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Original Research Paper

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UNIVERSAL DESIGN FOR LEARNING AND ASSISTIVE TECHNOLOGY FOR QUALITY EDUCATION

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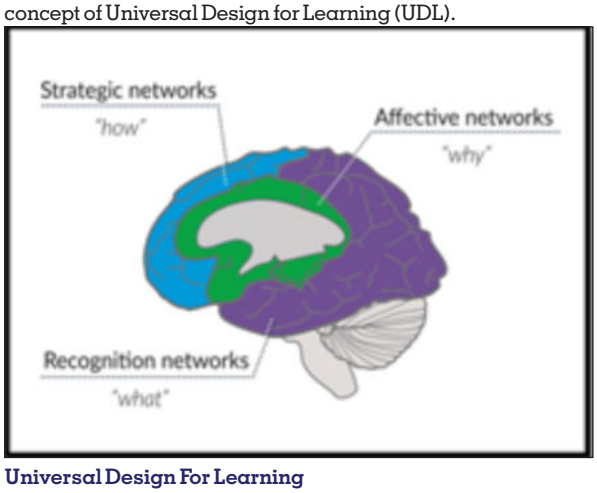
KEYWORDS :

INTRODUCTION

Universal Design for Learning (UDL) provides all students equal opportunity to succeed. The UDL principles offers flexibility in the teaching learning process. Teachers are facing lot of challenges in planning teaching learning process in inclusive classrooms. Rights of Persons with disabilities RPwD Act ensures every right to receive equal opportunities in inclusive educational set up. Teachers have to ensure that all their students have to get accessibility in and around classroom to succeed in inclusive education. Students are with varied differences and need differentiated instruction. They demonstrate different types of abilities, disabilities, learning styles, learning needs and preferences. A teacher has to cater to the above diversities in a morepossible way. The general curriculum should be adapted to provide opportunities to all students to get access to participate and develop in the teaching learning process. The Rights of Persons with Disabilities Act (2016) also directs to provide accessibility to all students to learn in general curriculum. Thus, an innovative approach has to be framed to design to meet the needs of the diverse learners and here comes the concept of Universal Design for Learning (UDL).



Universal Design For Learning

Universal design for learning directs us to develop flexible learning environments to accommodate diverse needs of all learners. UDL aims to reduce physical, cognitive, affective and institutional barriers of learning. UDL aims to create flexible and accessible learning experiences to all learners. It also aims to implement inclusionary practices in the classroom. The UDL principles lay foundation for a practice which accommodates all learners. The concept of Universal Design for Learning was inspired by the Universal Design movement in architecture and product development, originally formulated by Ronald L.Mace at North Carolina State University. It calls for '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'. UDL applies this idea in the teaching learning process were the needs of diverse learners are met.Thus, the general curriculum is designed to accommodate all kinds of learners with the incorporation of Universal Design principles in the learning process and laid foundation for Universal Design for learning framework (UDL). Universal Design for Learning is design based on neuroscience research. It gives more than one way to interact with the learning materials. They identified three neurological networks that impact learning an individual. They are recognition network, Strategic network and affective network.

Recognition Network: The "What' of Learning

Recognition network located at the back of the brain, deals about how we gather facts and categorize what we see, hear and read. It enables us to identify and interpret patterns of sounds, light, taste, smell and touch. The network will be responsible to recognize voices, faces, letters and words. It also senses and assign meaning to the patterns we see. It helps us to understand the information, ideas and concepts. Recognition network refers to as the "what" of learning. As this network gathers information and interpret information it involves attention, memory and perception. This network has to be understood best by the teacher as the learner who has more difficulty with visual processing which occurs in the occipital lobe may be best in his or her auditory processing ability in temporal lobe. Thus, knowing this principle the teacher has to plan their lesson that allows flexibility in accessibility of information and that is "what" of learning refers.

Strategic Networks: "how" Of Learning

This network helps the learner to construct his or her own meaning to information. They are able to receive, sort and classify the information. The network located in frontal lobe is able to receive the information, identifies the patterns and make connections between information, sequencing, comparing, analyzing and investigating. This network deals about "how" of learning.

