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ORIGINAL PAPER

The Use of Technology to Improve Education

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Abstract
Introduction The primary purpose of the Individuals with Disabilities Education Act (IDEA) is to ensure free appropriate public education for individuals with disabilities in the least restrictive environment. The statute also mandates student's access and services for students' access to devices and technology as part of the individual education program. Along with the advancement of technology in the past few decades, the use of high-tech devices has gained attention from educators. However, the statute only ensures the use of these technology devices for students with special needs as assistive technology.
Methods A discussion of the history and current regulations related to special education was provided focusing on the IDEA and the Assistive Technology Act of 1988 as amended. Additionally, articles related recent movement in education to support evidence-based practices were reviewed. In particular, the author evaluated No Child Left Behind (NCLB), Every Student Succeed Act (ESSA), the establishment of What Works Clearinghouse (WWC), and the increasing use of technology.
Conclusion The Universal Design for Learning (UDL) takes a completely different stance in the use of technology. This model places an emphasis on educators being proactive and flexible in order to teach students with diverse needs. The author contends that technology should be incorporated throughout the classroom regardless of pre-existing assumption of educational services, thereby assuring that all students can be instructed with necessary accommodations. The author argues the immediate needs of policy and system changes to improve overall education services for all.

Keywords Technology · Special education · Universal Design for Learning

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The Centers for Disease Control and Prevention (CDC) revealed that about 22% of adults living in the United States live with some type of disability. This is estimated up to 53 million adults in 2013 (Courtney-Long et al. 2015). Additionally, the prevalence of developmental disabilities (DD) has continued to increase in the past decade. There was a 17% increase in the number of children with DD from 1997 to 2008 (Boyle et al. 2011). According to this study, about 1 in 6 children was diagnosed with DD in the U.S. between 2006 and 2008. This is equivalent to 1.8 million of children with DD. Further, a study by the Cornell University Employment and Disability Institute revealed the number of non-institutionalized individuals with disabilities was estimated to be 37,627,800 in 2012 (Erickson et al. 2014). This warrants continuous evaluation of the pedagogy as well as systems and regulations used to support the most effective teaching strategies and interventions to meet their unique needs. Additionally, the Universal Design for Learning (UDL) with the use of technology in education has gained the attention of educators, administrators, and policy makers as a new and innovative educational strategy (Campbell et al. 2006).

In this paper, I will first review historical background of special education services. Second, the regulations and systems related to special education services will be discussed. Third, I will address the fundamental deficit in our concept of special education pedagogy and services. Then, I will propose the possible solution and future direction of special education.

Special Education History

The humane treatment and equal rights for those individuals with various disabilities were not always in existence. Until the mid-eighteenth century, "people perceived as disabled…were lumped together under the broad categorization of an idiot, scorned as inferior beings and deprived of rights and privileges" (Winzer 2007, p. 23). In the mid-eighteenth century, European philosophers promoted the necessity for the equal rights for all, including individuals with disabilities. Influenced by this "European Enlightenment," innovative pedagogy and interventions were developed and adopted by the U.S. and other countries by the end of the century. In order to care for those with disabilities, many institutions were built in 1817. Despite the initial mission to protect and educate individuals with disabilities, institutionalization created further discrimination and inhumane environments for them. By the late nineteenth century, many states adopted the idea of free compensatory education for all children but in reality, the practice did not take place until after World War II. In the 1950s, many parent advocacy groups were established along with the civil rights movement. For instance, in the seminal case, Brown v. Board of Education of Topeka, in 1954, the U.S. Supreme Court ruled that the separate school systems for Caucasian and African American students violate the Fourteenth Amendment of the U.S. constitution. Additionally, in 1972 the district court of Pennsylvania ruled denying or postponing "mentally retarded" students' access to free public education and training is a violation of the Fourteenth Amendment and assured the access to free public education and training for all students between the age 6 and 21 (Pennsylvania Association for Retarded Citizens v. Commonwealth of Pennsylvania 1972). These stimulated the schools to open doors for all students along with enforcement of civil rights laws. These diligent and persevering advocacy activities promoted "normalization philosophy" for their children with disabilities and eventually led to the enactment of the Education for All

Handicapped Children's Act (EHA) of 1975. This was reauthorized as Individuals with Disabilities Education Act (IDEA) in the 1990s (Califano 2007). Despite these painstaking efforts for advocacy, the history of marginalizing people with disabilities still has an impact on the special education philosophy and systems.

