown that students exposed to diverse educational experiences benefit cognitively and socially (Scott et al., 2003).

Multicultural backgrounds, English language learners, and other needs. Students with physical and cognitive disabilities are not the only growing group needing access to general education. Students from different cultural backgrounds or learning English as a secondary language are not denied access but are often forgotten about in learning environments. Yet, education and services designed using the principles of UD reduce discrimination, create flexible materials, and support an equal field of opportunity for individuals who are immigrants or disaster refugees, practicing a minority religion, homeless, from a divorced or separated family, or are from a different culture than the norm (Matanga, Freeze, Duchesne, & Nyachoti, 2008). Higbee and Barajas (2007) argue environments that integrate multiculturalism into the curriculum, utilizing diverse experiences and identities, help all students by eliminating the barriers of isolation and discrimination. This element of UD provides interaction among social

groups, creates the opportunity for all students to learn and apply knowledge, and gain social skills in a contextual setting. A learning environment of equal opportunity that reaches full participation and is free from barriers can be produced by designing instruction under the principles of UD that provides self-directed access and is sensitive to the physical, cognitive, social, and situational needs of all students.

Online Learning

In the past two decades, the advent of personal computers and the Internet has provided a new realm to the pedagogical continuum. No longer are students confined to the walls of a school building or the desks in a classroom. The technology is available today to design, develop, and implement new tools for learning that follow the principles of UD. The research supports, although not conclusively, that online learning platforms affect change in student achievement (Grabinger, Aplin, & Ponnappa-Brenner, 2008; Pisha & Coyne, 2001; Scott et al., 2003). Thus, the questions arise: Are online learning platforms sufficiently designed for students with special needs? If not, what features must be designed in order to meet those needs?

Crow (2008) outlines the basic requirements of online platforms in meeting the needs of online learners with physical and cognitive disabilities. Students with visual impairments require screen readers and magnifiers, textual descriptions for non-textual features, limited use of unnecessary graphics like tables, clearly organized headings, non-cluttered layouts, and reduced reliance of color-dependent content. Students with hearing impairments require text captioning for video or other forms of multi-media. Students with motor impairments require a limit to synchronous chat-based activities, gaming or simulations, and additional time to complete computer-dependent activities. Students with cognitive impairments, vast in their types, need all of the same requirements as those with physical disabilities. It can be argued that due to their

needs, multicultural students and English language learners can also benefit from the same requirements. With this structure of requirements needed for many, if not all, students in place, the question remains: Are online learning platforms meeting these needs?

Keeler and Horney (2007) attempt to answer this question by examining 22 online courses, 66 lessons, and 183 assessments of online high schools. This study uses 156 elements and 600 data points of instructional design identified to be barriers or non-barriers for students in special education by various sources, in particular the *Instrument of Instructional Design Elements of High School Online Courses* (IODE). The results show that online platforms, for the most part, meet the necessary requirements for access to the instruction. For example, 95% have no barriers to students with hearing difficulties by including sufficient textual translation and 59% have no barriers to students with vision disabilities by including verbatim audio descriptions. In addition, the study shows that 100% of the web site designs create no significant barriers to students with special needs, in particular citing sufficient images, color balance, and white space, and consistent pattern in layout. They did find, however, that external technology requirements (e.g., external links or software), instructional methods like “talking head” lectures in digital format, and lack of online support are pervasive in these platforms, which all have been found to cause barriers for students with special needs.

The answer that online technology is meeting the needs of students with disabilities is not entirely conclusive. So, the second question remains: What can be done to improve online platforms? Studies have found support for the reasons why online platforms are ineffective; for instance, limiting the amount of graphics to an appropriate level for the target user, providing more accessible formats, increasing the amount of audio used, increasing student options, and providing human support are the types of features that are needed yet not currently and

consistently provided. In addition, tools should be dynamic and tactile and facilitators of collaboration and discussion (Simoncelli & Hinson, 2008). The research of Grabinger et al. (2008) stipulates that in order for instructional design to follow the principles of UD, designers must approach development with a matrix of needs, specifically for those with cognitive difficulties. Designers of online platforms must consider the 5 symptoms of disability (attention and memory, language, executive function, problem solving and reasoning, and social function) through 3 lenses (recognition, strategic, and affective). The researchers purport that designing online features and options to this matrix not only helps students with cognitive disabilities, but will also provide universal access for all students.