Affective Network: "Why" of Learning

Affective networks are responsible for the "why" of learning. They control our emotional involvement with learning such as our motivation and our ability to focus and remain engaged with a task.Affective networks are specialized to evaluate patterns and assign them emotional significance; they enable us to engage with tasks and learning and with the world around us.The affective network regulates students' attitudes and feelings about incoming information as well as their motivation to engage in specific activities. The above three networks underline Universal Design for Learning Framework. They are:

1. Multiple Means of Representation: Multiple means of Representation supports recognition network where learners

receive information in different ways. This is "what" of teaching and learning. This is the approach were the teachers has to present information in different ways to be comprehended by all learners. Teacher has to provide options for perception, provide options for Language, mathematical expression and symbols, provide options for comprehension and make them to be resourceful and knowledgeable learners. Learners bring considerable prior knowledge to new learning, and activate that prior knowledge to identify, organize, prioritize, and assimilate new information; they recognize the tools and resources that would help them find, structure, and remember new information; they know how to transform new information into meaningful and useable knowledge.

2. Multiple Means Of Action And Expression: This UDL framework supports strategic network, which is "why" of the learning. It is the framework to stimulate interest and create motivation among the learner to learn. Here we had to provide options for physical actions, provide options for expression and communication and provide options for executive functions to become strategic and goal directed learners. Learners formulate plans for learning; they devise effective strategies and tactics to optimize learning; they organize resources and tools to facilitate learning; they monitor their progress; they recognize their own strengths and weaknesses as learners; they abandon plans and strategies that are ineffective. This principle provides flexibility in expressing material and to show what they learnt in different forms.

3. Multiple Means of Engagement: It supports affective network which provide learners interest and motivate them to learn. This is providing options for motivating interest, providing options for sustaining effort and persistence, providing options for self-regulations. learners are eager for new learning and are motivated by the mastery of learning itself; they are goal-directed in their learning; they know how to set challenging learning goals for themselves, and know how to sustain the effort and resilience that reaching those goals will require; they can monitor and regulate emotional reactions that would be impediments or distractions to their successful learning.

The Curriculum, Instruction, environment and assessment provide the above qualities with the infusion of Universal Design for Learning.

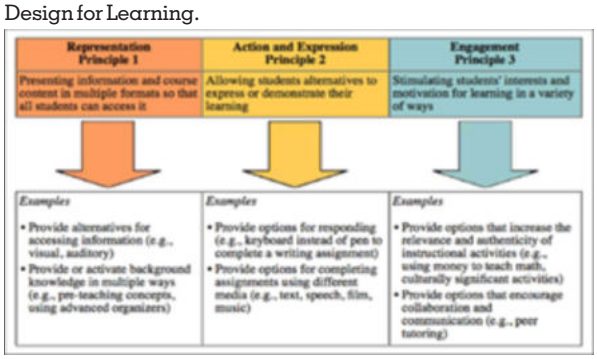


Image from The Star Legacy Module: UDL: Creating a Learning Environment That Challenges and Engages All Learners (The IRIS Center for Training Enhancements, 2009).

Multiple Means of Representation (what)	Multiple Means of Engagement (why)	Multiple Means of Action & Expression (how)
Here it offers flexibility in ways of Presenting, receiving & interpreting information/content Adapting for different languages, learning styles, multiple intelligence, cognitive stages of development, sensory needs, perceptual differences, social needs Adjusting the complexity of materials presented Adjusting environment	Here it offers flexibility in ways Customizing the affective network system in learning to increase participation Adjusting for student interests & cultural backgrounds Arranging the environment for variety in grouping, arrangements, individual work and access technology and other materials Using human resources and the classroom and school	Here it offers flexibility in ways How learners respond to information presented Providing output format that can be change easily to accommodate preferred means of control (perceptual, sensory, motor control) Using different strategic systems Identifying areas of strength and needs Assessing knowledge of content Tracking progress

Three Essential Qualities of Universal Design for Learning- The 3-M's of UDL Source: R.Orkwis, Universally Designed Instruction

Universal design for Learning is a process of differentiating the curriculum, instructional methods & materials, learning experiences, learning environment and assessment procedures to maximize the learning. It is the process of understanding their learners' interest, knowledge level, learning preferences and learning styles and preparing their instructional objective to achieve their learners' needs in differentiated lessons. This consists of three components such as content (Planning), process (Presentation of information) and product (how students respond to the information).

