Enhancing Linguistic Ability to Speaking Impaired Learners Using Universal Design Framework: An Experimental Study

Agalyasri. G.S, & Bhuvaneswari G[1]

[1] School of Social Sciences and Languages, VIT College, Chennai, India

Correspondence: Agalyasri. G.S, School of Social Sciences and Languages, VIT College, Chennai, India.

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Abstract

Many students around the world struggle with speech impediment, a form of communication dysfunction. Because of this, it is crucial to provide effective teaching for students with speech impairments so that they can improve their communication abilities. This experimental study looks into how well the Universal Design for Learning (UDL) framework can help students with speech impairments develop their language skills. The study involved 112 participants aged 18 to 20 diagnosed with speech impairments. During the study, the participants were randomly divided into two groups: an experimental group n=56, which received speaking skills instruction using the UDL framework, and a control group n=56, which received traditional instruction. Participants from both groups will complete a pre-test to measure their baseline speaking skills. The experimental samples received instruction using UDL, while the control group was exposed to traditional methods. After the intervention, both groups completed a post-test to measure their speaking skills. Statistical methods such as ANOVA and t-tests were used to analyze the data collected. According to the results, the experimental group performed better on the post-test than the control group regarding speaking skills. Performance levels were higher among the experimental group than among the control group. This study proves that the UDL framework can effectively facilitate speaking skills for learners with speech impairments. The study suggests that the UDL framework can help educators deliver instruction accessible to all learners, including those with disabilities.

Keywords: Universal design, speech impairments, linguistic competence, accessibility, inclusive education, experimental study

1. Introduction

Speech impairment is a communication disorder that affects a significant proportion of learners. It is characterized by difficulty in articulating words and sounds, leading to communication breakdown and frustration (Pi & Ha, 2021). Learners with speech impairment often struggle with speaking and are disadvantaged in educational settings requiring effective verbal communication skills. The universal design framework offers a holistic approach to teaching that ensures access and participation for all learners, including those with disabilities. The purpose of this study is to determine whether the UDL framework is useful for instructing students with speech impediments in the art of communication. The intellectual, social, and emotional growth of students can be severely hindered by speech difficulties, according to research by Fox et al. (2002). As a result, it is crucial to provide efficient interventions for students with speech impairments so that they can enhance their communication abilities. In order to create classrooms that are welcoming to students with a wide range of abilities, the universal design framework is proposed here. The objectives of this research are as follows: One goal is to examine how students with speech disorders can benefit from instruction based on the universal design framework. Second,ecognize the obstacles students with speech impediments face when learning to communicate. Third, we need to look at how UDL intervention might be utilised to help students who have trouble communicating.

The UDL framework has become increasingly popular in recent years as a means of expanding students' access to quality education (Garcia, et al., 2020). The goal of UDL is to ensure that all children, regardless of their cognitive or physical abilities, have access to the same high-quality education. In order to reach as many pupils as possible, it is important to design flexible, individualised lectures. Students who have had trouble communicating verbally have benefited from the use of the UDL framework. There is a lack of research on how the UDL framework might be used to teach language to kids with speech impairments, despite the framework's apparent success in other areas. Consequently, the purpose of this research is to determine whether or not the UDL framework is useful for instructing students with speech disorders in the art of communication. Although technology has been proposed to improve efficacy for learners with speech impairments, there is limited research on using technology specifically for teaching speaking skills. Overall, these research gaps highlight the need for further research to investigate the effectiveness of the UDL and technology in teaching speaking skills to learners with speech impairments and to identify best practices for implementing these approaches.

2. Literature Review

Speech impairments are common communication disorders affecting an individual's ability to produce speech sounds correctly or fluently. Communication abilities are often impacted for those with speech difficulties in educational and social settings. Prior academics proposed

the UDL to develop accessible and equitable learning environments that cater to the different requirements of individuals, including those with speech impairments. This literature review indicates the effectiveness of the UDL framework for teaching speaking skills to learners with speech impairments. It has been established that universal design principles include equity in use, flexibility, simplicity of use, perceptible information, tolerating errors, requiring minimal physical effort, and allowing for easy access and use (Capp, 2020).

Research studies have shown that UDL can effectively create inclusive and accessible learning environments for learners with disabilities, including those with speech impairments. A survey by Clipa et al., (2020), investigated the effectiveness of the universal design framework for teaching speaking skills to learners with speech impairments. Learners with speech impairments showed improvements in their pronunciation, fluency, and accuracy after implementing the universal design framework, according to the research.

