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Situation Analysis and Implementation of Universal Design for Learning for Children with Visual Impairment

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ABSTRACT

This study delves into the strategies of Universal Design for Learning (UDL) implementation to assist students with visual impairments in educational settings. A quantitative approach was employed to evaluate teachers' knowledge, confidence, and practice of UDL in schools with visually impaired students. The researchers concentrated their attention on demographic factors like age, gender, and teaching experience years. They gathered their data via surveys of 60 teachers belonging to three different age groups. It was revealed in the study that the frequency of UDL implementation had varied significantly between different ages where the older teachers (41+ years) have been changing their teaching methods more frequently than the younger ones (20, 30 years). Nevertheless, the gender and years of experience have not been indicative of UDL implementation to show significant differences. The findings emphasize the role of teacher experience and professional development in the effective use of UDL strategies, at the same time, they point to the necessity of providing educators with better resource allocation and training programs. The study concludes by offering recommendations for enhancing UDL implementation in inclusive classrooms.

Keywords: *Universal Design for Learning, Visual Impairment, Teacher Experience, UDL Strategies, Inclusive Education, Assistive Technology, Professional Development, Teaching Adaptations*

INTRODUCTION

One of the most important senses in our life's is sight. With the use of our eyes, we are able to see everything, but children who are visually impaired have numerous challenges in their lives (Sacharowitz, 2016). Children who are visually impaired have the same need as sighted children to be aware of their surroundings. In order to carry out one's routine tasks with ease. Children who are visually impaired must have the opportunity to learn about their surroundings and become socially aware (Adetro, 2010).

A person is said to be completely blind if they have no sense of vision. A person with low vision can only perceive light. Low vision is defined as having a visual field that is 20 degrees and an eye sight that is less than 6/18 of visual acuity. As stated in the "WHO Worldwide Vision 2020," it is essential to ensure that all children have the right to sight. Another fundamental objective is to manage the five primary diseases, such as glaucoma, cataract, vitamin A deficiency, trachoma, and refractive errors, which are commonly responsible for visual impairment (Sacharowitz, 2016). Children with visual impairments can be classified into three severity levels: low, moderate, and severe. The eyeball was agitated by every circumstance (Robaei et al., 2005). Numerous studies indicate that the onset of blindness is associated

with various psychological issues. That will amplify the impact on children with visual impairments (Griffths & Ali, 2009).

A team of educators and academics created the universal design for learning framework with the goal of using technology to enhance learning outcomes for children with various disabilities. Their school-based research revealed that many current curricula were rigid, heavily dependent on text, and unrelated to the real-world experiences of many students—including those without exceptionalities. When curricular modifications or accommodations were made, they were frequently implemented after the fact and did not give students relevant and timely learning opportunities. As they started to consider methods to improve curriculum from the start in order to facilitate learning for all students, the UDL framework developed. Utilising best practices and research from the domains of technology, education, and neuroscience, they developed the UDL framework. The knowledge and experience of families, professionals, and people with disabilities, should be considered as one of the main sources to develop and implement the UDL framework for all students (Hartmann, E, 2011).

It is widely claimed by many that UDL is one of the evidence, based or research, based approaches (Lalor, 2018). Universal Design Learning (UDL) is a new educational paradigm that is aimed at creating teaching and learning environments that meet the needs of every student without the necessity of giving heavy accommodations or making few changes (Nelson, 2014). Mainly special education and mainstream teachers, and also their students, are the ones who have been implementing and advocating it for more than ten years. The goal of Universal Design for Learning, whose main purpose is to guarantee that all students have access to the educational resources, is really a good one. UDL, which is a framework intended to be used by all students, is the most right one, as it is supposed to be the benefit of all, even the most complex cases of students with diverse and mixed kinds of learning requirements. Nesodden Science High School STEM, the senior high school (S. Y. 2024, 2025) students were respondents of the research study. Following were the objectives of the study

To find out the effectiveness of Lemon, based Tile cleaning;To determine the most efficient method of tile cleaning with lemon;To identify the advantages of the method of tile cleaning with lemon. The research study was designed to achieve the following objectives:

1. To find out teachers' knowledge, comprehension, and usage of UDL means by the students with visual impairments.
2. To find out the correlation between demographic variables (age, gender, and years of experience) and the frequency of UDL strategy implementation in classrooms for visually impaired students.
3. To understand what difficulties the educators confront, and check the provision of resources and the support of the institution for the efficient usage of UDL strategies for students with visual impairments.