Recent Movement in Education

IDEA, IEP

The Individuals with Disabilities Education Act (IDEA) is a federal statute which has been amended several times since its original passage in 1975. The primary purpose of this statute is to ensure the free appropriate public education (FAPE) in the least restrictive environment (LRE) for children with disabilities. These disabilities are legally categorized as "autism, deaf-blindness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, and visual impairment" (IDEA, 20 U.S.C. § 1400, 2004). In order for the educational agencies to be qualified for federal funds, these agencies need to comply with the IDEA regulations including FAPE and LRE. The current statute clearly defines FAPE as:

> special education and related services that a) have been provided at public expense, under public supervision and direction, and without charge; b) meet the standards of the State educational agency; c) include an appropriate preschool, elementary school, or secondary school education in the State involved, and d) are provided in conformity with the individualized education program required (20 U.S.C. 1401 (9)).

In addition, the statute mandates LRE:

> Each public agency must ensure that–
>
> (i) To the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are nondisabled; and
> (ii) Special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only if the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily (20 U.S.C. 1412(a)(5)).

Along with the requirement to provide FAPE to the students with disabilities, the IDEA mandates educational agencies to develop an individualized education program (IEP) for each eligible child. The statute specifies the procedural requirements, including parental involvement, parental consent, and the timeline for the IEP process. Additionally, the IDEA clearly indicates key elements of IEPs: (1) a statement of present academic and functional level of the student, (2) a statement of "measurable annual goals" of the student, (3) a statement about assessment and when the results will be reported to parents, (4) a statement of special education services, related services, and program modifications supported by "peer-reviewed" research, (5) the proportion of time that the student will spend in special education and/or general education classrooms, (6) a statement about

participation and accommodations related to district and/or statewide assessment to measure the student's progress, (7) the anticipated beginning date of the services, including frequency, duration, and location of services, and (8) the transition plan for students above 16 or 14 when appropriate. Additionally, the IDEA indicates that the IEP team must consider special factors as follows.

(i) In case of a child whose behavior impedes the child's learning or that of others, consider the use of positive behavioral interventions and supports, and other strategies, to address that behavior;
(ii) In the case of a child with limited English proficiency, consider the language needs of the child as those needs related to the child's IEP;
(iii) In the case of a child who is blind or visually impaired, provide for instruction in Braille and the use of Braille unless the IEP Team determines, after an evaluation of the child's reading and writing skills, needs, and appropriate reading and writing media (including an evaluation of the child's future needs for instruction in Braille or the use of Braille), that instruction in Braille or the use of Braille is not appropriate for the child;
(iv) Consider the communication needs of the child, and in the case of a child who is deaf or hard of hearing, consider the child's language and communication needs; opportunities for direct communication with peers and professional personnel in the child's language and communication mode, academic level, and full range of needs, including opportunities for direct instruction in the child's language and communication mode; and
(v) Consider whether the child needs assistive technology devices and services. (§300.324 (a)(2))
(vi) Furthermore, the IDEA requires the educational agencies to adopt National Instruction Materials Accessibility Standard (NIMAS) to provide accessible instructional materials (AIM) for the students with disabilities such as auditory or Braille format of textbooks (20 U.S.C. 1474(e)(3)(B)). This statute and its requirements are the foundations of special education services, but there are other regulations and systems that complement current special education services.