Rose and Meyer (2002) conducted research into how task-based language teaching (TBLT) can help children who are hard of hearing develop their language skills. Researchers showed that TBLT not only improved students' linguistic abilities but also boosted their self-esteem and desire to study a second language. The research indicated that TBLT might be useful for language instructors who work with students who have hearing impairments. Kim et al. (2022) conducted research on how virtual reality (VR) could be used to adapt language instruction for youngsters with autistic spectrum disorder (ASD). The study indicated that students with ASD who used VR reported greater gains in their speaking abilities and were more motivated to engage in language learning activities. The study found that language instructors working with kids who have ASD could benefit from using virtual reality technology. Teachers of languages around the world can benefit from this research by learning about new methods and resources for helping students who have trouble communicating. According to Chen et al. (2023), teachers of languages can use technology, task-based techniques, and virtual reality systems to give students plenty of opportunities to practise their spoken communication skills in a safe and interesting setting. These studies stress the significance of tailoring linguistic instruction for individuals with speech impairments to their specific needs.

There have been a number of research on the topic of language instruction and communication disorders, each of which has focused on a specific area of language learning or speech impairment. One study looked at how well CALL (Computer Assisted Language Learning) helped students with dyslexia improve their oral communication skills (Fletcher et al., 1999). The research shows that CALL (Computer Assisted Language Learning) can help kids with dyslexia improve their language skills. The results of the study suggested that students who struggle with public speaking could benefit from the use of technology in language classrooms since it would provide them more opportunities to practise speaking in a safe and controlled setting.

The most effective strategies for teaching students with speech impairments using the universal design framework have also been found through research. Pictures, diagrams, and videos are all examples of visual aids that can be used to help in language learning and communication (Viel-Ruma et al., 2010). Using digital media like movies and interactive games to improve learning and motivation is another recommended strategy, as stated by Karmila and Harrison (2019). Orosco and Connor (2013) argue that facilitating group activities and peer feedback can help students improve their language and communication skills.

3. Prominent Research on UDL and Language Instruction

The efficacy of UDL in language learning has been the subject of a number of studies. The ideas and methods of UDL in higher education, including language study, are discussed by Burgstahler (2015). The author maintains that students, particularly those learning a second language, can benefit from UDL since it allows them to meet their individual learning goals. In their 2013 article, "Universal Design for Learning," Rose and Cram outline the ideas of UDL and offer concrete examples of how they might be used in language instruction. The authors suggest that UDL can improve language students' access to and interaction with learning resources, their ability to express themselves, and their ability to apply what they've learned in a variety of contexts. The views of educators on UDL and its use in ELL instruction are explored by Rao & Torres (2016). The results indicate that UDL principles can be used to build more welcoming classrooms for students of all linguistic backgrounds.

Lopes-Murphy (2012) explores how well UDL works to aid ESL students in distance education settings. According to the results, UDL has the potential to improve English as a Second Language (ESL) students' access to, engagement with, expression of, and application of knowledge. These studies suggest that UDL concepts can be successfully implemented in language learning to make courses accessible to students with a wide range of needs. Significant findings have emerged from research on the application of UDL to language acquisition. Secondly, students of any language, but especially those learning a new one, can benefit from the universal accessibility of UDL principles. With UDL, students can express themselves and apply what they've learned in a variety of contexts since they have access to a wide range of representational, expressive, and interactive learning options.

In a study conducted by Coy et al "The principles of UDL can be used to make classrooms more welcoming to students of all backgrounds and abilities. Educators can better support the success of their students learning a new language if they provide lessons and exercises that are accessible to students with a wide range of abilities. Learners with impairments or other learning issues may benefit greatly from UDL since they may need extra help getting started with and maintaining interest in their coursework." (p.14). The ideas of UDL can be successfully implemented in virtual classrooms for the study of foreign languages. With the rise in popularity of e-learning, it's crucial that students have easy entry to all of the content and tools they'll need to succeed.

UDL can help to make online learning environments open and inclusive for all language learners, especially those with unique learning needs. Overall, these results demonstrate the potential benefits of implementing UDL concepts in language learning. By implementing

UDL norms, educators can develop inclusive and readily available learning environments that accommodate the different learning requirements of all language learners, irrespective of socioeconomic status or learning difficulties.

Technology has been proposed to enhance learning for learners with speech impairments. One example is using speech recognition technology to provide feedback on pronunciation and fluency (Griful et al., 2021). Virtual reality (VR) technology has also been proposed to create immersive environments for learners to practice speaking skills (Navarro et al., 2020). With the purpose of developing inclusive and accessible learning environments that meet the various needs of learners, the Universal Design for Learning (UDL) framework has been developed. The framework seeks to offer many platforms for representation, expression, and participation to assist students in accomplishing their learning objectives (Winter, 2016).

