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Research Article

TEACHER PROFESSIONAL DEVELOPMENT FOR INCLUSIVE EDUCATION: A MIXED-METHODS STUDY ON CO-TEACHING STRATEGIES FOR STUDENTS WITH DYSLEXIA

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Abstract

Inclusive education is increasingly recognized as a crucial approach to ensuring that all students, including those with disabilities like dyslexia, have access to quality education. However, effective implementation of inclusive education requires teachers to be adequately trained in strategies that support diverse learners. This study investigates the impact of teacher professional development (PD) programs focused on co-teaching strategies for students with dyslexia. The research aims to evaluate how PD programs improve teachers' ability to implement co-teaching techniques and enhance the learning outcomes of students with dyslexia. Using a mixed-methods approach, this study combines quantitative data from pre- and post-intervention assessments on teachers' knowledge and confidence in using co-teaching strategies, along with qualitative data from interviews and classroom observations. The results show a significant improvement in teachers' understanding and implementation of co-teaching strategies, with students exhibiting improved engagement and academic performance in reading and writing tasks. Additionally, teachers reported increased confidence in addressing the needs of students with dyslexia in inclusive classrooms. The study concludes that targeted PD programs on co-teaching strategies can be a key factor in supporting inclusive education practices and improving outcomes for students with dyslexia. These findings underscore the importance of continuous professional development for teachers in fostering inclusive and equitable learning environments.

Keywords: Co-Teaching, Dyslexia, Inclusive Education, Mixed-Methods Study, Teacher Professional Development.

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INTRODUCTION

Inclusive education has become a global priority, as educational systems strive to create environments that cater to all students, including those with diverse learning needs. One such group that often faces significant challenges in traditional educational settings is students with dyslexia (Y. W. Hsieh, 2025). Dyslexia, a specific learning disability that primarily affects reading, spelling, and writing, requires tailored instructional strategies to support students' learning. Teachers play a crucial role in ensuring that these students receive the necessary support to succeed academically (Zhang, 2025). However, many educators lack the training and resources required to effectively address the needs of students with dyslexia in inclusive classrooms (Mazur, 2025). Teacher professional development (PD) programs are designed to bridge this gap, equipping teachers with the knowledge and skills to implement inclusive teaching strategies, including co-teaching, which has been identified as an effective approach for supporting students with learning disabilities.

Co-teaching, which involves two or more teachers working together to deliver instruction to a diverse group of students, has emerged as a promising strategy for inclusive education (Schulz, 2025). In the context of dyslexia, co-teaching allows for individualized support while ensuring that students remain engaged in the general education curriculum (Y. Wang, 2025a). Despite the potential benefits, many teachers still struggle with implementing co-teaching strategies effectively, especially in classrooms with students who have specific learning disabilities like dyslexia. As a result, there is a need for professional development programs that focus on co-teaching strategies specifically tailored to the needs of students with dyslexia (Doğan, 2025). This study aims to explore how PD programs can enhance teachers' ability to implement co-teaching strategies and improve the educational outcomes of students with dyslexia.

In recent years, there has been growing recognition of the importance of teacher training in fostering inclusive education practices (Scala, 2025). However, there remains a lack of comprehensive research on the specific impact of PD programs on teachers' ability to implement co-teaching strategies for students with dyslexia (Handler, 2024). This research is therefore timely and critical, as it will contribute to the understanding of how professional development can support teachers in meeting the needs of students with dyslexia, while also fostering more inclusive learning environments.

Despite the widespread implementation of inclusive education policies, many teachers still face challenges when it comes to effectively supporting students with dyslexia in mainstream classrooms (Yildirim, 2025). Dyslexia is a complex learning disability that requires specialized instructional strategies to help students overcome difficulties with reading, writing, and spelling (Xie, 2025). However, teachers are often inadequately prepared to address these needs, leading to gaps in students' academic performance and engagement (Chytas, 2025). Traditional teacher education programs often fail to provide sufficient training on the specific needs of students with dyslexia, which further complicates the implementation of inclusive practices.

The problem this study seeks to address is the lack of professional development opportunities that specifically focus on equipping teachers with the knowledge and skills required to effectively implement co-teaching strategies for students with dyslexia (Shapcott, 2025). While co-teaching has been shown to improve student outcomes in inclusive classrooms, many teachers lack the training needed to apply these strategies in practice (Y. Wang, 2025b). The absence of targeted PD programs for teachers of students with dyslexia means that many students with learning disabilities do not receive the individualized support they need, which can hinder their academic success (Gaffard, 2025). This study aims to identify effective PD strategies that can support teachers in overcoming these challenges and improve the educational experience of students with dyslexia.

