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UNIVERSAL DESIGN FOR LEARNING: FOSTERING NEURODIVERSITY, EQUITY, AND INCLUSIVITY THROUGH EDUCATIONAL TECHNOLOGY

Neurodiversity is an approach to learning and disability that posits diverse neurological conditions are the results of normal variations in the human genome, and not inherently pathological.[1] Neurodiversity in the class room provides an inclusive space, where students from diverse backgrounds could learn together. This requires instructors to design a dynamically integrated approach with students at the center of their vision that provides alternatives for students to learn and express their knowledge of the subject matter. One of the key tools used to address the needs of neuro-divergent students is Universal Design for Learning (UDL).[2] UDL refers to a set of principles that guide the design of inclusive classroom instruction. The UDL educational framework is based on evidence from research in the learning sciences. UDL guides the development of adaptable learning environments that can accommodate individual learning differences.[3] UDL originally emerged from the fields of urban design and architecture, and refers to the process of designing practical solutions to meet the needs of those with disabilities but at the same time benefitting those without disability as well. As universal design removes barriers from the physical environment,

so also universal design for learning eliminates barriers from the learning environment, and it does so through the following three principles: 1) multiple methods of representation that give learners a variety of ways to learn; 2) multiple means of student action and expression that provide learners options for demonstrating what they have learned; and 3) multiple modes of student engagement that tap into learners' interests, challenge them appropriately, and motivate them to learn.[4]

The goal of UDL is to maximize the learning of students with a wide range of characteristics. UDL principles are applicable to all aspects of instruction, including instructional methodology, zphysical spaces, information resources, technology, personal interactions, and assessments.[5]

The UDL approach offers all students an equal opportunity to succeed through flexibility in the ways students access material and how they engage to acquire information and build knowledge. The table below adopted from educational strategies developed by the Understood Team illustrates some of the differences between the traditional and UDL classrooms.[6]

DIFFERENCES BETWEEN TRADITIONAL CLASSROOMS AND UNIVERSAL DESIGN CLASSROOMS	
Traditional Class Rooms	UDL Class Rooms
Teaching focuses on what is taught	Teaching focuses on both what is taught and how
Accommodations are for specific students	Accommodations are for all students
The teacher decides how the material is taught	The teacher works with the student to decide how the student will learn the material.
The classroom has a fixed setup	The classroom has a flexible setup
There's one way for a student to complete an assignment	There are multiple ways to complete an assignment.
Grades are used to measure performance	Grades are used to reinforce goals

Source: Adopted from Educational Strategies, The Understood Team (2018)

As a scientifically valid framework for guiding educational practice, UDL reduces barriers in instruction. Moreover, UDL provides appropriate accommodations; maintains high achievement expectations; and eliminates or reduces roadblocks to academic success for all students. UDL values diversity in the classroom through proactive design of inclusive curriculum; increases options for access, participation and demonstration of learning; and leads to increased equitable access to the general curriculum.[7,8]

The UDL involves the use of appropriate technology, including assistive technology, within curriculum design and instruction that provides challenging, supportive curriculum. Moreover, UDL and Assistive Technology are increasingly becoming essential as a means of providing free or affordable and appropriate education to students with disabilities, addressing unique learning needs that result from a student's disability.[9] In practice, the process of implementing UDL can be broken down into four critical elements: (1) The establishment of clear goals, (2) intentional planning for learner variability, (3) the use of flexible methods and materials, and (4)) maintaining timely progress monitoring.[10]

It is also important for instructors and educational technology support teams to understand and debunk the prevailing misconceptions about UDL. Theses misconceptions are not limited to but including the following: (1) The use of technology does not constitute the use of UDL, (2) UDL is not just for persons with disabilities, it is for all students; (3) UDL is not an instructional strategy; UDL is a scientifically based framework, supported by both foundational and field-based evidence; (4) UDL is not for specific subject areas; UDL is inherently designed for all subjects; and (5) The assertion that there is no research behind UDL is unfounded and UDL is based on solid research evidence from the learning and brain sciences.[12,13]

Evaluation of the implementation of UDL is based on measuring four fundamental parameters: (1) The extent of implementation of UDL instructional practices: (2) The impact of UDL implementation on student engagement; (3) The impact of UDL implementation on student's independence in learning; and (4) The impact of UDL implementation on teaching practices.[14] The monitoring and evaluation plan of UDL implementation should be incorporated in the design of the UDL and provisions made for flexibility and adjustment of the plan based on the results of ongoing monitoring during the implementation process.[14]

In Sum, UDL is an essential framework in educational technology for personalized learning which should be implemented to foster equity, and inclusivity and to address the unmet needs of an ever-growing diversity of students, including students with learning disabilities.

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About the Author

Professor Asrat Amnie joined Hostos Community college in 2014. Professor Amnie received Doctor of Education in Health Education (EdD) degree from Teachers College Columbia University in 2016. He also earned a Master's in Public Health from Emory University in 2013, specializing in global health with an infectious disease concentration.

Professor Amnie earned his Doctor of Medicine degree from Jimma University in 1992, completed a General Surgery Residency Program at Addis Ababa University in 2002, and is certified and licensed to practice general surgery in Ethiopia—his country of origin.

Teaching and Related Service
Professor Amnie has taught Medical Terminology, Introduction to Community Health Education, Nutrition, and Interpersonal Relations and Team Building in the Education Department. He has also taught Bio 230 Anatomy and Physiology I (Lab and Lecture) and Bio 240 Anatomy and Physiology II (Lab and Lecture) at the Natural Science Department.

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Research Interests
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Personal Style
Professor Amnie lives in Manhattan, New York City. He loves spending time with his wife and three children. When time allows, he enjoys hiking and traveling.