

The Use of UDL in an Inclusive Classroom: A Review Based Study

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Abstract

This review paper's target is to provide insight into UDL stands for Universal Design for Learning and how it functions within a complete learning environments in the classroom. The researchers examined a large number of national and international research papers, journals, articles, theses, and dissertations in this regard. The literature describes how to establish a versatile atmosphere for learning in the classroom in which information is presented in a number of formats, students learn in a diversity of formats, and students demonstrate their learning in a variation of formats. Incorporating universal technique principles improves the inclusiveness of the learning environment. As a consequence, classroom designs and structures must be barrier-free and facilitate the overall and complete development of each and every learner. UDL is a teaching strategy that aims to meet all specific requirements and competencies of students by removing unnecessary learning barriers. This paper also concentrated on the factors that possess a significant influence on the obstacles that pupils with special needs face in the classroom, as well as how UDL addresses these challenges. Classroom instructors can make sure that their teaching environments have been tailored to serve every pupil, especially those with exceptional needs, via the implementation of UDL. UDL prioritizes learner variability over disability. The study advises teachers, parents, counselors, and school administrators on how to implement UDL and its implications.

Keywords: Universal Framework for Learning, students who struggle, inclusive classroom.

Introduction

The (UDL) is a pedagogical framework built during the 1990s by America's CAST, or the Center for Applied Special Technology. Ronald Mace, the architect who coined the phrase "universal design," is defined by CAST as "The framework" based on the assumptions that (a) variability among students is systematic, (b) learning is a combination of cognitive and emotional processes, and (c) different people's brain structures engage, process, can convey information in a number of ways Rose and Meyer (2002); Meyer et al. (2014). Universal design (UD) has been described by North Carolina State University's Center for Universal Design (CUD) as an outline designed to enhance learning and instruction in the digital age. The term "universal design" Originally applied to architecture, but later to commercial products and information technology. In order to create a space that was accessible to everyone, universal design was first applied to the field of architectural design (Nelson, 2014). The implementation this way of thinking can help make education attainable to all learners by providing all

of our students a fair opportunity to succeed (Rose & Meyer, 2002). The key objective of UDL is to involve every pupil, irrespective of their expertise or impairments. This design sets a premium on both diversity and inclusiveness. This approach of looking at things contributed to developing universal design as a notion (UDL). As this idea has changed education to become a system that outlines ideas and tactics for creating a suitable atmosphere for education for everybody (Myer et al., 2014). This evolves in tandem with neuroscience studies as educational research into various forms of instruction as well as curriculum design progresses. While CAST, an organization that founded UDL, has a history in special education, the creators assert that UDL is an integrated paradigm that blends technology, architecture, and neurology knowledge to create spaces for learning and instructional materials (Meyer and colleagues, 2014). This is a method of teaching that intends to attain the requirements and abilities of all students while eliminating unnecessary learning barriers. The father of UDL, David Ross, is famous for stating, "teaching, at its core, is emotional work." Learners vary in terms of personality traits, attitude, and aptitude. UDL has the capability to make teaching and learning easier and more readily available to all. Everything comes collectively to break down hurdles. Teachers facilitate learning via eliminating every barrier and allowing and customize the course of study to support students' learning irrespective of their disabilities (Nichol et al., 2013).

Principles of UDL

In the past two centuries, there have been change a worldwide push to satisfy the needs of a variety of students. Techniques for teaching that foster more welcoming school environments are being implemented. A similar strategy is applying (UDL), which stimulates the evolution of adaptable readily available educational opportunities for all learners, regardless of their characteristics. When planning with UDL, teachers must consider three core principles: how they will deliver the content so that it is easily approachable (portrayal), the manner in which pupils apply what they have learned (expressing themselves), and how they'll inspire every student to provide their finest effort they can. As per the three UDL principles listed below, every component of the course of study should provide an abundance of options for participation, communication, and enthusiasm in conjunction with brain research. As research in education on different approaches of instruction and curriculum design advances, UDL evolves.

1. **Multiple ways to viewrepresentation:** to provide learners with multiple avenues to pick up knowledge and understanding. Representation, the first UDL principle, calls for a variety of strategies for expressing knowledge by addressing both physical and mental obstacles to The learner educational institutions as stated by Capp (2017). In 2020, Dickinson and Grosseto describe as the principle of illustration as the creation and implementation of curriculum using a variety of sources, including visual resources (McGuire et al., 2003), hearing written work Burgstahler and associates (2000); Hall and associates (2015). e-reading resources and (Proctor et al., 2011).
2. **Multiple forms of expression:** to give students various means for demonstrating what they know. The second concern UDL idea is to act and express oneself., emphasizes the capacity of pupils to plan, strategize, and express themselves. The expression principle is concerned with the manner in learners show their expertise, arrange their thoughts, and take part in the subject matter (Capp, 2017; Walker et al., 2017) and
3. **Various ways to promote involvement:** figuring out learners' interests, providing acceptable obstacles, and boosting inspiration. (CAST) Engagement is the final UDL principle that focuses on

learners' involvement in the learning process, particularly their desire to learn, fascination, and autonomy (Alameda et al., 2016; Rose and Meyer, 2006).

