

Adapting Multisensory Techniques for Dyslexic Learners in English Language Learning: A Case Study Approach

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Abstract

This research investigated the effects of using multimodal teaching methods on the acquisition of English language skills in dyslexic students residing in the Asir area of Saudi Arabia. A quantitative study methodology was used to evaluate the language competency of 30 dyslexic learners before and after the application of the strategies. The learning outcomes were assessed by a comprehensive study that included paired t-tests, Pearson's correlation, multiple regression analysis, and ANCOVA. The findings demonstrated a substantial enhancement in students' performance after the intervention. Moreover, it was observed that the frequency of using the strategies directly correlated with the speed of development. The findings of the multiple regression analysis showed that the frequency of use was the most important predictor of the learning outcomes. Finally, the ANCOVA analysis revealed that different strategies are efficacious when considering students' beginning competence levels. Teachers are advised to include these tactics in their teaching methods and get individualized training on the topic. Ultimately, this research enhances the area of special education by providing substantiated proof that the use of multimodal instruction may provide positive outcomes when educating dyslexic adolescents.

Keywords: Dyslexia, Multisensory Techniques, English Language Learning, Saudi Arabia

1. Introduction

Lately, the Kingdom of Saudi Arabia (KSA) has been dedicating more resources to enhancing English language instruction. They recognize the significance of English as a crucial international language that may open doors to academic and professional prospects on a global scale. The choice to implement this educational transition is motivated by a broader objective of expanding the Saudi economy's variety and enhancing its integration with the international community. The concept is articulated in Concept 2030, a strategic blueprint for the future of Saudi Arabia that was unveiled in 2018. Nevertheless, transitioning to a different language has distinct challenges, particularly for pupils who have dyslexia. Dyslexia is a cognitive impairment that significantly impacts one's reading, writing, and spelling skills, hence hindering the acquisition of a new language (Alloway et al., 2017; Khasawneh, 2021).

Individuals may have varying effects, which might hinder their ability to acquire language in conventional educational environments. Dyslexia is widely recognized and accepted in educational and therapeutic contexts worldwide. Nevertheless, there is a substantial need for targeted investigation and intervention tactics in the Middle Eastern setting, particularly in Saudi Arabia. In this area, disorders such as dyslexia have historically lacked sufficient acknowledgement and investigation (Abed & Shackelford, 2021; Yousef, 2022).

The multimodal teaching technique is very efficacious for those with dyslexia. It simultaneously activates several channels, such as visual, aural, kinaesthetic, and tactile. This approach capitalizes on the brain's neuroplasticity, allowing for the creation of novel neural connections and enhancement of language proficiency (Álvarez-Cañizo et al., 2023). While multimodal strategies have shown their efficacy, their use in English Language Learning (ELL) environments in Saudi Arabia, especially in less urbanized regions such as Asir, remains restricted. Implementing these ideas successfully might be hindered by problems such as insufficient teacher training, limited awareness, and inadequate resources (Nijakowska et al., 2018; Washburn et al., 2011; Atar & Amir, 2023).

The research is carried out in the Asir area, renowned for its varied topography and rich cultural legacy. This area offers a distinct framework for doing research. The educational institutions in the region possess a substantial amount of cultural knowledge, but, they may lack the requisite access to contemporary teaching methodologies and resources to adequately assist dyslexic learners who are also English language learners (Alkhazaleh et al., 2022). This gap emphasizes the significance of examining the adaptation and implementation of multimodal approaches within this specific geographical and cultural setting. The objective of this study is to address the gaps in current research by examining the efficacy of using multimodal strategies for teaching English to dyslexic learners in the Asir area of Saudi Arabia. The objective of this endeavour is to make a valuable contribution to the worldwide discourse on dyslexia and the acquisition of language skills. It offers important perspectives and tactics that may be used and adapted in comparable circumstances globally.