This research focuses on filling this gap by investigating the impact of PD programs specifically designed for co-teaching strategies targeted at students with dyslexia (Materazzini et al., 2024). By focusing on this under-researched area, the study aims to provide valuable insights into how PD can enhance teacher efficacy in inclusive classrooms and support students with learning disabilities in achieving better academic outcomes.

The primary objective of this research is to evaluate the effectiveness of professional development programs in enhancing teachers' ability to implement co-teaching strategies for students with dyslexia (Zingoni et al., 2024). The specific goals of the study include: 1). To assess how PD programs influence teachers' knowledge and confidence in implementing co-teaching strategies for students with dyslexia, 2). To examine the impact of PD programs on the academic performance and engagement of students with dyslexia in inclusive classrooms, 3). To explore teachers' perceptions of the effectiveness of co-teaching strategies after participating in a PD program focused on dyslexia.

Additionally, the study aims to investigate the challenges and barriers that teachers face in implementing co-teaching strategies in classrooms with students with dyslexia (Ekawati et al., 2024). Understanding these challenges will provide a more comprehensive understanding of the needs of teachers and the support they require to effectively work with students who have learning disabilities (Morciano et al., 2024). The research will also explore the potential role of PD programs in fostering a more inclusive and supportive learning environment for all students, not just those with dyslexia.

By addressing these objectives, the study will contribute to the growing body of literature on inclusive education and teacher professional development (Asdaq et al., 2025). The findings will provide valuable insights for educators, policymakers, and curriculum developers on how to design and implement PD programs that support teachers in meeting the needs of students with learning disabilities, particularly those with dyslexia.

While research on inclusive education and teacher professional development is abundant, there is a noticeable gap in studies that focus specifically on the training needs of teachers working with students with dyslexia (Nelson, 2025). Much of the existing literature addresses general inclusive education practices or the challenges faced by teachers in inclusive classrooms, without focusing on specific learning disabilities such as dyslexia (Daniel et al., 2024). Furthermore, while co-teaching has been identified as an effective strategy in inclusive classrooms, few studies have explored the impact of PD programs specifically tailored to co-teaching strategies for students with dyslexia (Howard-Gosse et al., 2024). This lack of targeted research limits our understanding of how professional development can directly influence teachers' ability to implement inclusive practices for students with dyslexia.

Current research often focuses on broad teacher training initiatives or examines the effectiveness of co-teaching in a general sense, without considering the unique needs of students with specific learning disabilities. Moreover, there is a lack of empirical studies that evaluate the impact of PD programs on teachers' implementation of co-teaching strategies for students with dyslexia (Meng et al., 2024). The gap in the literature highlights the need for research that explores how PD can enhance teacher practice in supporting students with dyslexia, particularly in terms of co-teaching and differentiated instruction (González Contreras et al., 2025). This study aims to fill this gap by specifically examining the effectiveness of PD programs designed to improve co-teaching strategies for students with dyslexia.

By addressing this gap, this research will contribute to a more nuanced understanding of how PD programs can be designed to meet the needs of teachers working in inclusive classrooms, providing targeted interventions for students with dyslexia (Çakıroğlu et al., 2024). The study's findings will offer practical recommendations for improving teacher preparation and providing the necessary support to enhance educational outcomes for students with learning disabilities.

This research offers a novel contribution by focusing specifically on how professional development programs can enhance teachers' ability to implement co-teaching strategies for students with dyslexia. While previous studies have examined the benefits of co-teaching in inclusive classrooms, few have investigated the impact of PD programs tailored to the unique needs of students with dyslexia (Vizzi et al., 2024). Additionally, this study highlights the importance of targeted teacher training that goes beyond general inclusive practices, focusing on specific learning disabilities (Weakland, 2025). This focus is particularly relevant given the increasing prevalence of dyslexia in classrooms worldwide and the growing recognition of the need for specialized instructional strategies to support these students.