(Myer, Rose and Gordon, 2014)

The framework known as UDL is based on research from neuroscience studies that shows individual learners differ in their motivation (affective network), comprehension of information (recognition network), as well as expression of what they know (strategic network). Finally, UDL principles combine to form a learning structure designed to allow students to learn in a "beneficial, competent, prudent, and efficient". Furthermore, prescriptive, One-size-fits-all educational programs are created with the objective to meet the requirements of mainstream learners while neglecting the wide variety of skills, needs. A UDL curriculum, on the other hand, is designed and developed to fully exploit individual learners' inherent variability. As a result, a UDL curriculum is by definition adaptable. CAST consists of 31 checkpoints and nine recommendations that provide training in light of studies to adopt UDL (Hall & Associates, 2012). The roadblocks offer useful, procedures based on facts which possess the possibility to efficiently eliminate obstacles for education (Basham et al., 2020). The (UDL) is a teaching structure created for educators who teach a wide variety of students. The framework is divided into three sections: tenets instructions, and inspection points. Thus, UDL-based instruction distinguishes itself through its range of uses and adaptability, when students absorb and apply material before sharing their knowledge, eliminating the requirement for retrofitting guidance. When preparing using UDL, active, deliberate, and beneficial designs are given priority, resulting in the ability to respond. Because of the structure of the ability to take into account a variety of aspects of children's variety, UDL has been illustrated by federal laws Every Student Succeeds Act [ESSA], 2015; Higher Education Opportunity Act, 2008) and in international situations (Garcia-Campos et al., 2020; Flood & Banks, 2021; Al-Azalea et al., 2017; Balata et al., 2020). It addresses more than just students with Individualized Education Programs (IEPs) get their needs met by UDL, but also the needs of learners who are at risk but are still not known (Kilo & Sigmund, 2008). In order to capitalize on efficient instruction, educators use UDL-based methods of instruction to identify numerous and flexible ways of involving pupils, symbolizes material, and allow students to articulate what they are aware of. Conventional learning environments are transformed into flexible spaces that highlight each learner's distinct cognitive, psychomotor, and affective abilities. The field of universal design is somewhat recent concept that developed in the 1980s in the United States, including the seven tenets listed below describing its philosophy. Subsequent publications of papers, articles, and anthologies have attempted to provide more specific, real-world examples of how to work and think (Presser and Ostroff, 2001; Vatic, 2009). The inclusive design toolkit, the universal design process, and user- or human-driven design are the three ideas that these recommendations and methods most commonly employ (Clarkson et al., 2007). A group of designers, designers of products, architects, and design for the environment researchers created seven guidelines for universally accessible products and spaces at the Center for Universal Design (CUD) in 1997.

- **Fair Utilization:** The build is successful and appealing to people of various capacities.
- **Usability Adaptability:** The layout is designed to a broad spectrum of personal preferences and skill levels.
- **Convenient to use and perceptive:** Despite the person's past experiences competence, proficiency in languages, or present concentration level, the layout remains easy to use.
- **Information That Can Be Seen:** Whatever the circumstances or the individual's ability to sense, the design efficiently conveys all that is required to them.

- **Tolerant of mistake:** the structure mitigates hazards and the negative consequences of unforeseen or accidental behaviors.
- **Lack of physical Demand:** The design facilitates efficient, comfortable, and fatigue-free use.
- **Approach and use space** and size despite of the user's body size, positions, or accessibility, an appropriate dimension and area are provided for accessibility, reach, and tampering and use.

The current study's primary goal was to

1. define and comprehend UDL
2. Provide a brief overview of UDL's historical perspective.
3. Using UDL in inclusive classroom settings.
4. Exploring the essence of UDL to overcome barriers.
5. Explore methods and approaches for building an atmosphere that is adaptable in classroom settings using UDL.

Preliminary UDL reviews

UDL provides a flexible framework for creating curricula, instruction, and assessments that can be tailored to the needs of every student. The method is founded on three core ideas: supplying numerous methods of representation (i.e., presenting information in various ways), numerous means of action and expression (i.e., letting students show their understanding in various ways), and numerous means of involvement (i.e., offering different ways for students to connect with the content and stay motivated). Success in a variety of spheres of life, including education, the workplace, and interpersonal connections, depends on one's ability to communicate effectively. There are several ways that UDL principles can be used to improve communication abilities. For instance, using a variety of representational techniques to deliver information in various formats, such as visual aids, audio recordings, or written materials, can enable students with various learning preferences and linguistic backgrounds in comprehending the subject matter. Learners can be given different opportunity to collaborate and receive peer evaluation that can increase their sense of involvement and commitment in the communication process. After a literature search, 21 papers on UDL were found. The most current study was published in 2023, and the first was published earlier this year. A range of terms, including exploratory examination, further assessment, collaborative examine, and methodically review—a phrase that five authors referred to as meta-analysis—were employed by the UDL examiners to describe the work of sixteen writers. A tiny percentage of the researchers were foreign nationals (Al-Azalea et al., 2016; Airway & Al Kahayan, 2021; Block et al., 2018; Gainful - Freixenet et al., 2020; Seek et al., 2018), but the majority were American citizens, some of whom were descended from Indians. Looking at the literature that experts have studied for twenty research projects instead of having them submitted for peer review yielded fifty different conclusions in all. Chen et al. (2023) concluded that the finest inclusive education could be provided to students with skill sets spanning from traditional academics to university course content and ages ranging from preschool to maturity. Expand upon the UDL framework to create an inclusive learning environment in the classroom. However, implementing such an inclusive educational system is still exceedingly difficult in every country, including Australia. Teachers' mindsets are the most crucial component in developing inclusive learning environments. The purpose of this study was to find out what Australian secondary school teachers thought of the UDL framework. With certain pertinent reservations, like preconceived conceptions about how to give