Other Regulations and Systems

No Child Left Behind (NCLB)/Every Student Succeeds Act (ESSA)

The No Child Left Behind (NCLB) Law was originated from the Elementary and Secondary Education Act (ESEA) of 1965 which developed to improve education by providing funds to the schools serve students from lower income families. The purpose of NCLB was "to ensure that students in every public school achieve important learning goals while being educated in safe classrooms by highly qualified teachers" (Yells, p. 150). In order to achieve these goals, NCLB mandates the all public schools participate in state standardized tests and increase the percentage of students meeting the "proficiency standard". Further, teachers are required to implement research-based interventions and evaluate the progress of students to adjust instructions according to student needs. NCLB also provides a financial incentive to the school districts and states to improve students' academic performance and parental involvement (Title I) as well as to improve the quality of teachers and administrators (Title II). However, its' one-size-fits-all approach along with

common core and standardized tests requirement did not address the needs of students with disabilities.

In order to provide flexibility to promote high-quality education for all students, the Every Student Succeeds Act (ESSA) was signed on December 10, 2015, to replace NCLB. There are few critical changes made in this new law. First, ESSA allows states to modify academic standards for students with a severe cognitive disability which is aligned with the content of the alternative assessment. While requiring an annual assessment like NCLB, ESSA allows states to determine when and how to conduct the assessment. The law also requires multiple measures of assessment that can be in a form of portfolios or projects. Thus, students' progress will be measured more accurately. Additionally, ESSA emphasized on evidence-based teaching strategies to promote better student outcomes with a competitive grant incentive. Further, ESSA expanded its provisions to community activities, pre-school services, and guidance for college and career preparation.

What Works Clearinghouse (WWC)

In order to support the implementation of evidence-based interventions in educational settings, the Institute for Education Science of the U.S. Department of Education established the What Works Clearinghouse (WWC) in 2002. Its purpose is to provide resources to educators, policy makers, and researchers with scientific evidence relating to various educational interventions. The WWC disseminates summaries of scientifically sound interventions to the public so that evidence-based intervention and teaching strategies can be applied in educational settings. The criteria to screen the quality of studies set forth by the WWC include, (1) the magnitude of the intervention effectiveness, (2) the statistical significance, (3) the number of replicated studies showing positive effects, and (4) generalizability of the intervention. Additionally, with increasing use of single subject research designs in educational research, especially in the field of applied behavior analysis, the WWC developed guidelines to assess the effectiveness of interventions demonstrated with single subject research designs (Kratochwill et al. 2010). It specifies six components to demonstrate "evidence" of causal relationship; level, trend, variability, immediacy, overlap and consistency of data. These standards and summaries of results in a user-friendly format support educators, parents and administrators in choosing effective educational interventions for children with various disabilities not only required by the IDEA and ESSA but also for the best educational practices.

Assistive Technology (AT) Act

With increasing awareness and potential of technology to assist individuals with disabilities, Congress launched the Technology-Related Assistance for Individuals with Disabilities Act in 1988. The purpose of the act was to secure the funds to support technology-related services for individuals with disabilities. Congress further adopted the definition of assistive technology from the AT Act verbatim and included it in the IDEA recognizing the impact of those services on individuals with disabilities. The IDEA defines assistive technology device and services 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 the functional capabilities of a child with a disability (20 U.S.C. 1401(1)).

The term 'assistive technology service' means any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device, including the evaluation, obtaining and customizing the devices, coordinating the IEP team as well as training for the team.

Expansion of Provisions

The critical changes and expansion of provisions in these regulations over the past several decades have significantly improved the lives of children with unique needs through ensuring access, FAPE, desegregation, and evidence-based interventions. These changes also have impacted assistive technology services. Prior to the amendment of IDEA 1997, regulations only required the provision of assistive technology when such devices or services were necessary to provide FAPE to the child. However, with the amendments of 1997, the IDEA mandated that the Individualized Education Program (IEP) team must consider the needs of assistive technology devices and/or services regardless of the child's category. Further, the Assistive Technology (AT) Act of 2004 shifted its purpose to require the States to "support individuals with disabilities to access" such devices and services compared to "the system changes for access" in the Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Bausch et al. 2005). With this new focus, the IEP team must not only consider the students' needs of assistive technology but also provide support for their access to the system.