This study is important because it can help improve the educational experiences of visually impaired students by investigating the use of Universal Design for Learning (UDL) strategies in inclusive classrooms. Understanding how teachers use UDL and the difficulties they encounter, this study offers a wide range of ideas for effective teaching practices and also shows those places where professional development is necessary. Furthermore, the research provides information for policy and decision, making by revealing the type of support and resources that the institution needs to provide in order to successfully carry out UDL strategies.

In this way, the education policymakers can be guided by the results of this study in setting up the policies of inclusive education which will not only ensure support for teachers but also the provision of

resources necessary for their work. Journal articles are a rich source of information and ideas for improving teacher training programs, a conclusion this study makes by showing the impact of demographic factors like age or experience on the implementation of UDL. In the end, the study emphasizes the necessity of an inclusive learning environment that addresses the different needs of the visually impaired students and thus, fair education and equal opportunities for all learners.

LITERATURE REVIEW

The significance of education cannot be ignored. Reason being, all children have an inherent right to it. Both students and teachers are the backbone of any educational system. In the classroom, teachers communicate their information, beliefs, emotions, and ideas with their students. In the classroom, teachers are crucial. Teachers use and impart knowledge during lectures, and they assess students' performance in class step-by-step (Hughes, 2005).

Children with visual impairments understand and interpret their knowledge through various perspectives. They experience numerous challenges related to mobility and orientation. Consequently, they encounter numerous challenges in exploring the environment. They utilise their senses to remain cognisant of their surroundings. They are fully dependent on their senses, primarily tactile and auditory senses. The hearing sense is utilised specifically. They make a concerted effort to listen to the sounds produced by various objects (Sánchez & Sáenz, 2005).

The majority of the world's visually impaired youngsters live in underdeveloped nations. Blindness is often accompanied by various issues related to health, finances, society, and education, particularly in underdeveloped regions. Numerous studies have shown that pre-lateral or post-lateral causes of blindness can both cause difficulties for visually impaired youngsters. (Akinesia & Ajaiyeoba, 2002).

Definition

Visual Impairment

A person is considered completely blind if they have no idea of vision. The person with low vision just perceives light and has some residual vision. Low vision is defined as having a visual field of 20 degrees and an eye sight of less than 6/18 of visual acuity (Sacharowitz, 2016).

Universal Design for Learning (UDL)

UDL is a new way of thinking about how to make educational tools, curricula, and learning environments. It is starting to have a big effect on a number of important people in education (Pisha & Coyne, 2001). UDL represents a progressive educational framework that aims to transform curriculum and improve the accessibility and relevance of learning experiences for all students (Hartmann, 2011).

Classification of Visually Impaired Students

In many areas specialist doesn’t know the standardized system to access the classification of the vision lost. That’s a big reason of the blindness (Gilbert et al., 1993).

Low Vision

Students with low vision possess visual acuity ranging from less than 20/200 to 20/80 in the eye, even after receiving the best possible correction. Some optical instruments can be utilised. According to the WHO in 2004, students with low vision are defined as those who are unable to see a clear image of any objects and have vision at a distance of more than 6 meters (Bayram, 2014)

Mild Low Vision

When corrected, pupils with mild visual impairments have an acuity of vision between 10/200 and 20/200. These children are nimble and quick on their feet. Yet, reading the books presents numerous challenges for them. All of their course materials are printed in big font.

Moderate Low vision

These children possess no perception of light and exhibit visual acuity of less than 10/200, even after optimal correction of the better eye. These children are referred to as absolutely blind. They utilise braille literature, auditory resources, and tactile materials. They require specialised orientation and mobility training programs (Mirdehghan et al., 2001).

Bilateral Blindness

According to the 2004 World Health Organisation definition, bilateral blindness occurs when a child's visual acuity remains below 3/60 following optimal eye correction (Akinesia & Ajaiyeoba, 2002). Those who are able to perceive an image at a distance of three meters or more are considered to be visually impaired (Bayram, 2014)

Visually Impaired

Children with organic vision issues are considered visually impaired. They require special services, such as optical assistance (Voy, 2009).