instructions, the results can be utilized to produce. When visiting schools, teachers received training on how to use the tools, as found by Radica Mesquite and associates in 2022. Teachers were first given access to the tool through workshops. Future technology developments with Quizlet, Quizziz, Cahoots, and Pallet could drastically alter how students collaborate in the classroom. See how students may work together on a single board and rapidly share solutions by reading about works, Pallet, and similar tools, among others. In order to address the issue of pupils not owning their own devices, teachers developed at-home programs and gained family cooperation. Further research into innovative DT applications in Indian classrooms is possible. Oliver et al. conducted a thorough analysis of the Universal Design for Learning principles in inclusive workplaces in 2019. Seven manuscripts that satisfied the requirements for review inclusion were looked into. Despite the fact that the study was carried out in a practical setting, the findings proved the conceptual validity of the investigation. In order to investigate the effects of incorporating UDL into inclusive classrooms, the study encouraged research that directly uses UDL concepts. Schrieffer et al. (2019) evaluated the use of UDL for students with impairments in postsecondary STEM programs by looking at published materials created after 2006. It was determined that four research and the accompanying literature reviews satisfied the requirements for inclusion. The results showed how applying UDL concepts affected teacher preparation, self-advocacy for students with special needs, and STEM education in postsecondary education. The study indicates that student-centered research that implements the framework's principles is necessary to assess the effectiveness of the UDL framework with both impaired and non-impaired students. The teaching model was examined and reported on in the review. The learning objectives from the selected studies, the course evaluation, and the real-world implementation of UDL concepts. This study found that using UDL concepts improved the academic performance of college students, both disabled and non-disabled. Capp (2017) investigated the effectiveness of using UDL concepts. Utilizing the meta-analysis approach technique, the researchers examined eighteen empirical research studies. Based on the reviewed research, Universal Design for Learning (UDL) is a crucial approach to teaching that should help students learn more effectively. The need of implementing UDL principles to improve learning outcomes for all students was emphasized in the research's findings and conclusions. Al-Azawei et al. (2016) conducted a review and content assessment of twelve UDL-related studies that were published between 2012 and 2016. Examined were the findings, study participants, sample characteristics, environment, data collection methods, analytic strategies, and learning models associated with the identified studies. The findings demonstrated the effectiveness of applying the UDL framework and how it helped modify learning environments with easily accessible content. The outcomes also demonstrated a variety of benefits and drawbacks related to applying the UDL paradigm. Robert et al. (2011) looked at UDL-based research done in higher education settings and published after 2000. The review contained eight studies that satisfied the inclusion criteria. The analysis's absence of empirical studies and recommendations to conduct UDL-based research on educational environments resulted from the review's finding that there is a dearth of empirical research on the use of Universal Design Instruction (UDI) in higher education. According to Courey Susan et al. (2012), teachers can better meet the needs of individual students when they organize lessons using a universal method for learning (UDL). Lesson plans created by aspiring teachers in a teacher preparation program before and after they received UDL training are compared in this study. The greater variety of alternatives for lesson planning shows that teachers possess a deeper comprehension of UDL principles; yet, Instructors desire more experience in putting UDL principles into practice. According to the teaching idea known as "differentiated instruction," which was

introduced by Hall Tracey et al. (2004), curriculum and instructional strategies in classrooms should adapt to each unique and diverse learner (Tomlinson, 2014). Instead of assuming that students will adjust to the content, teachers using the differentiated instruction model must be adaptable in their lessons. The necessity of using technology to incorporate pupils who have visual impairments in their education in inclusive settings was discussed by Lam and Siu (2012). An alternate input method for computer-assisted learning (CAL) was a Braille keyboard. With this equipment and the instruction, the visually challenged pupils were no longer divided, and learning became more approachable and user-friendly. Coyne et al. (2013) investigated how word learning and letter performance were scaffolded for students with intellectual impairments using electronic textbooks and letter and word recognition software. What part does technology play in helping children develop their reading and writing skills? This cutting-edge framework was developed to support learning in kids with highly common conditions such as other health impairments (OHIs), BD, and LD. High levels of satisfaction were demonstrated by students with LD, BD, and OHI with the ways that mathematical and biological science topics were taught, as well as the ways that they could demonstrate what they had learned, according to Kortering et al. (2008). These techniques are essential for enhancing the subject-matter learning of children with LD, according to Kortering et al (2008).