Implicit Assumptions

The current laws and regulations have been launched and amended to ensure the provision of necessary and specialized instructions for individuals with disabilities as well as to protect them from discrimination. For example, LRE requires the consideration of "inclusion," that students with disabilities will be educated with students without disabilities to the maximum extent possible. In addition, the specific guidelines for the content of IEPs ensure the quality and delivery of special education services. Further, other systems and regulations have been set in place to provide appropriate services for students with disabilities. However, these laws, regulations, and complementary systems are based on the assumption that only students with disabilities who were diagnosed with specific conditions are "DIFFERENT" and require specialized technology. Despite the advancements in laws and regulations listed above to protect individuals with disabilities, the underlying assumption is to treat individuals with disabilities as "DIFFERENT" continues to exist in our society. I contend that this underlying assumption needs to be changed to improve special education and overall education system for all.

Issues Associated with the Assumption

The problems related to current systems based on the assumption that disability equals difference. This assumption is exemplified by the system that is: (1) reactive in nature, (2) discriminative, and (3) focuses on disability instead of ability.

As mentioned above the IDEA ensures special education services including specialized instruction and assistive technology are for individuals with disabilities who are failing to meet standards (Courey et al. 2012; Edyburn 2010; King-Sears 2009). Since those

additional services are not readily available in the general education classrooms, those services need to be added when students are diagnosed with specific disabilities after evaluation and assessment as stated in the IDEA. Therefore, the system is very reactive in nature (Edyburn 2004, 2010) and based on failure. This required process by the statute often causes delays in providing services which possibly results in the student being further behind or lost in the standardized curriculum. Thus, the system does not offer the most effective solution for those who need additional and immediate support.

These discrepancy-based criteria in the regulations and systems can also be discriminative because students without disabilities do not qualify to receive the specialized instructions along with the use of technology as a pedagogical learning tool and/or additional opportunity to access learning through multiple means of representation, action, and expression as described in UDL principles. All students would benefit from those services. Not all students in general education classes and special education classes respond to a teaching strategy or curriculum in exactly the same way. Some require more accommodation than others to acquire various skills. Therefore, a standardized curriculum *does not* work for every student and every student should have access to the accommodations and adaptations regardless of the existence of a classification. The ultimate goal of education is to maximize the potential of all students, not just those students with disabilities. Again, reflecting the underlying assumption, the current system does not provide the best education for all because students have to fail first to qualify for specialized services. However, both students with and without disabilities would benefit from universal opportunities to access and engage in learning in order to reach their maximum potential.

Further the current regulations and systems primarily focus on what students cannot do instead of what they are able to do. For example, the assessment required to be qualified for special education services is based on a model which is focused on weakness and deficit instead of strength as mentioned above. In addition, the IEPs primarily focused on what students are not doing or cannot do (Donovan and Cross 2002; Schuerholz et al. 1995; Torgesen et al. 2001). Even though the IEP must include the student's' strengths, the IEP goals and teaching strategies are not typically reflecting the students' strength. Without promoting the individual strength, students are less likely to reach their maximum potential. For these reasons, the current education regulations and systems are not proactive and not effective towards meeting the needs of all students. These regulations and systems are deficit-based and prevent maximizing the potentials of students through focusing on disabilities and limiting access to services to only students with disabilities. We need to move away from this outdated conception of special education and look at education for all students from a new point of view. The initiation of the change in this concept can be found in Universal Design (UD) and Universal Design for Learning (UDL).

Universal Design for Learning

The concept of Universal Design originated in the 1970s as an architecture concept promulgated by Ron Mace. He suggests that "Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (1997, p. 1). Examples of universal design include ramps, doorways wide enough for the wheelchair accessibility, captioning for TVs, and audio cues for traffic lights for people with hearing impairments. These proactive changes in structures or designs have become requirements in new constructions since the launch of

American with Disability Act (ADA) in 1990. Universal Design (UD) consists of seven guiding principles, (1) equitable use, (2) flexibility in use, (3) simple and intuitive use, (4) perceptible information, (5) tolerance for error, (6) low physical effort, and (7) size and space for approach and use (Connell et al. 1997). Each principle is described more fully below.