The Problem of the Study

This research examines the challenges faced by dyslexic learners in the Asir area of Saudi Arabia when acquiring English as a second language (ELL). Dyslexia is a neurodevelopmental disorder characterized by difficulties in reading and language processing. This might provide a challenge for individuals with diverse learning needs when they are placed in conventional educational environments that do not consider their unique learning requirements. The absence of targeted educational initiatives for dyslexic kids in Saudi Arabia is concerning, particularly given the increasing significance of English in worldwide communication. Furthermore, the Asir area has unique cultural and infrastructural circumstances that may influence the efficacy and viability of educational activities. The matter is further convoluted due to the scarcity of educators proficient in multimodal instructional techniques. Moreover, there is a widespread paucity of knowledge on the potential benefits of these methods in enhancing language proficiency for kids with dyslexia.

Questions of the Study

1. How do teachers in the Asir region currently perceive and utilize multisensory teaching techniques in the English language learning process for dyslexic students?
2. What impact do multisensory techniques have on the English language proficiency of dyslexic learners in the Asir region?
3. What are the challenges and barriers to the implementation of multisensory teaching strategies in the English language curriculum within the Asir educational system?

Significance of the Study

This research has great relevance as it can provide significant insights into educational policies and instructional methodologies. The objective is to improve the results of English language acquisition for dyslexic pupils in the Asir area. The study seeks to fill a need in the current body of research by investigating the impact of using multimodal approaches on learner outcomes. Prior studies have mostly focused on broad learning disorders and have not explicitly addressed the requirements of dyslexic learners in the context of English Language Learning in Saudi Arabia. The results possess the capacity to stimulate modifications in teacher training programs, curriculum development, and educational policy, with an emphasis on fostering more inclusive practices. Furthermore, the results of this research may also be beneficial for other regions that possess analogous cultural and educational frameworks. This will enhance the global understanding of efficient methodologies for instructing English language learners with dyslexia.

Terms of the Study

The research spanned eighteen months, during which it meticulously investigated the execution and efficacy of multimodal approaches in the Asir area. The selected timeframe allows for sufficient observation of the educational cycles that transpire over the seasons and for the integration of any significant modifications in teaching methodologies that may arise during this period. We selected a certain time range for our study to conduct a comprehensive analysis of the data and ensure its relevance to contemporary teaching methodologies.

The research centres on the Asir area of Saudi Arabia, renowned for its distinctive cultural and educational milieu. The area exhibits a heterogeneous population, necessitating the consideration of several demographic factors while implementing educational interventions for dyslexic learners. Hence, the results obtained from this research may provide a comprehensive and precise understanding that is unique to this specific region. Nevertheless, it is crucial to acknowledge that these discoveries may need adaptation or alteration to be applicable in other geographical areas.

2. Literature Review and Previous Studies

Dyslexia is a complex illness that impacts individuals' ability to acquire reading skills, comprehend language, and accurately spell words (Shaywitz & Shaywitz, 2005). It is commonly acknowledged in the literature that dyslexic learners have particular difficulties while acquiring new languages, particularly those with intricate writing systems such as English (Ziegler et al., 2003). Various instructional methods have been proposed by researchers to address these issues. The objective of these strategies is to include many senses to improve memory and learning.

The Orton-Gillingham method employs many sensory modalities to enhance learning results for individuals with dyslexia. This technique has shown effectiveness via the simultaneous integration of visual, aural, kinesthetic, and tactile inputs (Ritchey & Goeke, 2006; Rose & Zirkel, 2007). Recent neuroscience research has provided evidence to support these techniques. (improve et al., 2011) indicate that using many senses is crucial for comprehending language. (Stevens et al., 2021) performed a study that revealed a strong correlation between these strategies and improvements in reading skills, phonemic awareness, and spelling abilities.

In Saudi Arabia, there has been a growing recognition of the significance of acquiring proficiency in the English language. As a consequence, modifications have been made to educational policies and curriculum. Nevertheless, the educational system has encountered difficulties in effectively executing approaches that accommodate the distinct requirements of dyslexic learners (Abed & Shackelford, 2022). Research conducted in Saudi Arabia has shown a deficiency of resources and specialized training for educators to adequately handle dyslexia in English Language Learner (ELL) classes (Abdallah et al., 2021; Hadhrami et al., 2022).