Universally Accessible Learning Environment

When methods and materials follow the principles of UD, the classroom in whatever form becomes a universally accessible learning environment (UALE) to all students. The environment transforms from inviting to some to open to all. UALE is formed by *equity* (not equality) that is not inherent in current instruction. In other words, all students should be held to the same high standards through individualized instruction and materials. However, individualized does not mean that all students receive one-on-one instruction. It means giving all students options, like in using AT tools, and the *flexibility* to approach a variety of tasks using different strategies. This creates a community of diverse learners that is not at the expense of high standards. In fact under the current system, modifications can not only reduce the level of work a student with special needs is expected to do, but it can separate and isolate them from their peers. When students with disabilities are held to the same expectations as those without disabilities, they are treated and accepted as equals (Scott et al., 2003).

Students should be given the time, physical and cognitive space, and support to reach expectations. UALE demands that instruction and materials anticipate students to have a period of *trial and error* with the content to construct knowledge and understanding. This is achieved by providing ownership in their learning and designing curriculum that is hands-on and authentic. UALE also demands that students' construction of learning is supported partly through peer *collaboration* (Scott et al., 2003). Research has shown that a synergy is created when students with disabilities and those without are brought together to work off the strengths of each individual and produce a greater understanding than could be achieved individually (Dymond et al., 2008). More importantly, UALE requires that teachers actively support students' learning by creating a *user-friendly* environment, one in which students are challenged but not discouraged from pushing the limits of their knowledge base and abilities.

Most importantly, though, the guiding principle of UALE is to *limit and eliminate barriers* to learning for all students. Designers and teachers must actively and constantly look for possible difficulties, not due to the content, but due to the setup of the instruction or the materials created for instruction (Scott et al, 2003). For example, students with ADHD often have difficulty with organization, remembering tasks or important dates, and reading disabilities that are due to symptoms in attention and memory. To anticipate this barrier to learning the content, professors could not only provide students with an organized delineated syllabus, but also produce a class newsletter that highlights concepts from the readings and lecture, use an online platform like Moodle that can post and even email students upcoming due dates, and verbally clarify salient points face-to-face. As a result, students are given the tools necessary to take on responsibility for their learning by providing multiple and universal access points that are

purposefully designed, safeguarded by the teacher, and supported by the teacher and peers (Grabinger et al., 2008; Scott et al., 2003).

Discussion

UD challenges the current system of services from one where students are given exceptions to accommodate their special needs to one where diversity is expected and incorporated into the pedagogy and development of instructional materials. This is a paradigm shift that is neither comfortable for nor entirely welcomed by teachers and professors. They must adapt their current focus on content to pedagogy. This can be extremely controversial especially among college instructors who believe how a student learns is just as important an indicator of intelligence as what he/she learns. UD and UALE provide students of different modalities of learning flexible and multiple points of access to the content, which equalizes the “how” in learning. In other words, if a student in math does not understand the professor’s lecture, UALE will provide the time for him/her to learn and relearn. In traditional college math, if a student does not understand the strategy a professor uses to solve a problem, then that student is not capable. Changing this philosophy can be extremely difficult to do, especially when teachers are ensconced in their method of teaching. Transitioning from a teacher-driven to student-driven learning environment can be intimidating, and even when the environment has been changed or elements of UD are implemented, many teachers are not convinced that it is more effective than the current model of education. Fortunately, research shows that the majority of teachers are open to UALE but just do not know where to start (Dymond et al., 2006; Pisha & Coyne, 2001; Scott et al., 2003).