(1) In equitable use, the design should be applicable and marketable for all of the users with various abilities. Therefore the design will accommodate all users with identical or equivalent forms that would avoid the stigma associated with the particular structures or designs only for certain populations. (2) In flexibility in use, the design should embed choices and adaptability. For example, the design should incorporate the needs of left-handed users or others with diverse ability. (3) Simple and intuitive use means that the design should consider a wide range of users with various levels of experience, language, or knowledge. Thus, the design should avoid unnecessary complexity and provide prompts or feedback for effective use without requiring prior or specific knowledge. (4) For perceptible information, the design effectively provides essential information or instruction for all users. This means that the design should accommodate all users with "sensory limitations" through providing various cues or prompts, including pictorial, audio, or tactile cues. (5) In tolerance for error, the design should embed problem-solving features and structural strength to prevent undesired consequences by accidental or erroneous use. If the design considers "tolerance for error", it is hard to cause serious damage to the device and preventive features should warn the user before such damage would occur. (6) In a low physical effort, the design should consider its efficiency and comfort without repetition and tremendous physical effort. Therefore, the design can be easily used by users with various physical abilities. (7) For size and space for approach and use, the design should accommodate the user's size and the environment. This includes consideration of the user's hands and grip, access from standing or seated position, and the environmental space (Connell et al. 1997).

Further, the concept of UD was expanded to include effective pedagogy for individuals with and without disabilities, resulting in Universal Design for Learning (UDL) (King-Sears 2009; Meyer and Rose 2000; Rose 2001). Along with the guidelines for Universal Design listed above, UDL also focuses on three learning networks in the brain based on pre-requisite abilities for learning described by Lev Vygotsky, (1) recognition, (2) strategy, and (3) affect. In this concept, individuals will learn by first recognizing the information, second applying strategies to "process information", and then finally engaging with learning activities (Vygotsky 1978). While universally designed architecture provides accommodation for a variety of users with and without disabilities, the universally designed curricula set up user-friendly learning environments for students with and without disabilities, especially through incorporating the use of technology through providing multiple means of (1) engagement, (2) representation, and 3) action and expression (Edyburn 2010).

This concept not only accepts the variety of individual needs but also is prepared to address all the needs in all educational environments. Therefore any students who need accommodations or support do not have to request or wait for additional services like special education since it already exists for everyone. Thus, there is less need for focusing on the student's disabilities and educators can promote students' learning by elimination barriers.

Advantages of the Use of Technology

The advancement of technology in the past few decades has produced the various devices available to meet the needs of diverse users including students with disabilities. These high-technology devices are now becoming more and more portable and less expensive. There are many advantages for the use of these devices in the classroom or in our daily life, especially to apply the concept of Universal Design for Learning and to provide the best educational practice.

First of all, the use of technology would make the proactive strategies used in UDL easier to implement since many accommodations and adaptation can be built into the technology devices. For example, the accessibility options on many devices include text to speech, magnification, or auditory output. These options are necessary for those with dexterity, visual, or learning impairments. Since these devices are already designed with flexibility to meet various users' needs through multiple means of representation as well as engagement, and action and expression, they can decrease the needs of additional accommodation and adaptation. Thus, various students' needs can be addressed mainly in the general education classrooms and there will be less need for specialized assistive technology. This could also reduce the need for self-contained special education classrooms. Ultimately there could be no classification necessary for students with disabilities since the necessary accommodations would be provided within the classroom for all students.