According to the findings, UDL can be used to create inclusive learning environments that cater to the diverse needs of learners, including those with speech impairments.

4. Research Questions

1. What is the effectiveness of the universal design framework in teaching speaking skills to learners with speech impairment?
2. What are the best practices for implementing the universal design framework in teaching speaking skills to learners with speech impairments?

The following testable hypothesis was formulated in alignment with the research questions.

Research hypothesis: Teaching speaking skills to speech impairment learners using the Universal Design framework will significantly improve their speaking abilities compared to traditional teaching methods.

The Universal Design framework is a collection of guidelines intended to provide inclusive and accessible learning environments for people with a range of abilities and learning preferences. When used to teach speech impairment learners to improve their speaking abilities, it might help to lessen the obstacles and difficulties they encounter in conventional teaching approaches. It is, therefore, possible to hypothesise that teaching speaking skills using the Universal Design framework will result in notable increases in the speaking abilities of students with speech impairments.

This hypothesis can be tested through an experimental study comparing the outcomes of two groups of learners: one group receiving traditional teaching methods and another obtaining teaching methods based on the Universal Design framework. If the experimental results show that the group that received teaching based on the UDL performed significantly better in speaking skills than the group that received traditional teaching methods, the hypothesis can be supported. This finding can have important implications for designing educational programs catering to speech impairment learners' needs.

5. Methodology

Any experimental research needs a methodology since it outlines the approach, techniques, and steps taken to address the research issues. This section outlines the methodology and research design utilised in an experimental study that tries to determine how well universal design can help tertiary students with speech impairments learn how to talk. An experimental research design with a pre-test and post-test will be used for this investigation. The intervention-receiving experimental group will be randomly assigned, whereas the intervention-free control group will get the participants. The intervention will consist of UDL-based speaking exercises. Ten weeks will pass until the study is finished. The sample size will consist of 112 speaking-impaired youngsters between the ages of 18 and 20 who will be grouped into two groups: an experimental group (56 children) and a control group (56 children). The experimental group will receive UDL-integrated speech training, while the control group will receive traditional methods.

6. Ethical Considerations

When conducting an experimental study on teaching speaking skills to speech impairment learners using the UDL framework, it is essential to consider and address ethical considerations carefully. This is especially important for speech-impaired learners, who may be vulnerable to stigma and discrimination. Therefore the following ethical considerations were taken into account. Firstly, Consent was received from both the participants and the institution's head. The goal, procedures, and possible risks and advantages of the study were explained in detail to the participants. They could participate voluntarily, and their informed consent was obtained before the study commenced. Secondly, confidentiality was maintained throughout the study. Participant's personal information was kept confidential. The researchers ensured that the study procedures were designed not to cause undue stress or discomfort to the participants. Participants were not discriminated against based on their speech impairment, and their cultural or linguistic backgrounds were respected. A statement was provided to the participants informing them that they were free to withdraw from the study any time. The steps in the study are shown in Figure 1.

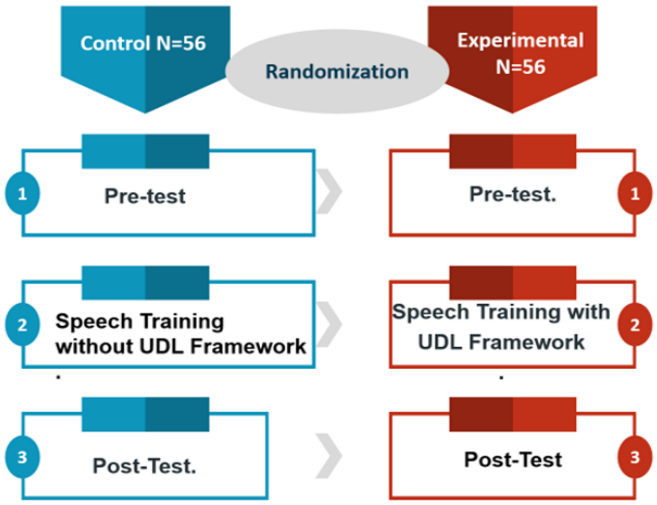

Figure 1. Steps in the Research Study

Participants

Participants are recruited from a tertiary-level institution and consist of speech impairment learners. Inclusion criteria for the study are participants with a speech impairment diagnosis, aged 18 years or older, and currently enrolled in a tertiary-level institution. Participants are recruited using purposive sampling techniques. Participants in this study are learners with speech impairments enrolled in a unique education program. Participants selection criteria for inclusion were as follows:(a) diagnosed with a speech impairment, (b) able to read and write in English, and (d) not currently receiving any speech therapy.