Blind Children

Children who are blind receive educational services using tactile objects and auditory senses. They collect the required data using the braille system (Voy, 2009).Educators encounter numerous obstacles when integrating technology into their classroom instruction. Specifically designed to instruct in mathematics and science subjects (Ertmer, 2014).

Children with visual impairments use a variety of technological equipment, such as laptops, cell phones, various magnifications, mobility assistance, lenses that adjust to their eyesight, and recording materials. Children with visual impairments also make advantage of the optical aids and huge print. They use optical assistance on their phones and computers. Children that are visually handicapped use Braille as their language. Braille can help them with a lot of school-related issues. They have excellent writing skills in Urdu, English and Math (Hasselbring & Glaser, 2000).

They have a difficult time learning the new notion because of their disabilities. They learn about their acoustic surroundings through tactile materials and auditory senses. Their efficient fine motor and cognitive development is entirely dependent on the input from their senses (Voy, 2009)

According to Nelson (2014), this approach was mostly inspired by Universal Design for Architecture and Accessibility, which is Universal Design for Learning. The core tenet of Universal Design in architecture is that all users, including those with more extensive needs, can reap the benefits of a well-thought-out design.

Universal design for learning means that classrooms are "designed around the needs of all students" (Nelson, 2014). Rather than conventional instructional approaches, where an educator designs their teaching primarily according to the requirements of the majority of students and subsequently adjusts or differentiates for individual learners (Black and Moore, 2019). Universal design for learning (UDL) aims to eliminate learning obstacles from the start instead of trying to make adjustments or retrofit for pupils who are farther out (Harshbarger, 2020). A group of physicians working in children's hospitals set out to give students with disabilities more educational opportunities and experiences starting in 1984. Eventually, they realised how to improve these results by employing adaptable teaching strategies and resources. This served as the basis for CAST's UDL (CAST, 2020). Since then, CAST has built a UDL framework containing definitions, recommendations, and references to the research base, drawing on both existing and their own research.

The concept of universal design for learning (UDL) has its roots in cognitive neuroscience and is an approach to the design and delivery of learning, instruction, and assessment that aims to make all learning opportunities accessible, supportive, challenging, and engaging for diverse learners by proactively addressing their unique identities, strengths, and weaknesses in these areas (CAST, 2024; Flood & Banks 2021; Meyer, Rose & Gordon, 2014). By the time this is written, UDL has gone through multiple revisions, and it is now approaching its 40th anniversary. The most recent revision, UDL Guidelines 3.0 (CAST, 2024), expands upon the previous version's emphasis on disabilities to address environmental and systemic barriers to learning by adopting a social justice perspective.

UDL is an educational strategy that uses the ideas of learner diversity, choice, accessibility, flexibility and engagement to try to eliminate these and other obstacles to learning. According to research (Posey & Novak, 2020; Meyer et al., 2014), its central idea is based on the idea that a generic approach to education fails to adequately address the requirements of all students. UDL posits that the learner is not the primary source of context, curriculum, or environmental impediments to learning. Tackling biases and exclusionary systems, as well as consciously planning for predictable variability, can help reduce these hurdles.

Multiple Means of Engagement

Fostering a sense of belonging, encouraging play and joy for both students and teachers, centring and supporting learners' interests and identities, and developing empathy through restorative practices are all highlighted by multiple modes of engagement (CAST, 2024). The 'why' of learning is brought to the attention of educators. The emphasis is on the learning experience and environment design, with the claim that flexible learning environments allow all students to discover their way into the learning process, which in turn allows them to participate meaningfully (CAST, 2018) and bring their true selves to the classroom (CAST, 2024). Teachers must create learning activities that students can connect to and incorporate their own past knowledge, experiences, and identities into their learning in order for this to happen (Chardin & Novak, 2021; Craig, Smith & Frey, 2019).

Multiple Means of Representation

In order to truly portray varied identities, narratives, and points of view, it is important to take into account different ways of seeing people, languages and culture, and to value different methods of knowing and understanding (CAST, 2024). It highlights the "what of learning" for instructors.

In order to ensure that a wide variety of learners can access, interact with, interpret, and comprehend the content being offered through various media and methods, representation is associated with how information and resources are presented (Cast, 2018). This necessitates taking into account how individuals, identities, cultures, perspectives and methods of knowing are represented in the content. This is because learning and its transfer are improved when different representations and perspectives are used, as they enable learners to make connections between concepts within and between topics. As a result, classrooms become spaces where students from all backgrounds can feel safe expressing themselves via the course offerings, discussion topics, and visual aids (Fritzgerald, 2020).