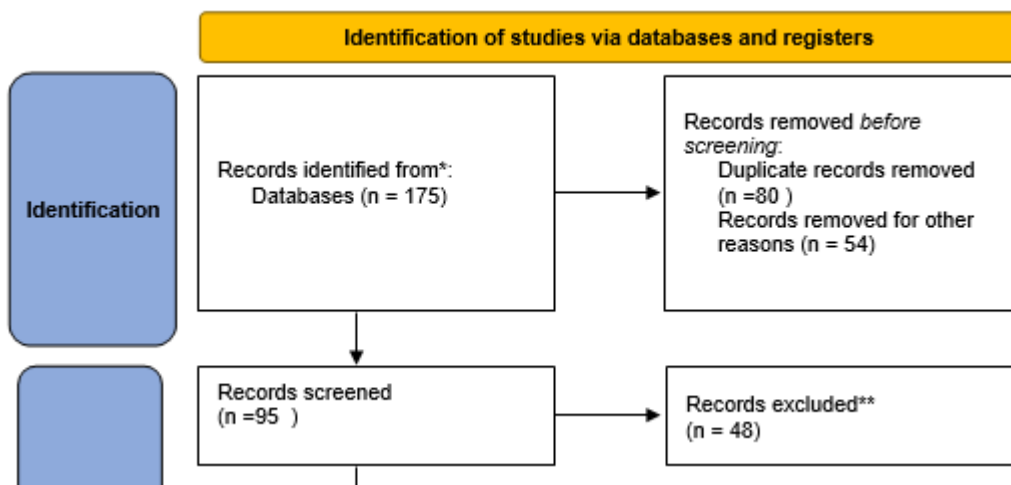
Methods

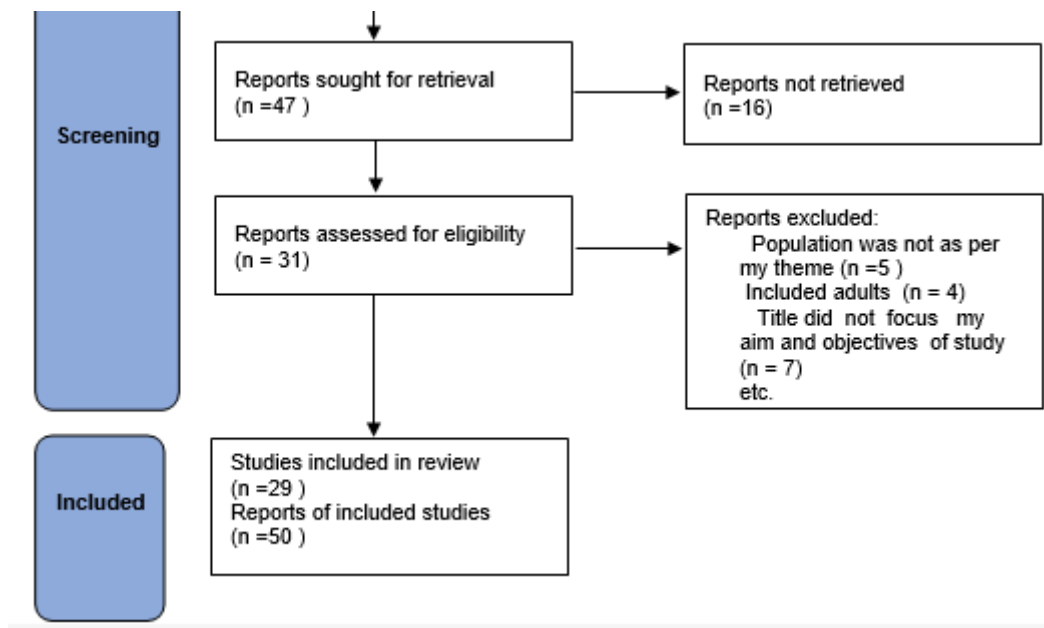
Design: After reviewing the various Review papers, Research papers , peer Reviewed Articles, work containing empirical, dissertations and Phd thesis we outlined the main conclusions and study characteristics. Furthermore, we assessed the research's quality and spoke about potential explanations of result.

2.2 Search Strategy

We used the search terms UDL , Students , Teachers, Inclusive Classrooms to find relevant published articles in the databases Scopus, PubMed, ERIC, GoogleScholar, Research Gate, and Shodhganga. Articles released between January 2006 and April 2024 were included.

Figure 1





Criteria for inclusion and exclusion

Studies pertaining to UDL and its application in classroom were included. We included studies that uses UDL as a means and also includes the studies that uses UDL lesson plans to make it more successful. There were 175 abstracts found. Figure 1: The search technique under consideration. We eliminated publications that had nothing to do with the application of UDL in the classroom after carefully reviewing each of the 175 abstracts. After removing 85 duplications, we were left with 90 publications. Based on the established inclusion and exclusion criteria, we determined that 23 publications met the study's objectives.

After analyzing the 90 papers, we concluded that it made sense to split them into two categories based on length. Thus, 23 publications served as the foundation for the review of The Use of UDL in an Inclusive Classroom: A Review Based Study (Figure 1). Liyanagunawardena, Adams, and Williams (2013) state that a variety of techniques, including database and search engine searches, can be utilized to find pertinent work for a review research. We used the four phases of Chekfoung, Lily, & Kecheng's (2015) recommended strategy to systematically retrieve pertinent literature. Nonetheless, the inclusion criteria and classification themes were modified to align with the objectives and characteristics of this investigation. For the purpose of finding pertinent material, the primary keyword "Universal Design for Learning" was utilized. This will make the research easier to understand and more replicable. Peer-reviewed papers were retrieved using the ERIC, Google Scholar search engine, and Science Direct. We conducted this search in DEC 2023. The number of papers that were obtained from these sources is displayed in Table 1. We came up with four inclusion criteria based on the goal of the study:

1. Peer-reviewed articles
2. Works containing empirical findings;
3. Articles that employed UDL as a structure;
4. The books were published between 2006 and 2024.

Database or journal used	Search Result	Relevant
Google Scholar	80	11
ERIC (Educational Resources Information Center)	45	8

Research Gate	50	4
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Data extraction

We used a standardized protocol and reporting form to abstract the following data from each publication: year of publication, first author's name, country in which the study was conducted, aim of the study, study design, age and number of persons in the study sample, In Table 1, under the rubric study design, we include each study's dependent and independent variable. However, since the different studies did not have the same dependent and independent variables, we chose the main dependent variable and independent variables. The reason for this choice was number of words in the table and making the table optimal for reading. We used the date that the article was first published online as the publication year, not the date of the print edition.