Staff development is a key element of successful acceptance and implementation of a UALE. The research of inclusion programs designed under the principles of UD demonstrates

that success starts with a strong collaborative relationship between the teacher and the special services staff. Unfortunately, this relationship rarely exists even in the current system of special education where collaboration would help. General education teachers, who are neither educated nor highly qualified in special needs, are often left to learn about a student's disability and strategize on and implement accommodations independently. The impact of this relationship is even more acute in a UALE model where it leaves the teacher having to bear the high level of work and participation required to facilitate a dynamic, constructivist-learning environment. The end result can be a teacher that resents students with special needs (Dymond et al., 2008; Scott et al., 2003; Simoncelli & Hinson, 2008).

Just as NCLB made curriculum standards and accountability compulsory where there had been little in existence, legislation must be used to affect change in teaching methodologies and special education policies in order to make way for UD. Unfortunately, current law creates a gap between the ideal of UD and what schools are required to do for students with special needs. Even though NIMAS requires schools to provide digital media to textual instruction and IDEA requires schools to provide students with disabilities a free and appropriate education (FAPE), the law does not require schools to provide universal access to all students. Many researchers believe that NIMAS is a first step towards UD, but to truly implement a systemic change would require schools to design the learning environment for inclusion of all students (Pisha & Stahl, 2005). This is a major shift in policy that faces both philosophical and political opposition. Policy makers are uneducated on UD, but understand that the costs and time can be extensive: ensuring all schools have the necessary technology; training for administrators, faculty, and students; a high degree of coordination must occur between publishers, online content developers, special education services, social services, teachers, students, and parents; and the

current accountability system, which is quantitative, would need to adjust to one that is qualitative (Matanga et al., 2008).

What has the most impact on political and philosophical barriers to UD is the lack and type of research currently available. The research on UD as it applies to students with special needs is sparse and their methodologies, which are primarily quantitative, are not widely accepted with government policy makers. In fact, current forums and policies on national math standards only accept quantitative research because qualitative research is seen as subjective and biased, as some researchers cite as limitations (Boaler, 2008; Dymond et al., 2006). Although individual elements of UD are studied, the overall effectiveness of UD is not. For instance, Simoncelli and Hinson (2008) found specific causes for ineffectiveness of technology among students with disabilities at the college level while Dymond et al. (2008) found that inclusion models using UD principles work at the high school level. In addition, other than the studies by Keeler and Horney (2007) and Matanga et al. (2008), most of the new research (that are not reviews on policy) has few participants; consists of interviews of teachers, administrators, and staff; uses narrative or case study observations of students on the effectiveness of UD; and does not mention limitations or bias (Dymond et al., 2008; Dymond et al., 2006; Elder-Hinshaw et al., 2006; Meo, 2008; Pisha & Stahl, 2005; Sapp, 2007; Scott et al., 2003; Simoncelli and Hinson, 2008). A lack of reliability and validity and a gap in what and who is researched weakens the argument for using UD in addressing special education and can cause policy makers to be uncomfortable about committing to an inconclusive framework.

Conclusions

No matter how the research stands on its effectiveness, UD is poised to be a major catalyst in shifting the framework of special education. Now servicing students in a cycle of

“identify, label, tutor, and accommodate” (Scott et al., 2003), special education law may need to switch from providing students an education under the least restrictive environment (LRE) to a “no restriction” environment. However, UD is not a magic bullet and the model may need to be adjusted so that a UALE is created for the *greatest number* of students, not *all* students (Scott et al., 2006). This leads us back to the question: Does universally designed online learning academically benefit students with special needs? Even though some of the research qualitatively shows some elements of UD are effective, the data is inconclusive to answer the question. Further research that is more comprehensive, consistent, quantitative-based, and connects to the measures of NCLB accountability is needed. Furthermore, the research needs to focus more on the direct connection of online learning and special education with questions like: To what degree does web design accommodate the needs of students with special needs? What features other than audio or visual elements can help these particular students? How can UD help develop AT tools in online platforms to be more accommodating for students with special needs and address the sometimes-conflicting needs? What elements of instructional design are essential to online platform design in ensuring pedagogically sound content for all students? What features, unique to online platforms, help positively change the attitudes and performance of students? Until research focuses on questions like the preceding, the full potential and product of UD and UALE may not be realized and remembered merely as just another swing on the pendulum of educational reform.

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Figure 1: Implementation of universal design in special education, online environments, and universally accessible learning environments.