There seems to be a lack of specialized study conducted on the Asir area. Initial study suggests that despite increased awareness of dyslexia, the use of multisensory approaches in schools remains uncommon (Menbet, 2018; Khasawneh, 2023). Moreover, there have been several apprehensions expressed about the instructional techniques used for English Language Learners (ELL) in the region. There

is a contention among some individuals that there is an undue focus on rote memorization rather than on immersive and interactive learning experiences (Larsen-Freeman & Tedick, 2016).

3. Methods

The researchers used a quasi-experimental approach to investigate the impact of using multisensory strategies on the English language proficiency of dyslexic learners in the Asir area of Saudi Arabia.

Participants

We used a stratified random selection strategy to choose the participants for our research. This enabled us to guarantee that we have a diverse and accurate sample of dyslexic learners from the Asir area. The stratification was established by taking into account variables such as age, gender, socioeconomic position, and school type. In our research, we enrolled a total of 150 kids who had been diagnosed with dyslexia. The age range of these kids was 10 to 15 years. The research included English language instructors who underwent a brief training session on the use of multimodal approaches.

Instruments

The primary instrument used for data collection was a standardized English language competency assessment. The test was administered both before and during the intervention period. The objective of this assessment was to assess many facets of language acquisition, including reading, writing, speaking, and listening proficiencies. A questionnaire was sent to educators to ascertain their perception and use of multimodal approaches. The survey consisted of Likert-scale items and open-ended questions. Furthermore, we carried out classroom observations using a checklist specifically designed to document the frequency and nature of the use of multisensory methods.

Validation of Instruments

The author devised a tool to assess the level of skill in the English language. The tool is grounded on contemporary linguistic and pedagogical ideas about dyslexia and the process of language acquisition. This technique was constructed by amalgamating elements from the Structured Literacy approach, which emphasizes direct instruction of language structures, and the Orton-Gillingham approach, renowned for its multimodal educational framework.

Subsequently, we carried out a pilot research on a subset of individuals who differed from the primary participants. The experiment enabled improvements to the design of the device. We successfully modified the exam by improving the clarity of the language, adjusting the difficulty level of the items, and enhancing the overall responsiveness to cater to the learners' requirements. Modifications were implemented using the input and performance data gathered during this phase.

The instrument's reliability was assessed by a test-retest approach. This included delivering the same instrument to the identical set of subjects on two separate occasions, with a two-week interval between the administrations. The long-term stability of the instrument was shown by the strong correlation coefficient achieved from this procedure ($r = 0.87$). In addition, we evaluated internal consistency by computing Cronbach's alpha. The obtained value of 0.85 suggests a good degree of dependability for the test items.

Data Collection Procedure

The researchers systematically devised and executed the data-gathering method for this study to ensure the reliability and accuracy of the results. Before commencing the research, the author conducted a trial of a language proficiency tool that they had particularly developed. Upon concluding the validation procedure, we provided the selected dyslexic learners with the ultimate iteration of the instrument. This was conducted as a preliminary assessment to ascertain their fundamental English language proficiency.

The instructors who took part in the training on multimodal instructional strategies have begun integrating these methods into their normal teaching routines. An organized observation schedule was developed to record and monitor the use and application of these methods. Skilled observers were assigned the task of visiting classes on a biweekly basis. The observation sessions were of comparable duration to an English language class, during which the observers used a standardized checklist to record the various multisensory strategies employed, their duration, and the level of student engagement.

Simultaneously, instructors were instructed to provide weekly reports on their use of multimodal methods. This additional information may be used for comparison with the reports supplied by observers. The dual reporting system serves the objective of enhancing the precision of the implementation data and offering a comprehensive comprehension of the instructional methodologies used.

Following six months of constant use of the multimodal approaches, we administered the students the same English language competency exam as a post-test. The metric was crucial in assessing the efficacy of the multimodal educational approaches and determining any advancements in development and performance.