Randomisation

Randomization is a critical step in experimental studies that involves assigning participants to different groups or conditions in a random manner. The purpose of randomisation is to minimise bias and ensure that the groups are comparable at the beginning of the study. The protocol was followed to implement randomisation effectively. One hundred twelve representative studies (Speaking Impaired) from St. Louis Institute of Deaf and Blind, Adyar, were randomly chosen for the study. Fifty-six belonged to the control group, and 56 were from the experimental group. This sample is large enough to ensure that the groups are comparable and that any differences can be attributed to the treatment or intervention being studied. After randomisation, researchers confirmed that the groups were similar in demographic and other relevant characteristics. As a result of randomisation, the researcher was able to minimise bias and ensure that the groups were comparable when the study began.

Pre-test for both groups

After the randomisation of samples, a pre-test was conducted for both groups. An important part of experimental research is pre-testing, which entails collecting data on the outcomes of interest prior to the administration of the intervention or treatment being studied. As stated by Leppink (2019), "The major purpose of pre-testing is to determine whether or not the groups are comparable at the outset of the study and to set a standard against which to measure the results of the intervention. Confounding variables that may have affected the results of the study can potentially be detected by pre-testing. Pre-testing is helpful because it reduces the influence of confounding factors on the results of interest, hence increasing the study's internal validity " (p.14). By measuring outcomes before the intervention, researchers can ensure that any differences observed after the intervention are due to the intervention and not to pre-existing differences between the groups. Pre-testing allowed the researcher to identify and address any potential issues with the measures before the intervention was administered, thereby increasing the accuracy and precision of the data collected.

Speech training for speaking impaired (UDL)

As mentioned earlier, UDL is a framework that aims to provide all learners with equal opportunities to learn, regardless of their learning style or disability. UDL can be used to train people who have trouble speaking by focusing on the three UDL principles: multiple ways to represent, multiple ways to act and express, and multiple ways to engage. The control group was taught without UDL intervention, whereas the experimental group was instructed using the UDL framework.

Pedagogical Framework: Implementation of UDL

Best practices for implementing the UDL framework include visual aids, digital media, and social interaction. UDL is a set of ideas about how to make learning materials, activities, and tests that are accessible and useful for all learners, even those who have different learning requirements and preferences. The UDL principles are shown in figure 2.

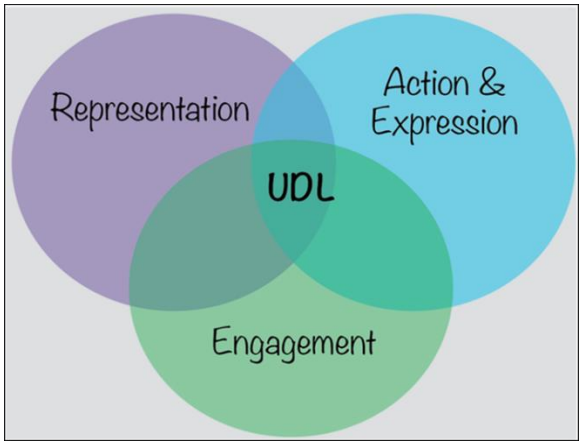

Figure 2. Principles of UDL

When applying UDL principles to teaching speaking, the researcher considered the following strategies: The students were provided various materials and resources to support their learning, including videos, audio recordings, visual aids, and written text. To make the material more applicable and interesting, the teacher used examples from real life. Students were given opportunities to show what they had learned through group work, individual presentations, and even arguments. They may express themselves verbally, through writing, or through technological means. The students were exposed to a welcoming classroom setting that valued their contributions and fostered teamwork. Researchers found that when they used UDL principles to teach speaking, they were able to better accommodate their students' varying learning styles and demands.

Technology-based tools and resources for various types of communication and participation are one way to implement UDL for teaching speech. Teachers can employ digital tools that enable students to record and share speeches for evaluation from classmates, for instance. Students have more opportunities for self-expression and active participation in their own education while using this method. Students have a wide range of options on how to DOCUMENT their lessons (e.g., video, audio, text) and interact with one another (e.g., written comments, audio feedback). Speaking can be taught using UDL in a number of ways, one of which is through giving students access to adaptable and varied resources. Teachers can promote student agency by, for instance, providing multiple reading options on a given topic so that students can select the one that best suits their needs in terms of both content and reading ability. Students of varying abilities can gain access to the same content using this strategy. UDL can also be used to develop oral communication activities. For instance, lecturers can provide students with detailed guidelines and evaluation rubrics for completing oral presentations. Because they can complete the assignment at their own pace, students are more likely to actively participate while using this strategy.