Second, a technology-based curriculum can embed immediate feedback and additional prompts, and, thus promote implementation of the principles of UDL (Edyburn 2004, 2010; Hasselbring and Glaser 2000; King-Sears 2009; Schacter 1999; Wehmeyer et al. 2004; Woodward and Rieth 1997). The efficacy of behavioral interventions using immediate feedback and additional prompts has been supported by abundant literature aimed at teaching students with disabilities a variety of skills such as social skills (Gresham 1981; Gresham et al. 2001; Koegel et al. 1992; Shukla-Mehta et al. 2009), academic skills (Browder et al. 2008; Green 2001; Kagohara et al. 2013), communication skills (Bondy and Frost 2001; Durand 1999; Kagohara et al. 2010; Kravits et al. 2002; Ramdoss et al. 2011), and leisure skills (Chan et al. 2014). Consequently, these strategies represent evidence-based instruction which meets the requirements of the IDEA and ESSA. Further, this proactive programming with the use of technology would maximize the potential for all students because appropriate instruction would be available for all.

Third, the commonly available high-technology devices applying the concept of UDL could lead to increases in respect and dignity for students with disabilities. As Bichard et al. (2007) contended the importance of "aesthetically appealing" design on reducing such stigma, its appearance, appropriateness, and social acceptability could reduce the stigma associated with disabilities (Parette and Scherer 2004). For example, while portable tablets or mobile phones can assist in improving communication skills (Hammond et al. 2010; Kagohara 2011; Lorah et al. 2013; Nepo et al. 2015), leisure skills (Carlile et al. 2013), and independent skills (Kagohara et al. 2012; Wilczynski et al. 2013) for individuals with disabilities, these devices are not stigmatizing as other traditional assistive devices have been since other students without disability would use devices for similar or other purposes. Flexibility and non-stigmatizing devices could remove barriers for students with disabilities which could lead to greater numbers of students with disabilities in the general education classroom. Ultimately, no classification necessary in order for the students with

and without disabilities to access necessary support, and this ideal environment would promote learning for all students to the maximum extent possible.

Additionally, there are more advantages of incorporating technology into the education system. On-going assessment is a critical part of education as emphasized in the recent enactment of the ESSA and high stake testing. Since everyone learns at a different pace, monitoring all students' progress is necessary to provide them "appropriate" and "meaningful" education. This is not only mandated by the IDEA but also critical in effective instructions. This can be easily accomplished through incorporating technology in the classroom because there are many computer-based programs which automatically collect data on students' progress and adjust feedback based on the students' responses (Avner 1980; Bostow et al. 1995). For example, Headsprout® Early Reading is a web-based reading program for K-5 students which monitors students' progress and adjusts feedback as well as curriculum based on the progress. READ 180® is also a computer-based reading program for K-12 students which collects progress data and adapts the curriculum based on individual progress. In this manner, technology can facilitate the teachers' ability to complete this important but often time-consuming process of assessment.

Furthermore, fluency training can be also built into the technology-based instructions. A large number of studies and practice of precision teaching suggest behavior fluency is related to "(1) retention and maintenance of skills and knowledge, (2) endurance or resistance to distraction, and (3) application or transfer of training" (Binder 1993; Binder and Watkins 1990; Chapman et al. 2005; Kubina and Wolfe 2005; Scott and Shearer-Lingo 2002; Singer-Dudek and Greer 2010). Incorporation of the technology can make it much easier to implement this empirically-supported teaching strategy because there are many computer-based programs such as Raz-Kids® or Read Naturally® already embedded this strategy in its curriculum.

Barriers to the Use of UDL and Technology

Despite many advantages of implementing UDL with technology devices or computer-based instructions, there are some barriers we need to overcome to implement them more in classrooms. First of all, current regulation does not support the implementation of assistive technology or technology-based instruction for all students. Therefore the use of technology or computer-based curricula often only for students with disabilities which could lead to further misunderstanding of its effective use. When those devices are only accessible for students with disabilities, they can become a source of stigmatization and/or discrimination (Bichard et al. 2007; Molenbroek and de Bruin 2006; Parette and Scherer 2004). The proactive curricula programming following the concept of UDL should provide technology access to students with and without disabilities because all students can benefit from such pedagogy. Therefore, changes in the system, policy, and regulation are warranted to support the implementation of UDL with incorporating technology through assuring funding and resources.