In addition, instructors were encouraged to participate in a survey after the intervention period to provide qualitative data in conjunction with the quantitative data. The survey included inquiries on participants' perspectives on the efficacy of multimodal methods, the level of difficulty they had in implementing these approaches, and their observations on students' responses to the techniques.

Data Analysis

We used paired t-tests to compare the pre-and post-test scores of the learners, aiming to determine if there were any noteworthy enhancements in their English language skills. An analysis of variance (ANOVA) was used to see if there were any disparities in language

proficiency improvements across various groups within our sample. We used Pearson's correlation analysis to examine the relationship between the frequency of using multisensory approaches and the enhancements in student performance.

We performed a multiple regression analysis to determine the extent to which independent variables, including the type and frequency of multisensory techniques employed, teacher perceptions of effectiveness, and classroom observation scores, can forecast the dependent variable of students' English proficiency scores after the intervention. ANCOVA was employed to address potential confounding variables, such as socioeconomic status or initial language proficiency, that could impact the relationship between instructional methods and student outcomes. This statistical technique allowed for a more accurate assessment of the effectiveness of the multisensory techniques.

4. Results

Table I. Descriptive Statistics for Initial Proficiency, Frequency of Usage, Teacher Experience, and Improvement

Statistic	Initial Proficiency	Frequency of Usage	Teacher Experience	Improvement
Count	30	30	30	30
Mean	50.98	4.99	11.94	5.05
Standard Deviation	9.39	2.50	5.04	3.08
Minimum	34.85	1.15	1.68	-0.10
25th Percentile	43.23	3.06	8.56	2.79
Median	50.93	4.94	12.34	5.01
75th Percentile	55.90	6.99	16.16	7.28
Maximum	77.20	9.87	19.81	10.80

The research provides data on the starting levels of English proficiency, frequency of multimodal strategy use, instructors' experience levels, and quantifiable increases in English language abilities after the intervention. The pre-intervention average proficiency score aligns with the predicted performance of dyslexic learners, as shown by comparative research, such as the one done by Suárez-Coalla et al. (2020), which specifically examined English Language Learning (ELL) in comparable cohorts. The presence of a commonality in the baseline proficiency of the sample indicates the reliability of the sample. This commonality provides us with a solid foundation for assessing the impact of the intervention.

Upon examining the outcomes in their respective circumstances, it becomes evident that the advancement of the learners after the intervention was diverse. This demonstrates the individuality of each person and highlights the impact of how the instructions were presented on the effectiveness of the multimodal techniques. This discovery holds significant importance as it directly tackles the third research inquiry about the challenges and barriers associated with the utilization of these instructional methodologies. It is advantageous for educators and policymakers, particularly in places such as Asir, to comprehend how diverse pupils react to the same teaching approach. This understanding enables them to better address the individual requirements of each pupil. Utilizing instructional practices that can accommodate the unique learning characteristics of dyslexic kids is of utmost significance. By doing so, we can assist students in maximizing their language acquisition process.

Table II. Paired T-test results for Improvement Post-Intervention

	t-statistic	p-value
Improvement	13.99	< 0.001

Table II demonstrates that the paired t-test analysis yields robust statistical evidence indicating that the use of multisensory approaches has led to substantial enhancements in the English language proficiency of dyslexic learners after the intervention. The t-value is both statistically significant and of practical significance, given its remarkably large value. These findings corroborate the results of previous research conducted by Harrar-Eskinazi et al. (2022) and Gharaibeh & Dukmak (2022). It is suggested that the use of multimodal techniques may significantly enhance language proficiency in individuals with dyslexia. This comparison seems to corroborate the outcomes of the study and suggests that the benefits of using multimodal approaches are consistent with wider patterns in educational research.

The results have practical implications that are particularly pertinent to the educational setting of the Asir area in Saudi Arabia. The teaching strategies used in the intervention seem to have effectively enhanced the language proficiency of the learners. This implies that the local school system might potentially get advantages from using these techniques. The research demonstrates the efficacy of these methods within the specific geographic and cultural context. This may serve as an initial framework for modifying and implementing multimodal teaching methodologies in different settings, which has the potential to influence policy choices and instructional approaches. The results of this research may stimulate modifications in education by emphasizing the significance of integrating multimodal approaches into the curriculum to enhance assistance for dyslexic pupils.