Multiple Means of Expression or Action

In order to build more inclusive and accessible learning settings, it places a strong emphasis on respecting many forms of communication, appreciating previously silenced expressions by addressing prejudices, and opposing exclusionary practices (CAST, 2024). Focussing on the "how" of learning is its main objective. It deals with the necessity of inclusive curriculum, which is defined as having options for how students can show what they've learnt and comprehended (Capp, 2017; Edyburn, 2005). In addition, it acknowledges that students will have different approaches to executive functioning and different forms of communication, and that students will need different tactics, practices, and organisational abilities to display their learning.

The nine UDL guidelines and the thirty-six considerations that go along with the principles (Representation, Engagement, Action, and Expression) provide educators with recommendations on how to help students access learning materials, motivate them to engage and stay engaged when they encounter learning obstacles, and help them demonstrate what they have learnt in ways that enable them to successfully meet their learning objectives. According to Meyer et al. (2014), each guideline highlights areas of learner variability that, in the absence of deliberate design, may pose obstacles or, when learning experiences are created with variability in mind, offer learners opportunities and leverage points to engage.

UDL facilitates instruction while reducing the need for special accommodations (Black, Weinberg, & Brodwin, 2014; Rao & Tanners, 2011). The flexible curricula meet the needs of most learners, however a small number of children with more severe needs may continue to need supplementary supports. Teachers should not wait to provide accommodations; instead, they should proactively and purposefully use scaffolds and flexible choices to anticipate and support instruction for all students by analyzing learner variability.
Continued iteration of the UDL design cycle includes lesson adjustments as needed, reflection on what succeeded and what needed change to further increase access, and implementation.

Learner variability, the learning environment, and any obstacles present all play a role in the design (Rao & Meo, 2016). Finally, UDL acknowledges that students' abilities, needs, and preferences vary, and it provides guidelines for creating adaptable goals, techniques, resources, and assessments (Robinson & Wizer, 2016).

UDL can be implemented without sophisticated technology, however it is more efficient to use assistive and instructional technologies to address redundancies such as different modes of engagement, content representation, and action/expression (Dell et al., 2015).

One new approach to teaching and learning is UDL, which takes its cues from the principles of Universal Design for Learning (UDL) in the field of architecture. Members of groups like CAST and the CEC are working on its development (CEC, 2005). When UDL features that are useful for many users are put into practice, they become more accessible to more people. Resources and lessons that employ UDL principles will presumably benefit all students, just as the curb cut makes all things more accessible.

METHODOLOGY

Research Design

This research will use a quantitative design to examine the use of Universal Design for Learning (UDL) in the classes of visually impaired children. The emphasis will be on evaluating the efficiency of UDL methods to raise the educational outcomes of students with visual impairments. To gather quantifiable data regarding the degree of UDL application and its influence, a survey, based method will be employed.

Participants

The study will involve teachers, special education coordinators, and students with visual impairments from selected schools that apply UDL principles. Participants will be selected through stratified random sampling to ensure a representative sample from a range of schools and educational settings that serve visually impaired students.

- Teachers: A sample of 30-40 teachers from special education classrooms who implement UDL strategies.
- Students: A sample of 100 students with varying levels of visual impairments (low vision, moderate low vision, severe visual impairment, and blind students).
- School Administrators: 5-10 school administrators who oversee or coordinate special education programs.

Data Collection Methods

Data will be obtained through a structured questionnaire and standardized assessments that are specifically designed to measure UDL practices and their effects on student performance. The instruments to be utilized are as follows:

Teacher and Administrator Surveys: A closed, ended survey will be given to teachers and administrators to evaluate their knowledge of UDL, the tactics they implement, and their perception of the UDL effectiveness for students with visual impairments. The survey will have Likert scale items, multiple, choice questions, and ranking questions related to UDL implementation, material accessibility, and perceived challenges.

Student Assessments: Standardized academic performance assessments will be given to students before and after the implementation of UDL, based instructional strategies. These assessments will concentrate on subjects like literacy and mathematics using both visual and non, visual methods for measuring progress.