UDL can now be used in the evaluation of oral presentations. Teachers can employ a wide range of assessment techniques, such as student and instructor evaluations, discussions, and reflections. By allowing them to get information from a wide variety of sources and in a number of different formats, this strategy gives students more ways to express themselves. In general, when UDL is used in the classroom, students have more opportunities to share their ideas and participate in the learning process. By doing this, teachers can make a learning environment that is open to all students and meets their different needs.

7. Data Analysis

The data collected will be analysed using descriptive statistics and inferential statistics. The primary analysis will be a between-group comparison of the pre-and post-test scores to determine the effectiveness of the intervention. This segment has presented the research design, methodology, and procedures used in an experimental research study investigating the effectiveness of universal design in teaching speaking skills to speech impairment learners at the tertiary level.

Design of materials

It is crucial to take the principles of universal design of learning into account when creating speaking resources for people who have speaking disabilities. UDL's guiding principles emphasise using a variety of input methods to support different learning styles. Figure 3 displays the codes.

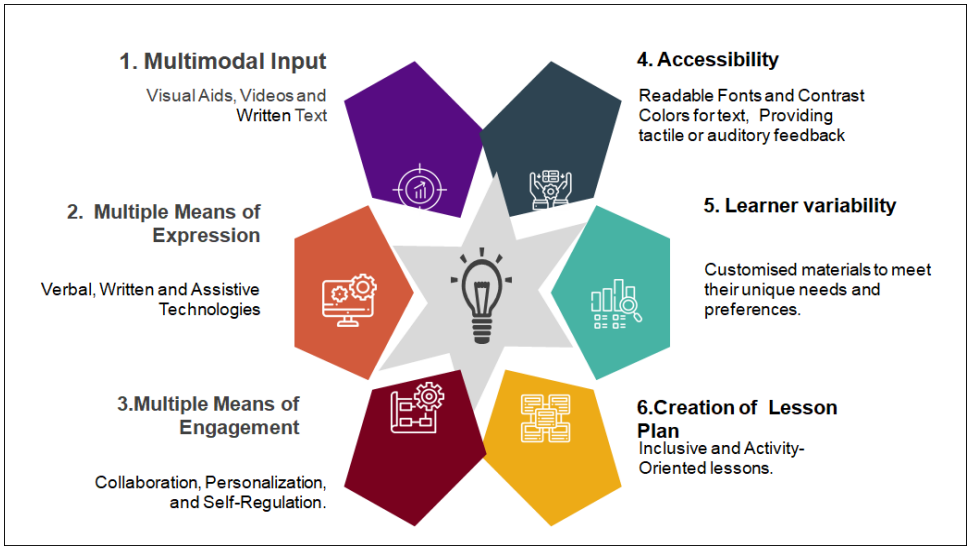

Figure 3. Principles of Material Design for the Speaking Impaired

When designing speaking materials for exceptional learners, it is essential to consider the principles of Universal Design for Learning (UDL). UDL is a framework that attempts to develop accessible and effective resources and environments for all learners, even individuals with various abilities and backgrounds. A main element of UDL is to provide diverse modes of representation, which involves providing information in many formats and modalities to fit the various preferences and methods of learning of students with special needs. Allowing students several avenues for communication and the articulation of their ideas is another guiding principle. For students with diverse learning styles, UDL also stresses the importance of having several entry points into lessons and activities. Closed captioning, legible fonts, and aural or tactile feedback for students with visual impairments are all important aspects of making content accessible.

Finally, it's crucial to factor in learner variability, acknowledging that students with special needs will have varying aptitudes and difficulties. If you want to create a classroom that is effective for all students, you must give them the freedom to alter and personalise the course materials to their liking. By adhering to these UDL principles while developing speaking materials for students with special needs, educators can foster an environment that is welcoming and supportive of students of all backgrounds and abilities.