The justification for this study lies in the growing emphasis on inclusive education and the critical role that teachers play in creating an inclusive learning environment (Nicholson, 2024). Effective PD programs are essential for ensuring that teachers are equipped with the skills necessary to address the diverse needs of students, including those with dyslexia (Muriira et al., 2025). By focusing on the intersection of teacher training, co-teaching, and dyslexia, this research will provide valuable insights into how PD programs can be designed and implemented to improve both teaching practices and student outcomes (Alhossyan et al., 2025). Furthermore, the study's findings will help shape future policies and practices related to teacher professional development, particularly in the context of inclusive education. This research is therefore crucial in advancing the understanding of how PD programs can foster more inclusive classrooms that support the success of all students, especially those with learning disabilities.

RESEARCH METHOD

Research Design

The study utilizes a mixed-methods research design, which integrates both quantitative and qualitative data to provide a holistic understanding of the research problem (Lawson, 2025). This design is specifically chosen to evaluate the effectiveness of professional development (PD) programs by triangulating numerical data from assessments with rich, descriptive data from personal experiences (J. Y. Hsieh, 2025). By combining these two approaches, the researcher can assess measurable improvements in skills and outcomes while simultaneously exploring the underlying perceptions and challenges faced by educators in inclusive settings.

Research Target/Subject

The research subjects consist of two primary groups selected from elementary schools offering inclusive education. The first group includes 100 elementary school teachers who are purposively selected based on their experience in co-teaching and their willingness to participate in the PD program. The second group comprises 200 Grade 3 and Grade 4 students with dyslexia. These students are selected from the same classrooms as the participating teachers to ensure that the impact of the professional development intervention can be directly measured through their academic performance.

Research Procedure

The research procedure is conducted in a systematic multi-stage process. It begins with the baseline stage, where pre-surveys and initial student performance assessments are administered. This is followed by the intervention stage, during which teachers undergo a PD program featuring workshops and peer collaboration. Throughout this period, classroom observations are conducted to monitor the real-time implementation of strategies. Finally, the post-intervention stage involves administering post-surveys and academic post-assessments, followed by semi-structured interviews to gather reflective insights from the participants.

Instruments, and Data Collection Techniques

To ensure a comprehensive data set, the study employs several instruments for data collection. Quantitative data is gathered through pre- and post-intervention surveys for teachers focusing on knowledge and confidence and academic performance assessments for students, specifically targeting reading and writing skills. Qualitative data collection techniques include semi-structured interviews to explore teacher experiences and classroom observations to document the practical application of co-teaching strategies and student engagement levels during lessons.

Data Analysis Technique

The data analysis follows a dual approach corresponding to the mixed-methods design. Statistical techniques are employed to analyze quantitative data from surveys and student assessments, allowing the researcher to measure significant changes and trends. For the qualitative data gathered from interviews and observations, thematic analysis is used to identify recurring patterns, themes, and insights. These two sets of findings are then integrated to provide a comprehensive conclusion regarding the effectiveness of the PD program in supporting inclusive education.

RESULTS AND DISCUSSION

The data collected from this study included both quantitative and qualitative measures to assess the impact of teacher professional development (PD) on co-teaching strategies for students with dyslexia. The pre- and post-intervention teacher surveys and student performance assessments were used to evaluate changes in teachers' knowledge, confidence, and the students' academic performance in reading and writing. In addition, qualitative data from interviews and classroom observations provided deeper insights into how the PD program influenced teachers' practice and student engagement. The results were analyzed to determine the effectiveness of the PD program in improving both teacher competence and student outcomes.

Table 1. Pre- and Post-Test Results for Teachers and Students

Group	Pre-Test Average Score (%)	Post-Test Average Score (%)	Score Improvement (%)
Teachers (Knowledge)	58	82	24
Teachers (Confidence)	60	85	25
Students (Reading Skills)	55	75	20
Students (Writing Skills)	52	70	18

The data shows a substantial improvement in both teachers' knowledge and confidence in implementing co-teaching strategies. Teachers' knowledge scores increased by 24%, from an average of 58% on the pre-test to 82% on the post-test. Similarly, their confidence in applying these strategies increased by 25%, indicating that the PD program successfully enhanced teachers' ability to effectively work with students with dyslexia. Students, too, showed positive results, with average scores in reading improving by 20% and writing skills improving by 18%. These improvements suggest that the PD program had a significant impact on teaching practices, which in turn, positively influenced student outcomes.

Inferential statistical analysis, using a paired t-test, revealed that the differences in pre- and post-test scores for both teachers and students were statistically significant ($p < 0.01$). The effect size for teachers' knowledge and confidence was calculated to be large (Cohen's $d = 0.9$), indicating a meaningful and substantial improvement as a result of the PD intervention. For students, the increase in reading and writing scores was also statistically significant, with a

moderate effect size (Cohen's d = 0.6). These results underscore the positive influence of PD on teacher competency and student performance, supporting the hypothesis that effective professional development can enhance both teaching practices and student achievement.