Use Of Technology In The UDL Classroom

Use of Technology in the UDL classroom provides the flexibility needed to adjust to the learner differences. Powerful digital technologies applied using UDL principles enable easier and more effective customization of curricula for diverse learners. Learning and demonstrating effective uses of technology is itself an important instructional outcome. Assistive technology assists and supports all type of learners. Assistive Technology can be sub-divided into the following common categories:

1. Daily Living aids
2. Communication aids.
3. Environmental aids
4. Sensory aids
5. Mobility and transportation aids
6. Computer access aids
7. Teaching and learning aids
8. Leisure, sports and recreation aids
9. Ergonomic aids
10. Seating and positioning aids.

Assistive technologies are a key in provide accessibility to the students in inclusive classroom to access the general education curriculum. They are used to teach learners essential skillsneeded in content areas which include matching, associations, reasoning, decisionmaking, and problem solving. The primary purpose of assistive technology is tomaximize individuals' ability in completing a task by minimizing barriers andunleashing potential to achieve desired learning outcomes. There are three basic categories ofassistive technology; 1) no tech, 2) low tech, 3) high tech. It involves strategies suchas extended time and chunking the information or task into manageable components.Low technology solutions involve simple technology such as slanted writing boards,adapted pencil grips, specialized lined paper, step by step picture reminder, taperecorder, and/or printed labels with essential vocabulary. High tech solution typicallyinvolves the computer or has its own computer components. Specialized software andadvanced

hardware devices fall into this category. Lowtech is magnifying glass, tape can be medium tech and computer will be high tech.UDL has been associated with digital technology for good reason: the power andflexibility of digital technology greatly enhances the ability of the teachers to design individualized andcustomized the learning experience. Digital technologies allow for variability amonglearners and learning environments and encourage flexibility. An obvious advantageof digital technologies is that the presentation of content can be altered in a variety ofways to suit individual needs and interests (e.g., changes in type face, font size, fontcolor, sound volume, presentation rate). Also, the difficulty of information can bealtered: images can be turned on or off and main ideas can be highlighted.

Summary

Universal design for learning directs us to develop flexible learning environments to accommodate diverse needs of all learners. UDL aims to reduce physical, cognitive, affective and institutional barriers of learning. UDL aims to create flexible and accessible learning experiences to all learners. It also aims to implement inclusionary practices in the classroom.UDL is based on the principles of neuroscience that reflects and supports many of findings in brain-based researches. Brain based research studies on multiple intelligences, learning styles, and differentiated instructions, reveals that there are no regular students and we all learn in diverse ways and may execute differently in different environments. CAST has suggested a three part framework which includes recognition networks, strategic networks and affective networks.The principles underline UDL frameworks are: i) Multiple Means of Representations to support recognition learning which give learners various ways to acquire information and knowledge. This is the 'what' of teaching and learning. The teacher needs to present information and content in different ways to be comprehended by all. ii) Provide Multiple Means of Engagement which supports affective learning to tap into learners' interests, offer appropriate challenges and motivate them to learn. This is the 'why' of the learning. The teacher here needs to stimulate interest and create motivation for learning, so that maximum indulgence is present. iii) Multiple Means of Actions and Expressions to support strategic learning which give learners alternatives of demonstrating what they know, it is the 'how' of the teaching and learning. Planning and performing tasks are executed here. UDL infused lesson planning contains six steps such as Goal setting, consider the learners variability, assessment, methods & materials/media, teach and reflect. In this technology era, the assistive technology plays a vital role in the process of Universal design for Learning infused classroom teaching. Thus, no tech, low tech and high-tech devices has to be infused in UDL classroom to meet the diverse needs of learners and accommodate diverse learners.

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