- All published papers before 2006.
- All papers without empirical findings. Papers that adopted other UD models.
- Papers that presented/explained the UDL model or compared it with other UD frameworks.

Finding

Article number	Year and authors name and year of publication	Aim	Method	Main Results	Sample
1	Davies et al. (2012)	Assessing the effectiveness of instructor-led education in light of UDL principles, this study looked at student perceptions.	From the participants, two groups were formed: an intervention group and a control group. Pre- and post-questionnaires were filled out by participants.	Learner perspectives showed a positive, notable shift once UDL was implemented.	Teachers and K-12 students.
2	Courey et al. (2012)	Evaluating the candidate teachers' knowledge of and proficiency with UDL concepts in their lesson plans	Three hours of training covering the foundations of UDL. Researchers assessed the example lesson plans both before and after the training	Researchers assessed the example lesson plans both before and after the training session.	candidate teacher

			session.		
3	McGhieRichmond& Sung (2012)	Investigating the understanding and use of UDL principles in lesson plans by aspiring teachers	The guiding principles of UDL were briefly reviewed. Next, using the UDL framework, participants were asked to assess a lesson plan.	Despite the lack of significant differences, quantitative data indicated that people made significant modifications. But as is evident, the structure was helpful to them. the qualitative results.	candidate teacher
4	Smith (2012)	The course was designed with adherence to the UDL requirements	At the conclusion of the course, students were asked to respond to a survey explaining their opinions.	The study made clear how important it is to employ UDL because it significantly affected learners' viewpoints.	graduate pupils
5	He (2014)	examining the perspectives of those enrolled in an online course	Throughout the online course, the three UDL ideas were used. To measure student	Participants conveyed their satisfaction with the course and how it had improved their sense of self-	Candidates for teachers

			perceptions, open-ended questions, pre- and post-surveys.	efficacy and confidence in online learning.	
6	Kumar & Wideman (2014)	Using technology to enhance in-person health science instruction	The students didn't find out that the course was created with UDL principles until the very end. After that, they were required to finish a survey and participate in a semi-structured interview.	Students enjoyed this course since the study helps them manage their stress levels during the learning process and also helps them adjust in their social lives.	Undergraduate students
7	Smith & Harvey (2014)	To evaluate the extent to which the UDL criteria were followed in the creation of the course content in an online library	At random, 478 classrooms from Khan Academy were selected.	The findings showed that UDL concepts were not being promoted by the library's lessons.	Students
8	Coyne et al. (2012)	This study examined the reading comprehension skills of children with intellectual disabilities using a UDL-based learning tool.	The participants were divided into two groups: the intervention group and the control group. Pre- and post-tests were then administered to	Student performance in the experimental group was much better than in the control group. This clearly shows how beneficial it is	School students

			evaluate their performance.	to use UDL to help children improve their reading abilities.	
9	Mavrou&Symeonidou (2014)	To evaluate Greek Cypriot NNC's compliance with UDL's principles.	The four areas that researchers examined to gauge how closely curricula adhered to UDL principles were goals, strategies, resources, and assessment.	Results demonstrated that the curriculum design did not follow UDL guidelines.	
10	King-Sears et al. (2015)	to look into how well learners with and without disabilities do when using UDL.	Students were randomly assigned to one of two groups (intervention or control). Three tests were administered: a pre-, post-, and a four-week delayed test, to evaluate the performance differences	There was no statistically significant difference in the groups' performance, according to the results. However, all of the participants in the intervention group's perceptions	School students Students were randomly classified

			between the groups. Following that, a survey was distributed to learner opinions.	dropped between agree and strongly agree, suggesting that their perceptions had improved.	
11	Hall et al. (2015)	Examining the impacts on student performance and teacher approaches in online and offline treatments of a strategic reader tool that incorporated curriculum-based measurement (CBM) and universal design for learning (UDL).	Researchers used pre- and post-tests to measure pupils' reading competency after treatments. Instructors were also asked questions, and students had to finish a final survey.	The usage of UDL benefited both teachers and students with and without disabilities, especially in the online treatment. For students with impairments, the variation in grades showed a statistically significant difference in their degree of involvement and happiness between online and offline.	
12	Fuller, E. J., Hollingworth, L., &Pendola, A. (2017).	Our main goal is to investigate the extent to which state equity plans recognise principal	An analysis of documents is used in this work. States are required by the Every Student Succeeds Act	An analysis of documents is used in this work. States are required by the Every Student Succeeds Act	Teachers

		turnover and distribution as factors affecting three leadership mechanisms—hiring teachers, developing teachers' instructional capacity, and managing teacher turnover—that impact students' access to effective teachers.	(ESSA) to assign an effective teacher to every classroom and an effective leader to every school.	(ESSA) to assign an effective teacher to every classroom and an effective leader to every school.	
13	Hall, T. E., Cohen, N., Vue, G., & Ganley, P. (2015).	Using Technology and UDL to Address Learning Disabilities: A Strategic Reader.	In order to enhance reading comprehension, CAST developed Strategic Reader, a technology-based solution that combines Curriculum Based Measurement (CBM) and Universal Design for Learning (UDL) in a	An experimental study compares two treatment circumstances (online vs. offline) to assess the efficacy of Strategic Reader. Strong evidence is found, through both quantitative and qualitative data analysis, that students who use the online	