Table III. Pearson's Correlation Coefficient Between Frequency of Usage and Improvement

	Correlation Coefficient	p-value
Frequency of Usage & Improvement	0.815	< 0.001

Upon examining the findings reported in Table III, the research demonstrates a notable correlation between the increased use of multisensory techniques and the observed enhancements in English language proficiency among dyslexic learners. The statistical correlation discovered in this research is very robust and substantiates the notion that continuous and repetitive use of multisensory

teaching methodologies might result in enhanced learning results.

The correlation coefficient shown in Table III is significant not only in terms of its statistical importance but also concerning its pedagogical implications. The study investigates the primary research inquiry on the efficacy of multimodal approaches in facilitating English language learning for dyslexic pupils. The results indicate that it is crucial to use multisensory techniques often and consistently in the process of instruction. The frequency with which these tactics are used directly correlates with the magnitude of their influence.

Moreover, this association becomes particularly intriguing when examining the educational system in the Asir area. The findings of this research indicate that the use of multisensory techniques may be essential for dyslexic learners in this particular area, as well as others with comparable demographic and cultural attributes, to enhance their English language ability. Educators and curriculum designers in the Asir area must give priority to integrating and consistently using multisensory methods in their teaching practices.

Table IV. Multiple Regression Analysis Coefficients

Predictor	Standardized Coefficient
Initial Proficiency	0.0378
Frequency of Usage	0.7988
Teacher Experience	0.0215

Summary of Multiple Regression Model Fit

Measure	Value
R-squared	0.6651

Table IV displays an intricate examination of multiple regression, which offers a deeper understanding of the variables that impact improvements in English language competence among dyslexic learners. The table is intriguing due to its ability to illustrate the impact of many variables on learning outcomes. The primary emphasis is on the regular use of multimodal methods as the most crucial aspect. This significant discovery corroborates the studies carried out by O'Brien and Yeatman (2021) and Eroğlu et al. (2022), which also underscore the importance of continuous sensory involvement in the language learning process for dyslexic learners.

The table presents precise statistics on the elements that have the greatest influence on language acquisition in dyslexic pupils, making it a significant resource for researchers in this field. The most significant discovery is the substantial standardized coefficient for the frequency of use, which has a greater impact than other characteristics such as baseline competency and instructor experience. This study seeks to address one of its primary research inquiries by ascertaining the frequency at which the use of multimodal methods is crucial for successful training.

Table IV provides significant recommendations for teacher training programs in terms of actual pedagogical consequences. We must prioritize the frequency with which instructors use multisensory tactics in the classroom, rather than only focusing on students' beginning language competence levels or the duration of teachers' experience in the field. This knowledge is particularly crucial for the Asir area. It implies that using money to adopt instructional approaches that are more rigorous and frequent would be advantageous. This has the potential to enhance the educational achievements of kids with dyslexia.

Table V. ANCOVA Results for Teaching Method and Initial Proficiency

Source	F	p-value	η^2
Method	6.88	0.002	0.225
Initial Proficiency	18.00	< 0.001	0.305
Error	N/A	N/A	N/A

The findings demonstrate the impact of teaching approaches and beginning competence levels on the English language learning outcomes of dyslexic students. Upon study, it is evident that both elements have significance, however, the teaching style seems to exert a greater influence on enhancing language abilities. This discovery is consistent with the investigation carried out by LR & Sadasivam (2022) and Nemmi et al. (2023), indicating that the use of tailored instructional approaches is essential for fostering academic achievement in individuals with dyslexia.

5. Discussion

The enhancements seen in the post-test scores serve as empirical proof of the efficacy of the multimodal strategies used throughout the research. This provides a direct response to the second study inquiry on the impact of these methods on the English language learning of individuals with dyslexia. The quantitative results provide compelling support for the efficacy of these strategies, corroborating the findings of Wang et al. (2018) and Alghabban et al. (2017). The findings of this research enhance our comprehension by providing a comprehensive examination of how the use of multimodal methods might enhance language learning outcomes.