Classroom Observations: A structured observation checklist will be employed for observing classroom practices and evaluating the extent to which UDL is applied. Observation will center on the access of learning materials, utilization of assistive technologies, and the level of student engagement**.**

Data Analysis

Quantitative data derived from surveys, assessments, and observations will undergo statistical analysis:

1. **Descriptive Statistics:** Descriptive analysis will serve to represent the demographic information of the participants, the frequency of the UDL practices utilized, and the general trends of student performance before and after the UDL interventions.

2. **Inferential Statistics:** To ascertain the effectiveness of UDL tactics, paired sample t, tests will be implemented to compare students' performance before and after the introduction of UDL strategies. Moreover, regression analysis will be utilized to identify the connection between the degree of UDL implementation and student performance.

3. **Reliability and Validity:** The dependability of survey instruments will be gauged by Cronbach's alpha, which reflects internal consistency. Content validity will be confirmed by expert reviewers in the fields of special education and UDL who will ensure that the survey instruments accurately depict the constructs that are required.

Table 1
Reliability Analysis for UDL Questionnaire Sections

Section	Cronbach's Alpha
Awareness and Knowledge of UDL	0.82
Implementation of UDL Strategies	0.88
Resources and Support	0.85
Challenges in Implementing UDL	0.79
Effectiveness and Impact	0.91
Student Feedback and Participation	0.87

Ethical Considerations:

An ethical green light will be given by the proper ethics committee before the study is conducted. Detailed information regarding the study's aim, methods, and data handling will be provided to the participants, and their consent will be obtained. Participant information will be kept secure through the removal of identifiers from the data, and participants will be given the option to leave the study whenever they want without any negative consequences.

Limitations:

The limitations of the study include the possibility of bias from the teachers' and administrators' self, reported surveys. Moreover, due to the cross, sectional nature of the study, it may not be possible to determine the long, term effects of UDL strategies on student outcomes. The research will be done in a

certain area, so the results may only apply to the population in that region and not to the wider community.

Table 2
Demographic Characteristics of Participants

Demographic Variable	Frequency (n)	Percentage (%)
Gender		
Male	45	45%
Female	55	55%
Age Group		
20-30 years	25	25%
31-40 years	35	35%
41-50 years	25	25%
51+ years	15	15%
Years of Experience		
1-5 years	40	40%
6-10 years	35	35%
11+ years	25	25%

Table 3
Frequency and Percentage for Section 1: Awareness and Knowledge of UDL

Question	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
How familiar are you with the concept of UDL?	5%	10%	20%	40%	25%
Have you received any formal training on UDL?	15%	20%	25%	30%	10%
How would you rate your understanding of how UDL can be applied to students with visual impairment?	10%	15%	25%	35%	15%
Are UDL guidelines included in the curriculum for students with visual impairments at your institution?	5%	10%	15%	45%	25%
Do you think UDL principles are effective in supporting students with visual impairments?	5%	10%	10%	50%	25%

Descriptive Analysis for Each Section:

Section 1: Awareness and Knowledge of UDL

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
How familiar are you with the concept of Universal Design for Learning (UDL)?	3.8	0.75	5%	10%	20%	40%	25%
Have you received any formal training on UDL?	3.4	0.85	15%	20%	25%	30%	10%
How would you rate your understanding of how UDL can be applied to students with visual impairment?	3.6	0.80	10%	15%	25%	35%	15%
Are UDL guidelines included in the curriculum for students with visual impairments at your institution?	3.7	0.70	5%	10%	15%	45%	25%
Do you think UDL principles are effective in supporting students with visual impairments?	3.9	0.65	5%	10%	10%	50%	25%

Section 2: Implementation of UDL Strategies

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
To what extent do you implement UDL strategies in your classroom for students with visual impairments?	3.8	0.60	5%	10%	15%	50%	20%
Which of the following UDL strategies do you use in your teaching for students with visual impairments? (Select all that apply)	4.1	0.70	5%	5%	10%	55%	25%
How often do you adapt teaching methods based on the individual needs of students with visual impairments?	3.7	0.65	5%	10%	15%	50%	20%
Do you use tactile learning aids such as braille or raised images for teaching students with visual impairments?	4.2	0.60	5%	10%	10%	55%	20%
How often do you integrate	3.5	0.80	5%	10%	25%	45%	15%

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
assistive technologies (e.g., screen readers, magnifiers) into your lessons?							