UDL is a broad concept and the protocol needs to be uniquely customized to meet the needs of each district, school, and classroom. As such, implementation varies and it is hard to develop systematic ways to apply the concept. Although the five phases of the process of UDL implementation, (1) explore, (2) prepare, (3) integrate, (4) scale, and (5) optimize, have been suggested (Fixsen et al. 2005) this dynamic and fluid process is not easy to

conceptualize for practical use. The additional examples and resources with over 30 checkpoints for teachers on National Center on Universal Design for Learning can be overwhelming for educators with many responsibilities. Therefore, a streamlined guide for easier implementation along with empirical studies to support its effectiveness is necessary to further promote the concept of UDL with the use of technology.

Additionally, teachers are not well prepared to implement the broad concept of UDL in their classrooms (Edyburn and Gardner 1999; Russell et al. 2003). Rose and Meyer (2002) pointed out this shortcoming of higher education curriculum for the future teachers. First of all, the concept of UDL is not a requirement of teacher preparation education. Thus, future educators are not well prepared to implement the concept of UDL and take reactive strategies more than proactive strategies. Second, most curricula do not incorporate the key teaching methods of UDL: (1) to promote diverse recognition through multiple examples, (2) to support diverse strategic network through providing opportunities to practice and demonstrate skills, and (3) to address diverse affective networks by offering choices of content, tools, and learning context. Further, pre-service teachers are not well educated on the use of technology in the classroom. As discussed above the recent advancement of technology has made many devices and systems available to enhance students' learning as well as to promote the concept of UDL. However, the college curriculum does not accommodate the increasing needs of teachers' knowledge regarding the concept of UDL along with the use of technology. This warrants the needs of changes in college curriculum and resources for teachers to prepare for effective teaching methods. The future education program should require students to learn the concept and application of UDL as well as how to incorporate technology into teaching strategies to promote learning.

Summary

Despite these barriers for the implementation under current policies and systems in education, application of the concept of UDL along with the use of technology brings tremendous benefits into the general education classroom as well as for students with disabilities. These policies and systems have been launched and amended to provide an appropriate education for students with disabilities for several decades. For example, the IDEA mandates inclusion of students with disabilities to the maximum extent possible. The IDEA also requires the use of assistive technology for those students to "increase, maintain, or improve the functional capabilities of a child with a disability" along with the definition of AT Act (20 U.S.C. 1401(1)). However, these approaches are based on the implicit assumption that considers students with disabilities as being "DIFFERENT", and unique in their need for additional support and individualized interventions. Without moving away from this assumption, the current education system is compromised and does not support the best possible education for all. The concept of UDL takes a view of everyone having unique learning abilities and needs. Following this concept, educators need to be flexible and intuitive to meet needs of all students. They have to be proactive by providing necessary accommodations. These accommodations should be embedded in the teaching strategies and curriculum from the beginning that are sensitive to individual abilities. Further, educators have to be skillful and flexible to implement fluid teaching strategies. As a result, more students' needs can be met in the general education classroom. This can be promoted more easily with the use of technology in the classroom (King-Sears 2009). Additionally, the use of technology can encompass on-going assessments to

examine the effectiveness of teaching strategies that meet the IEP requirement of the IDEA as well as the original purpose of the NCLB and ESSA, accountability. Furthermore, fluency training supported by an abundance of research can also be accomplished through the use of technology-based curriculum and teaching strategies. Along with the development of practical guideline of UDL and curriculums to prepare educators, the concept should be incorporated in the pedagogy and implemented to provide the best possible education for all. Through the concept of UDL with technology support, discrimination and stigma associated with diagnoses of special education students and the quality of overall education service are likely to improve. This ultimately leads to the dissolution of special education classification because all necessary accommodations and individualization can be delivered in any classrooms. We can learn from history that there are evidence-based pedagogy and technology to support the best possible services for all students. It is time to reevaluate the existing regulations and systems from a new, more inclusive point of view and change them to support the implementation of the effective teaching strategies for all.

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