			digital learning environment.	tool see a notable increase in comprehension.	
14	Almeqdad et al., Cogent Education (2023).	The Universal Design for Learning (UDL) paradigm supports students' different values in inclusive learning settings.	Empirical peer-reviewed studies (pre- and post-design) published in English and Arabic between 2015 and 2021 (N = 13) meet the inclusion criteria of the systematic search.	The results of the systematic review demonstrated that the studies that were found were conducted in six different nations, with a focus on K–12 or higher education levels, a single group quantitative research design, and a general application of all UDL criteria. By means of school interventions or professional development programs, the studies were also aimed at teachers or students.	
15	Almumen, H. A. (2020).	The purpose of this qualitative study was to examine how Universal Design for Learning (UDL) works	Instructor interviews added to and validated the study's conclusions. The findings demonstrate that UDL is an	The results also showed that teachers need more training and experience to properly fulfill the needs of all students, including those	

		in inclusive settings where students with and without impairments learn and acquire knowledge.	effective method for including all pupils, including those with disabilities.	with disabilities, even though they may have a core understanding of UDL.
16	Spencer, S. A. (2011).	<p>Universal design for learning (UDL) is a helpful technique for the proactive creation of engaging, accessible lessons in today's diverse classrooms.</p> <p>Although there is currently a dearth of conclusive quantitative research on UDL's effects on student outcomes, extant literature highlights advantages like fewer behavioral problems, increased metacognitive knowledge,</p>	<p>Representation, expression, and engagement—the three cornerstones of Universal Design for Learning—assist educators in crafting inclusive, captivating classes that will increase participation from all students, including those with special needs.</p>	<p>In order to provide students choices and the chance to become independent learners, educators can apply Universal Design of Learning (UDL) in the classroom through the use of technology, a range of instructional modalities, flexible assessment, and group activities.</p>

		and simpler curriculum access for students who struggle.		
17	Lowrey, K. A., Hollingshead, A., &Howery, K. (2017).	This study examined the language teachers used when discussing inclusion, Universal Design for Learning (UDL), and students with intellectual disabilities (ID) in order to better understand how instructors convey these relationships.	In order to identify the terminology that instructors used when talking about inclusive classroom environments, using Universal Design for Learning, and working with students who have intellectual disabilities, interview transcripts from seven general education teachers were reanalyzed using a secondary analytic approach.	The concepts that were discovered were then contrasted with the latest research on UDL and inclusive education as well as the tenets, directives, and benchmarks of the UDL framework. We wrap up by making recommendations for additional research and application in the fields of inclusive education, UDL, and students with ID.
18	KurttsPh D, S. A. (2006).	The implementation of universal design for learning (UDL) in inclusive	It was possible to comprehend how to modify the general education curriculum to ensure that all	The study uses a descriptive and conceptual research design, giving an example of how to include UDL

		classrooms by teams of preservice and inservice special education and general education teachers is described by the authors of this work.	students learn well by looking at the teachers' perspectives on UDL	in the curriculum of higher education courses in India as well as the various technologies that can be used in this digital age to turn a classroom into a learning lab.
19	Ghosh, N.	The study offers a novel conceptual framework for teaching that combines technology, UDL, and Dr. Ruben Puentedura's SAMR Model to help teachers design and use learning tools that support high learning achievement. Education experts think that such a teaching paradigm might significantly change the educational landscape.	The aim of this study is to illustrate the advantages of contemporary technology and illustrate how UDL may be used in conjunction with it to provide learning that is durable. In order to develop effective teaching strategies, educators must examine the challenges presented by learner diversity in the classroom. The research-based approach known as	

			<p>Universal Design for Learning (UDL) helps teachers create environments that recognize learners' needs and adaptive educational barriers to learning.</p>	
20	<p>Bhanu, P. S., & Kumar, S. V. (2024).</p>	<p>Strong communication skills are necessary to compete in the global job market of today, yet many college students find it difficult to acquire them. In order to improve students' communication abilities, this study investigates how to incorporate Universal Design for Learning (UDL) concepts into postsecondary courses.</p>	<p>A case study is provided wherein communication assignments in a university course were designed with UDL principles—like offering different ways of representation, action, expression, and participation—into account. The intervention addressed challenges such as language barriers, learning disabilities, and cultural differences while enhancing</p>	<p>Students</p>

			students' confidence, fluency, and engagement in communication activities.	
21	Kumar, K. (2010).	By incorporating flexibility into course design to accommodate student variety, UDL aims to relieve students of the pressure to adapt in order to achieve.	Creating a welcoming learning atmosphere and allowing for a variety of approaches to achieve learning objectives are two of UDL's powerful teaching concepts.	Positive reactions from my pupils to UDL-inspired teaching methods have led to more fulfilling teaching experiences for me as well. All instructors who are ready to prioritize the needs of their students in the design and delivery of their courses can implement UDL methods.
22	KurttsPh D, S. A. (2006).	The implementation of universal design for learning (UDL) in inclusive classrooms by teams of preservice and inservice special education and general	The two research questions that followed served as the study's guidelines: (2) How do preservice and inservice teachers feel about using educational software to	Making sure all of their pupils have access to and success with the general education, or classroom, curriculum is one of the biggest difficulties facing today's educators. The

		education teachers is described by the authors of this work.	implement instructional accommodations for students with mild to moderate educational disabilities? (1) How do preservice and inservice teachers understand the concept of universal design for learning?	ability of teachers to clearly depict concepts or "big ideas" and provide students with multiple opportunities for engagement with learning is a crucial factor in determining the outcomes for students with diverse educational needs, including those who receive special education services. This is especially true in light of current legislation like No Child Left Behind (NCLB) (Howard, 2003).
23	Anderson, L. K. (2022).	The article provides examples of how to use the four elements of the lesson planning process to include different means of	A framework for inclusive lesson preparation called Universal Design for Learning can help teachers create lessons that are inclusive.	The Universal Design for Learning framework is examined in this article along with ways that teachers might use it to lesson planning.