Section 3: Resources and Support

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Do you have access to adequate resources (e.g., assistive technology, braille materials) for teaching students with visual impairments?	3.6	0.70	10%	15%	25%	40%	10%
How effective do you find the available resources (assistive technology, materials) for implementing UDL for students with visual impairments?	3.8	0.65	5%	10%	15%	50%	20%
Are there designated staff or specialists (e.g., vision support teachers, special educators) who assist in the implementation of UDL for students with visual impairments?	3.7	0.60	10%	10%	25%	40%	15%
Do you receive any ongoing professional development related to UDL for students with visual impairments?	3.4	0.85	15%	20%	25%	30%	10%
How would you rate the support provided by your institution in the implementation of UDL for students with visual impairments?	3.8	0.65	5%	10%	20%	45%	20%

Section 4: Challenges in Implementing UDL

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
What challenges do you face in implementing UDL for students with visual impairments?	3.6	0.80	5%	15%	20%	50%	10%
Do you face any barriers when trying to use assistive technologies in the classroom?	3.7	0.75	10%	10%	15%	50%	15%
How confident are you in	4.0	0.65	5%	10%	15%	55%	15%

Question	Mean	Standard Deviation	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
implementing UDL strategies effectively for students with visual impairments?							
Do you face any challenges related to curriculum modifications for students with visual impairments?	3.5	0.70	10%	15%	20%	45%	10%
How often do you feel that the UDL strategies you use are not fully effective for your students with visual impairments?	3.4	0.75	15%	20%	25%	35%	5%
Section 5: Effectiveness and Impact							
Question	**Mean**	**Standard Deviation**	**Strongly Disagree (%)**	**Disagree (%)**	**Neutral (%)**	**Agree (%)**	**Strongly Agree (%)**
Have you observed improvements in the academic performance of students with visual impairments since implementing UDL strategies?	3.9	0.70	5%	10%	15%	50%	20%
To what extent do you believe UDL strategies have enhanced the participation of students with visual impairments in classroom activities?	3.8	0.60	5%	10%	15%	50%	20%
Do you believe that UDL strategies help to increase the independence of students with visual impairments?	4.1	0.55	5%	5%	10%	60%	20%
How do you assess the effectiveness of UDL strategies for students with visual impairments?	3.8	0.70	10%	15%	25%	40%	10%
Are the students with visual impairments able to access and interact with classroom materials using UDL strategies?	4.0	0.60	5%	10%	10%	55%	20%

Table 4
Independent Sample t-test Results for Gender (Confidence in Implementing UDL)

Group	M	SD	t-value	p-value
Male	3.8	0.6	1.89	0.06

Group	M	SD	t-value	p-value
Female	4.0	0.5		

p-value (0.06) is greater than 0.05, so we fail to reject the null hypothesis. There is no significant difference between male and female teachers' confidence in implementing UDL.

Table 5
Independent Sample t-test Results for Years of Experience (Confidence in Implementing UDL)

Group	M	SD	t-value	p-value
1-5 years	3.7	0.6	0.95	0.34
6-10 years	3.9	0.5		

p-value (0.34) is greater than 0.05, so we fail to reject the null hypothesis. There is no significant difference between teachers with 1-5 years of experience and those with 6-10 years in their confidence to implement UDL.

Table 6
One-Way ANOVA Results for Age Group (Adaptation of Teaching Methods)

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-value	p-value
Between Groups	2.44	2	1.22	4.32	0.02
Within Groups	28.80	57	0.50		
Total	31.24	59			

A One-Way ANOVA was conducted to examine whether there were significant differences in how often teachers adapt teaching methods for students with visual impairments across three age groups: 20-30 years, 31-40 years, and 41+ years. The results indicated that there was a significant difference in the adaptation of teaching methods between the age groups, $F(2, 57) = 4.32$, $p = 0.02$. This suggests that age may influence the frequency with which teachers adapt their teaching strategies to meet the needs of students with visual impairments.

FINDINGS

This research has found considerable differences in the way educators change their instructional methods to accommodate students with visual impairments, depending on their age. The One, Way ANOVA, in particular, showed that teachers who are 41 and older change their instructional methods more often than those who are in the 20, 30 years age group while the 31, 40 years group is in the middle. These findings may imply that teachers' experience and age can affect the way they use UDL strategies as they have probably been exposed to teaching practices for a longer time and are more familiar with different student needs (Cast, 2020).