Designers of spoken content should think about including visual aids like drawings, diagrams, and videos to supplement the spoken word. Because they may rely more heavily on visual clues to grasp the provided content, individuals with speech problems can benefit from multimodal input. The lecturer may use a visual to illustrate a process, such as the water cycle, and then explain it verbally. Designers of linguistic resources should think about including a variety of aids to communication in order to provide a wide range of expression options. Tools like speech-to-text programmes and picture/symbol boards fall into this category. These aids can help people with speech disabilities find new ways to express themselves and take an active role in group conversations. Designers of oral products might broaden their audience's appeal by including opportunities for participation across many senses. In this academic setting, the instructor employed exercises to drill in the material. Because some people with speech difficulties rely on using different senses to absorb and retain information, this helps them become more involved in the learning process. Instructional resources were designed with adaptability, personalization, and universality in mind. The instructor used a variety of methods to convey the material, including speech, visuals, and touch. This approach allowed learners with speech impairments to access data using alternative modes of communication.

The learners were provided with different ways of demonstrating their understanding of the content. Role-plays and assistive technologies were used. The instructor used clear and concise language to communicate instructions and concepts. Visual aids, such as diagrams, pictures, and videos, enhanced learners' comprehension of the material. The target learners were given opportunities to practice speaking skills and receive feedback from peers and educators. Using the UD framework, instructional materials had to be accessible, engaging, and adaptable to the various requirements of students with speech impairments.

Rubrics used for assessment:

When teaching speaking skills to speech impairment learners at the tertiary level using UDL, assessing their performance using appropriate rubrics is essential. Rubrics provide a clear and consistent way to evaluate students' speaking abilities and provide valuable feedback for improvement. The researcher incorporated five constructs: content value, organisation of content, articulation, fluency, and rate of speech. The rubrics for assessment are shown in figure 4.

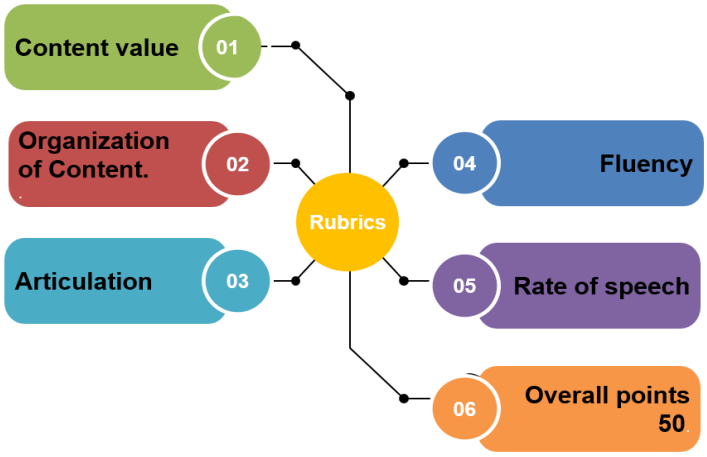

Figure 4. Rubrics for assessment

The target learners' speaking abilities were evaluated for speech impairment using these five components, and they were given comments on their strengths and areas for development. The rubrics were created with the needs of the learners and universal design principles in mind to make sure that everyone can use and comprehend them.

8. Results

An analysis of the data was conducted using descriptive and inferential statistics to determine the effectiveness of the intervention. Both groups were evaluated based on means and standard deviations of their pre-test and post-test scores. Pre- and post-test mean scores were compared using a paired samples t-test. An independent samples t-test is presented in the table-1 to compare the mean scores of the experimental and control groups.

Table 1. Pre-test-Group statistics

Group Statistics

Control and Experimental Groups		N	Mean	Std. Deviation	Std. Error Mean
Pre Total Score	Control Group	56	19.1632	2.34876	.31673
	Experimental Group	56	21.0132	3.87094	.43985

The group statistics shown in table-1 provide descriptive statistics for the two related samples being compared. It includes each sample's mean, standard deviation, and sample size. As the mean corresponds to the average value of the variable in each group, the standard deviation can be used to evaluate the degree of spread of the data. The sample size indicates the number of observations in each category. These group statistics aid in evaluating the normalcy and variability of the data and can assist in identifying any potential outliers or extreme results. Furthermore, they serve as a basis for conducting a paired t-test to compare the means of two similar samples. In the first table, we test to see if there is a statistically significant difference between the samples by determining if the difference in means is noteworthy. Important background data for interpreting t-test findings and drawing conclusions about the relationship between the two analysed variables may be found in table-1, which summarises the group statistics. The mean difference between the control and the experimental group is only 1.85. Although the mean difference is minimal, we cannot arrive at a conclusive result unless we compare the post-test results of the control and experimental groups. The results of the post-test between groups are shown in table 2.