		expression and action, numerous means of representation , and multiple means of engagement: learning objectives, teaching strategies, and instructional resources as well as evaluation		
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Results:

The 23 reviewed articles are summarized in table 1.2

After examining these studies, it was found that some studies of them had different objectives and approaches, they were all interested in determining how to implement UDL in classrooms 7 studies focused on the in general how to implement UDL in class room . 6 studies focused on role of teachers in implementing UDL in classrooms . 5 studies focused on the how Analysis of students about UDL in classroom. 5 studies were taken that find how both teacher and students analysis the UDL. The results showed that 10 Studies had the quantitative design (1,3, 4,11,5,14,7,6,10 ,22) , 3 were have used qualitative design (2,,15,17,) 8 were have used mixed method design as (8,9,12,16,18,19,21,23,) 2 were based on review paper as(13,20).

UDL and inclusive classroom

Applying the UDL idea is one technique to meet the requirements of a variety of students. The notion of UDL became widely recognized on an international level in 2002. According to Skinner et al. (2009), children's involvement as learners is a predictor of their academic achievement and school completion. The (CAST) created the (UDL) lesson design method to help educators create engaging lessons for a range of students in their classrooms (CAST, 2010). While (UDL) contains an effective process teaching methodology, ensuring that all prospective students, including those with impairments, can access the curriculum (p. 168 in Johnson-Harris & Mundschenk, 2014) those who face academic difficulties, Another option is to incorporate universal design into the classroom. As summarized by Mackey (2019, p. 81), the goal of UDL's function is to "provide equal opportunity to reach challenging targets across the variable students". According to the UDL theory, teachers should provide all students, including those with impairments, with a range of opportunities for participation, illustration, and action (CAST, 2020). It is well established that pedagogical knowledge, design for learning principles, and technology may be creatively used in the classroom to provide engaging instruction for learners of all ability levels (King-Sears, 2009). According to Chita-Tegmark et al. (2012). According to UDL, it

encourages "class environment conditions, the kinds of relationships that students and teachers develop, the environment and layout of educational facilities, the instructional methods used, the available resources, the feedback provided, and the frequency and kind of evaluations." Teachers who have recently graduated are often asked, "How can we reach out to those students with special needs?" There are still many educators is one that newly minted instructors are often asked. Even after receiving differentiation training, a lot of teachers continue to express worries about how challenging it could be to accommodate the unique needs of students in inclusive classrooms. Meyer and Rose in the year 2000 Unquestionably, students' learning outcomes at different ability levels are influenced by the manner in which teachers impart knowledge. According to Park, Holloway, Arendtsz, Bempechat, and Li (2012), students that possess intellectual curiosity work more in school, get higher marks, and are more likely to pursue higher education. But as they become older, students' interest levels usually wane. Both Fredericks, Blumenfeld, and Paris (2004) and Shernoff, Csikszentmihalyi, Schneider, and Shernoff (2003) talk on the educational system. Consequently, inclusive, diverse K–12 schools must employ teaching strategies that foster social and critical thinking. Universal design for learning has gained international recognition thanks in part to the Individuals with Disabilities Education Act (IDEA) and the No Child Left Behind Act (NCLB). The No Child Left Behind Act is mentioned in this sentence (NCLB). The NCLB Act requires schools to provide students additional opportunities for learning. Rushton and Juola-Rushton (2008) highlighted their involvement in general education in addition to their general participation (Broderick et al., 2005). For students with disabilities, the IDEA ensures "entry," "involvement," and "improvement" in the regular curriculum. According to Pugach and Warger (2001), they must fulfill the same requirements as their peers. This implies that all students should have access to the four components of the curriculum: learning objectives, media and materials, instructional strategies, and assessment. The 1997 IDEA renewal expanded access to education by requiring that students with documented disabilities acquire assistive technology and complete their coursework in the least restrictive environment possible. This rule demonstrated that special and general education may be combined, at least in theory, according to Hehir's (2009) research. Federal education statutes known as the Every Student Succeeds Act (ESSA) and the Individuals with Disabilities Education Act (IDEA) promote (UDL) in elementary and secondary schools. A special education program or a unique organizational framework for students with impairments are other names for (UDL). Given that UDL has only recently been acknowledged by federal general education policy, the passage of ESSA in 2015 may have contributed to some of the confusion surrounding the practice (Gravel, 2017). Because they are disabled, no child should be excluded from special education. The individualized education program (IEP) guaranteed due process and accountability (Yell, 1998). IDEA effectively paved the way for a UDL approach in K–12 educational institutions researchers from CAST; nonetheless, UDL has experienced a substantial theoretical change since then. subsequently (Meyer et al., 2014). ICT has been recognized by UNESCO as a powerful tool for fostering the free exchange of ideas and safeguarding knowledge worldwide since it preserves, grows, and distributes knowledge (V.C. Pandey, 2005). Technology is a key component of (UDL), as it encourages educators to employ resources such as voice-to-text software, interactive websites, and electronic texts to help students quickly learn new material. Without the thoughtful and well-planned use of technology, UDL cannot be applied in the classroom (Edyburn, 2006). Recent papers (Basham et al., 2010; Lohmann et al., 2018) have linked UDL and technology, particularly when it comes to employing technology to create engaging online courses or communication platforms. The essay by Rao and Tanner is important because it emphasizes that