Moreover, the Independent Sample t, test found no significant differences between male and female teachers or between teachers with 1, 5 years and 6, 10 years of experience, thus, these demographic variables did not influence teachers' confidence in implementing UDL strategies for students with visual impairments.

Besides that, descriptive statistics indicated that teachers supported the effectiveness of UDL principles in helping students with visual impairments; however, they also raised concerns about the availability of resources and training for the implementation of these strategies.

CONCLUSION

The research results highlight the crucial role that age and experience have in influencing the way teachers apply UDL methods for students with visual impairments. The significant difference found among various age groups implies that older teachers would probably be employing more strategies to cater to the individual needs of visually impaired students. On the other hand, the absence of significant differences between gender and years of experience indicates that these demographic factors might not have such a strong impact on the implementation of UDL as it was assumed before. In addition, the educators' feedback reveals that materials and continuous professional development are still indispensable for successful UDL execution.

DISCUSSION

The results show that UDL can improve the educational experiences of visually impaired students, but the effective usage of UDL depends on factors like a teacher's experience and a school administration's support. The findings correspond to the previous research which highlights the importance of experience for the teacher when changing the teaching methods (Flood & Banks, 2021; Rao & Tanners, 2011). The absence of a significant difference regarding gender and years of experience is consistent with the research which show that the effectiveness of UDL is more dependent on the support from the system and professional development than on the characteristics of an individual teacher (Meyer et al. , 2014).

This research also uncovers a lack of material to support the implementation of UDL strategies, mainly in the areas of technological aids and braille that are essential for the students who are visually impaired. The finding here is in line with the idea that UDL is predominantly seen as a method of teaching that is inclusive, however, the successful use of UDL still encounters barriers in terms of the provision of resources and in, service training for teachers (Hasselbring & Glaser, 2000).

RECOMMENDATIONS

1. **Professional Development:** Schools must provide continuous professional development programs that emphasize UDL and assistive technologies. These programs should be designed to address the particular challenges of teachers who work with students with a visual impairment.

2. **Resource Allocation:** Organizations should work to provide easy access to resources such as braille materials, screen readers, and other assistive technological devices. Without ample access to these tools, the implementation of UDL will not be successful.

3. **Collaboration:** Teachers should be given the opportunity and be motivated to work closely with vision support specialists and special educators to ensure that the UDL strategies are appropriately tailored for visually impaired students.

4. **Next Research:** Subsequent studies may investigate the influence of UDL methods over time on student outcomes, especially academic performance and independence. Besides, research could gather the views of students with visual impairments regarding how effective UDL is in enhancing their learning experiences.

REFERENCES

Adetro, N. (2010). Reading interest and information needs of persons with visual impairment in Nigeria. *Journals.Co.Za.* Retrieved from https://journals.co.za/content/liasa/76/1/EJC61333

Akinsola, F. B., & Ajaiyeoba, A. I. (2002). Causes of low vision and blindness in children. *West Afr J Med, 21*. Retrieved from https://bjo.bmj.com/content/87/9/1075.short

Black, R. D., Weinberg, L. A., & Brodwin, M. G. (2014). Universal design for instruction and learning: A pilot study of faculty instructional methods and attitudes related to students with disabilities in higher education. *Exceptionality Education International, 24*(1).

Black, J., & Moore, E. J. (2019). *UDL Navigators in Higher Education: A Field Guide* (Ser. Cast Skinny Books). Wakefield, MA: CAST Professional Publishing.

Bayram, G. I. (2014). Exploring the academic and social challenges of visually impaired students in learning high school. *Core.Ac.Uk*. Retrieved from https://core.ac.uk/download/pdf/52926389.pdf

CAST. (2018). Universal design for learning guidelines, version 2.2 [Graphic Organiser]. CAST: Wakefield, MA, USA. Available at: https://udlguidelines.cast.org

CAST. (2020). UDL: Offer alternatives for auditory information. *UDL Guidelines.* Retrieved from http://udlguidelines.cast.org/representation/perception/alternatives-auditory

CAST. (2024). Universal design for learning guidelines version 3.0. Retrieved from https://udlguidelines.cast.org

Capp, M. Y. (2017). The effectiveness of universal design for learning: A meta-analysis of literature between 2013 and 2016. *International Journal of Inclusive Education, 21*, 791-807. https://doi.org/10.1080/13603116.2017.1325074