Table 2. Post-test group statistics

Group Statistics

Control and Experimental Groups		N	Mean	Std. Deviation	Std. Error Mean
Post total score	Control Group	56	20.1354	2.98056	.64943
	Experimental Group	56	31.2248	2.76297	.79739

When interpreting the group statistics, it is essential to consider the mean difference's magnitude and the differences' standard deviation. A sizeable mean difference with a slight standard deviation suggests a strong effect of the intervention or treatment. In contrast, a little mean difference with a significant standard deviation suggests a weak product. Overall, the group statistics in a paired t-test provide essential information about the distribution of scores before and after an intervention or treatment, which can help evaluate the intervention's effectiveness. Performance scores have a mean difference of 11.0894 in the post-test. The standard deviation was 0.21759. Therefore we can conclude that the UDL intervention was adequate for the speaking-impaired students at the tertiary level. The comparative analysis of the mean difference is represented in figure-4.

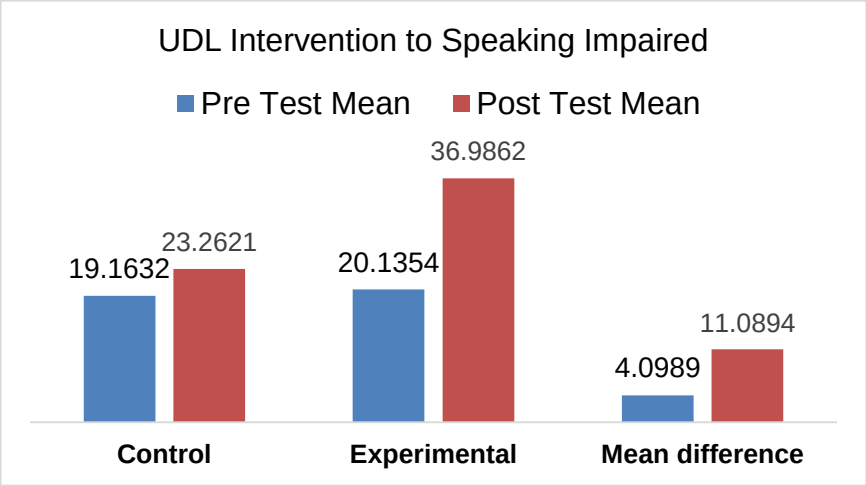

Figure 5. Performance Analysis of control and experimental groups

Analysis of Variance

ANOVA is a statistical test used to determine if there are significant differences between the means of two or more groups. It is often used in hypothesis testing to determine whether the data support a particular hypothesis. For a hypothesis to be supported, it must be shown that the observed differences between groups are not the result of chance or random variation but rather the consequence of some systematic difference between the groups; this is where ANOVA comes in (Herzog et al., 2019). By demonstrating that the observed differences are statistically significant, ANOVA can help support or reject a hypothesis and provide insight into the underlying factors responsible for those differences. As part of this study, ANOVA was used to compare the means of UDL and non-UDL groups. The results of the ANOVA are presented in table 3.

Table 3. ANOVA

Descriptive	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	82.286	2	82.286	171.232	.000
Within Groups	147.491		1.341		
Total	229.777				

SPSS's analysis of variance results lists each factor's p-value, F-value, degrees of freedom, mean square, and F-value. The F-value and the p-value are used to determine the significance of an ANOVA result in SPSS. The F-value measures the variance ratio between two groups compared to the variance within each group. When the F-value is large, it indicates that the differences between groups are statistically significant. The p-value would mean the probability of obtaining a result as extreme as the observed F-value if the null hypothesis (no significant difference between groups) were accurate. The p-value indicates a significant difference between groups when it is less than 0.05. According to the output table, the F-value is 171.232, and the p-value is less than 0.001. This suggests that there is a substantial difference between the means of the groups and that the effect of UDL on speaking-impaired learners is statistically significant. In conclusion, researchers are able to draw important conclusions regarding the importance of the examined impact from the ANOVA output in SPSS.

9. Discussion

The current experimental study tested the viability of employing the Universal Design framework to instruct students with speech impairments in the art of communication. The findings show that students with speech impairments benefit greatly from instruction in public speaking delivered within a UDL framework. The study's findings are consistent with the ideals of the universal design framework, which aim to make classrooms and other educational settings accessible and inclusive for students of all abilities and backgrounds. Students with speech impairments were taught speaking skills using the framework's principles, making it easier for them to overcome the challenges they face in traditional classroom settings. The findings of this study provide support for the idea that using the Universal Design framework to instruct students with speech impairments can be an effective strategy. The framework's focus on openness, diversity, and adaptability makes it more suitable for students with speech impairments. In addition to meeting the demands of a wide range of students, this approach is consistent with the concepts of Universal Design for Learning (UDL), which seek to equip students with multiple means of demonstrating, expressing, and interacting with their knowledge.