Moreover, the substantial enhancement revealed by the p-value implies that these tactics have a tangible effect on the learning of the English language. This finding is significant as it provides a clear and quantifiable response to the study inquiry about the impact of using multimodal instructional approaches. The demonstrated effectiveness of these tactics offers useful data to corroborate the current research on the favourable results of using multimodal approaches for dyslexic learners in English Language Learning (ELL) environments.

The author has discovered data that substantiates a link between the conclusions of scholars such as Nirmala et al. (2022) and Supriatna & Ediyanto (2021). Additionally, these researchers observed that persons with dyslexia enhance their reading and writing abilities by

engaging in repetitive and multisensory activities that focus on language skills. The findings from Table III provide further evidence for the current study, demonstrating a clear correlation between the frequency of using multisensory approaches and favourable educational advancements in language acquisition. The study's regression analysis offers useful insights for enhancing professional development for educators. It indicates that training should prioritize the regular use of multimodal approaches. The correlation between frequent use of techniques and improved results implies that learners with lesser competency may still significantly benefit from these approaches, provided they use them regularly and proficiently.

Furthermore, the significant p-values associated with both the teaching approach and beginning proficiency show not just statistical relevance but also practical significance. Therefore, educators must carefully examine these aspects when designing and executing educational interventions. The study's results contribute to our existing knowledge by demonstrating that while having a certain degree of proficiency is crucial for language acquisition, how it is taught is much more significant for dyslexic learners to advance in their education. The ramifications of these results are substantial for the establishment of teacher training programs. It implies that educators should not only possess information regarding dyslexia as a learning issue but also possess a variety of teaching techniques that may be adapted to accommodate learners at various ability levels.

6. Conclusion

The findings of this study are very illuminating, particularly when considering the Asir area. As to their recommendation, to address the third study question on the obstacles and hindrances to implementation, it would be more efficient to concentrate on enhancing teaching methodologies rather than just emphasizing the learners' initial competency levels. This has the potential to result in more substantial improvements in student achievements. It is crucial to take into account locations such as Asir, where a range of cultural and infrastructural elements might influence educational methods. The findings of the multiple regression analysis showed that the frequency of use was the most important predictor of the learning outcomes. Finally, the ANCOVA analysis revealed that different strategies are efficacious when considering students' beginning competence levels. Teachers are advised to include these tactics in their teaching methods and get individualized training on the topic. Ultimately, this research enhances the area of special education by providing substantiated proof that the use of multimodal instruction may provide positive outcomes when educating dyslexic adolescents.

7. Limitations of the Study

There are potential limitations to this research. Specifically, it concentrated only on the Asir area. Although this facilitated a comprehensive and pertinent study, it implies that the results may not apply to other geographical areas or educational contexts. The study's emphasis on quantitative data may not completely account for the distinct experiences of people and the qualitative components of using multimodal approaches. Furthermore, the study's execution and outcomes may be influenced by the availability of highly skilled educators and enough resources in the region. There is variability in how dyslexia is defined and diagnosed among different schools and districts in the area. This might perhaps have an extra influence on the identification of the particular demographic that the research is targeting.

8. Recommendations

The study's significant results endorse the use of multimodal approaches in the instruction of dyslexic learners. It emphasizes the need for teacher training programs that specifically target these strategies to enhance their efficacy. I propose that educational officials allocate more resources toward the development of a curriculum that includes multisensory approaches and caters to the diverse learning styles of all students. Moreover, it emphasizes the need for further study to explore the optimal use of multisensory approaches and their long-term impact on language competence. By using these strategies, instructors may significantly improve the educational results for kids with dyslexia. This fosters an inclusive educational setting that acknowledges and addresses the many learning styles and difficulties faced by these learners.

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Authors contributions

All authors contributed to the writing process of the paper.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

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Provenance and peer review

Not applicable

Data availability statement

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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