employing technology alone is not enough to implement UDL; rather, courses that use UDL should be intentionally created to enable learning that values diversity in expression, representation, and interaction. With the use of cutting-edge technology, UDL develops flexible teaching methods that students can use on their own to complete the core curriculum. In addition to lowering barriers, a UDL curriculum raises the bar for challenges and offers students in need prompt support. They are multicultural and employ a range of teaching strategies. Because of this, the instructional approach and the learning environment must meet their various requirements and preferences. Each child must be respected, and the classroom should be designed to accommodate their unique learning preferences. The obstacles and issues that the structure and system bring could make learning more challenging. Students who have specialized needs and expectations are especially mistreated by them. For this reason, structures and layouts need to be barrier-free and allow for each student's complete development. Benton and Borghi provided a conceptual framework based on TPACK (2013). This strategy is based primarily on two pillars: technological pedagogical content knowledge, or TPACK, and UDL. The core idea behind TPACK is that teachers must be skilled at incorporating technology into their lesson plans. However, it provides educators with a cohesive conceptual framework to support their preparation for using technology. It is necessary to distribute information in different formats as part of universal design in education since multimodal methods of learning and expression can improve curriculum accessibility for both students with and without impairments. Data conversion is now easier thanks to advances in technology. In addition to universal design, educational tools, resources, and instructional strategies can improve children's learning outcomes. Research on the views of students typically concentrates more on curriculum or systemic barriers that could be addressed through (UDL) than it does on attempting to address learning challenges caused by impairments. Students' opinions of their education were evaluated in two studies, both before and after a change in UDL with teachers (Davies et al., 2013; Schelly et al., 2011). The researchers discovered that students' perceptions of their professors' interactions with them, their attempts to involve them, and their assessments had evolved. The main researchers of the study made an effort to evaluate UDL's effectiveness from the perspective of the students. offering a fascinating look at the advantages that are believed to occur for teachers' professional development, even at low levels (one semester's worth), in terms of enhancing the learning results for pupils. The ultimate goal of (UDL) is to create and execute curricula that actively account for the differences of individual students, rather than trying to adapt content to match the needs of students. Moreover, there hasn't been much research done on how well UDL-based training supports learners' achievement (Walker et al., 2017). While some studies only offer treatment groups without comparison groups, others include both treatment and contrast groups. Marino and colleagues (2010) examined the outcomes of a scientific curriculum developed using data from four middle school students, both before and after UDL. Poor readers from lower socioeconomic origins did worse than readers from better socioeconomic backgrounds, as seen by the post-test findings. It is a useful tool for proactive, approachable, and interesting lesson planning in today's diverse classrooms. The goal of this type of training is to pinpoint each student's unique needs and skill set in order to eliminate unnecessary obstacles to learning and improve the educational experience for everybody. Applying universal design principles makes the learning environment more inclusive. The current project aims to establish a flexible learning environment in which students can acquire knowledge in multiple formats and demonstrate their learning in multiple ways. It can reduce obstacles to learning and broaden students' access to education. It makes use of multiple mediums. The use of podcasts in secondary social studies classroom was

covered by Kennedy et al. (2014). Daley et al. (2020) and Dalton et al. (2011) examined the use of text-to-speech and visuals for literacy comprehension in middle and primary schools, while Dean et al. (2017) evaluated the use of multiple technologies (including clickers and Mind Tap) in higher education settings. Despite UDL's growing importance in national policies, putting it into practice is still challenging. Whether or not differences facilitate or obstruct learning depends in large part on the educational setting. If a learning environment is adaptable and can be customized to a student's ability level, a deficiency could be explained.

Educational Implications

- UDL promotes inclusivity in education by offering multiple ways to represent, engage, and express diverse learning styles and abilities.
- It also promotes accessibility of material and methods to all learners, including those with disabilities, creating an environment where everyone may engage and succeed.
- UDL promotes personalized learning by tailoring instruction to individual needs and preferences, increasing student engagement and understanding.
- Flexible learning environments accommodate diverse learning styles and allow kids to use a variety of methods to show that they comprehend.
- UDL aims to remove learning barriers and promote educational equity by providing equal opportunities to all students, regardless of background, abilities, or learning styles.
- UDL promotes student motivation and a positive learning environment by providing diverse and engaging learning options.
- It promotes critical thinking and creativity by allowing students to explore and express their understanding through various modalities, supporting HOTS higher order thinking.
- UDL leverages technology to offer adaptable delivering interesting learning experiences that better prepare students for the digital age .

Conclusion

According to the research, a curriculum design based on UDL mitigates obstacles to teaching children who can and who cannot have disabilities. An additional advantage of using UDL is that it strengthens student perceptions. When compared to their peers, students who took UDL-based courses indicated greater levels of fulfillment, optimism, and commitment. Furthermore, more efforts should be made to provide sufficient evidence of UDL's appropriateness and applicability, particularly in developing countries. The implementation of UDL in education is a promising method for fragmenting down learning barriers. The application of UDL throughout cultures led to the conclusion that UDL works effectively for including all students, including those who have limitations. a curriculum design based on UDL while instructors may have some knowledge of how to use UDL effectively, they will require further guidance and usage to do so effectively.

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