The results of this research have a significant bearing on the development of curricula for students with speech impairments. By adopting the Universal Design framework, educators can create inclusive learning environments that support speech impairment learners' learning and development. The framework's principles can also be used in other parts of education, like teaching how to read and write, to make learning environments accessible and open to everyone. The study is expected to contribute to the existing literature on using UDL in inclusive

education and provide insights into designing instruction accessible to learners with disabilities. The results of this study can help teachers and policymakers develop and implement effective ways to teach students with speech impairments. Several research gaps in the literature are related to teaching speaking skills to learners with speech impairments using the UDL. Although previous researchers have proposed the suggested framework to create inclusive learning environments, there is limited research on its effectiveness in teaching speaking skills to learners with speech impairments. The study's findings have important implications for designing educational programs catering not only to speech impairment learners' needs but also to other facts of education to make the classroom more interesting and learning more experiential.

10. Limitations of the Study

The limitations of this study require attention. First, the study was limited by a relatively small sample size, which may limit its generalizability. Second, the study was conducted over a short period, and it is unclear whether the improvements in speaking skills will be maintained over time. Future research could address these limitations by conducting larger-scale studies over extended periods.

11. Conclusion

In conclusion, the present study proves that teaching speaking skills to speech impairment learners using the UDL framework significantly improves their speaking abilities. The study's findings have important implications for designing educational programs catering to speech impairment learners' needs. The framework's ideas can also be applied to other facets of education to make classrooms more welcoming to students of all abilities. Overall, the Universal Design Framework effectively teaches speaking skills to speech impairment learners in a CALL (Computer Assisted Language Learning) classroom. By using technology tools and providing accessible materials, learners can confidently develop their speaking skills and overcome speech impairments.

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All authors read and approved the final manuscript.

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Obtained.

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The journal’s policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix

Lesson Plan for the Speaking Impaired Using UDL

Introduction: Learners with speech impediments have distinct demands that must be met when teaching them to speak. This lesson plan aims to create a CALL (Computer-Assisted Language Learning) session accessible to all students, including those with speech difficulties, by utilising the Universal Design Framework. Tertiary-level students are the target audience for this lesson.

Lesson Objective: This lesson aims to prepare students to use appropriate language, methods, and technological resources to overcome speech difficulties and fully participate in a discussion.

Materials:

- Computers with internet access
- Headsets with microphones
- A video conferencing platform (Zoom, Skype, etc.)
- PowerPoint slides with audio and visuals
- Speaking activity worksheet

Procedure:

1. Introduction (10 minutes):
- Greeting students and explaining the lesson objective.
- Explain the importance of developing speaking skills.
- Provide an overview of the lesson plan and present the Universal Design Framework.
2. Pre-Listening Activity (10 minutes):
- Use PowerPoint slides to introduce the topic of the conversation.
- Provide visual aids and audio recordings to help learners understand the issue.
- Encourage students to ask questions and clarify any doubts they may have.
3. Listening Activity (15 minutes):
- Divide the students into pairs or small groups.
- Use the video conferencing platform to connect the learners and allow them to communicate.
- Provide a speaking activity worksheet with prompts to guide the conversation.
- Encourage learners to use appropriate language and strategies to overcome speech impairments.
- Monitor the discussions and provide feedback to the learners.
4. Post-Listening Activity (10 minutes):
- Allow the learners to share their experiences and feedback on the speaking activity.
- Encourage learners to provide constructive feedback to their peers.
- Use PowerPoint slides to summarise the conversation's main points and highlight essential language and strategies.
5. Extension Activity (15 minutes):
- Provide an extension activity for learners who want to continue practising their speaking skills.
- Provide additional speaking activity worksheets with different prompts to challenge learners.
- Encourage learners to use technology tools like speech recognition software to improve pronunciation.
6. Conclusion (5 minutes):
- Summarise the main points of the lesson.
- Encourage learners to continue practising their speaking skills.
- Provide resources and materials for learners who want to continue learning about speaking skills and speech impairments.

Assessment:

- Monitor the learners' participation and engagement during the speaking activity.
- Use the speaking activity worksheet to assess learners' language and strategies for overcoming speech impairments.
- Please provide feedback and constructive criticism to help learners improve their speaking skills.