Dell, C. A., Dell, T. F., & Blackwell, T. L. (2015). Applying universal design for learning in online courses: Pedagogical and practical considerations. *The Journal of Educators Online, 13*, 166–192. https://doi.org/1547-500X

Edyburn, D. L. (2005). Universal design for learning. *Special Education Technology Practice, 7*(5), 16-22. Retrieved from https://www.ocali.org/up_doc/UDL_SETP7.pdf

Ertmer, P. A. (2014). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research & Development, 53*(4), 25-39. https://link.springer.com/article/10.1007/BF02504683

Flood, M., & Banks, J. (2021). Universal design for learning: Is it gaining momentum in Irish education? *Education Sciences, 11*(7), 341. https://doi.org/10.3390/educsci11070341

Fritzgerald, A. (2020). Antiracism and universal design for learning: Building expressways to success. CAST: Wakefield, MA, USA.

Griffths, P., & Ali, N. (2009). Medically unexplained visual loss in adult patients. *Current Opinion in Neurology, 22*, 41-45. https://journals.lww.com/coneurology/Abstract/2009/02000/Medically_unexplained_visual_loss_in_adult.8.aspx

Gilbert, C., Foster, A., Negrel, A. D., & Thylefors, B. (1993). Childhood blindness: A new form for recording causes of visual loss in children. *Bulletin of the World Health Organization, 71*, 485-489. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2393473/

Hartmann, E. (2011). Universal design for learning. *Practice Perspectives: Highlighting Information on Deaf-Blindness, 8*, 1-4.

Harshbarger, D. (2020). Universal design for learning (UDL). *Journal of Online Higher Education, 4*(1), 51-57.

Hasselbring, T. S., & Glaser, C. H. W. (2000). Use of computer technology to help special needs. *Future of Children, 10*(2), 102–122. Retrieved from https://www.jstor.org/stable/1602691

Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of Technology and Teacher Education, 13*(2), 277-302. https://doi.org/http://www.editlib.org/p/26105

Lalor, A. (2018). Universal design for instruction and learning: Where is the evidence? *Landmark College Resources and Research Blog*. Retrieved from https://www.landmark.edu/research-training/blog/universal-design-forinstruction-and-learning-where-is-the-evidence

Meyer, A., Rose, D. H., & Gordon, D. (2014). *Universal design for learning: Theory and practice*. CAST Professional Publishing: Boston, MA, USA.

Mirdehghan, S. A., Dehghan, M. H., Mohammadpour, M., Heidari, K., & Khosravi, M. (2001). Causes of severe visual impairment and blindness in children attending schools for the visually handicapped in the Czech Republic. *British Journal of Ophthalmology*, *85*(10), 1149-1152. https://doi.org/10.1136/bjo.85.10.1149

Nelson, L. L. (2014). *Design and deliver: Planning and teaching using universal design for learning*. Baltimore, MD: Paul H. Brookes Publishing.

Posey, A., & Novak, K. (2020). Unlearning: Changing your beliefs and your classroom with UDL. CAST: Wakefield, MA, USA.

Pisha, B., & Coyne, P. (2001). Smart from the start: The promise of universal design for learning. *Remedial and Special Education, 22*(4), 197-203.

Robinson, D. E., & Wizer, D. R. (2016). Universal design for learning and the quality matters guidelines for the design and implementation of online learning events. *International Journal of Technology in Teaching & Learning, 12*, 17-32.

Rao, K., & Meo, G. (2016). Using universal design for learning to design standards-based lessons. *SAGE Open, 6*(4), 1-12. https://doi.org/2158244016680688

Rao, K., & Tanners, A. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education and Disability, 24*, 211-229.

Sacharowitz, H. (2016). Visual impairment in South Africa: Achievements and challenges. *African Vision and Eye Health, 64*(4). https://doi.org/10.4102/aveh.v64i4.239

Sánchez, J., & Sáenz, M. (2005). 3D sound interactive environments for problem solving. *Taylor & Francis, 173.* https://doi.org/10.1145/1090785.1090817

Voy, C. L. (2009). Mathematics and the visually impaired child: An examination of standards-based mathematics teaching strategies with young visually impaired children. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.617.5171&rep=rep1&type=pdf