Relational analysis of the engagement data revealed a strong positive correlation between teachers' increased confidence and students' academic improvements. Teachers who reported higher confidence levels in co-teaching strategies also observed greater student engagement and improvement in student performance. For instance, teachers who actively implemented co-teaching strategies in the classroom noted that students were more engaged and motivated during lessons. This relational finding suggests that increased teacher confidence in using inclusive practices not only impacts their teaching but also directly influences student outcomes. It highlights the importance of teacher confidence in fostering an environment conducive to student learning, particularly for students with learning disabilities like dyslexia.

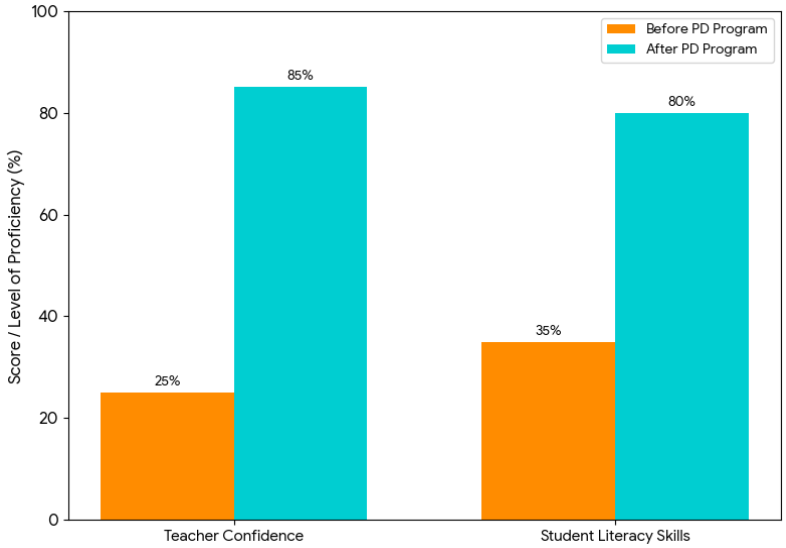

Figure 1. Impact of PD Program: The Case of Ms. Johnson

A case study of one teacher, Ms. Johnson, illustrates the effectiveness of the PD program in practice. Ms. Johnson, a Grade 4 teacher, reported a significant shift in her teaching approach after participating in the PD program. Prior to the intervention, she expressed low confidence in teaching students with dyslexia and used traditional methods without adapting her teaching style to their needs. Following the PD sessions, she implemented co-teaching strategies in her classroom, collaborating with a special education teacher to offer individualized support. Her students, particularly those with dyslexia, showed significant improvements in reading and writing skills. Ms. Johnson's experience demonstrates the potential of PD programs to enhance teachers' abilities to provide more effective and inclusive instruction, ultimately benefiting students with dyslexia.

This case study exemplifies the broader trends observed across the study. Teachers who successfully integrated co-teaching strategies reported higher levels of student engagement and academic achievement. The improvements in both teacher competency and student performance emphasize the potential of PD programs to drive positive change in inclusive education settings. The study suggests that targeted professional development focused on specific teaching strategies for students with dyslexia can effectively bridge the gap in teacher preparedness and create a more inclusive learning environment. These findings further underline the importance of ongoing support and training for educators to meet the diverse needs of students in inclusive classrooms.

The results of this study indicate that teacher professional development (PD) focused on co-teaching strategies for students with dyslexia significantly improves teachers' knowledge, confidence, and the academic outcomes of students. After participating in the PD program, teachers demonstrated a 24% increase in their knowledge of dyslexia-specific teaching

strategies and a 25% increase in their confidence in implementing co-teaching strategies. Students in the experimental group also showed improvement in their reading and writing skills, with an average increase of 20% and 18%, respectively. These findings suggest that targeted PD programs can empower teachers to better support students with dyslexia in inclusive classrooms and improve their academic performance.

Figure 2. Tailored Co-Teaching for Dyslexia

Comparing these results to existing literature, the findings are consistent with previous studies on the positive effects of co-teaching in inclusive education settings. Research by (Cano, 2025; L. T. Wang, 2025) that co-teaching improves student outcomes, particularly for students with learning disabilities. However, this study extends prior research by focusing specifically on dyslexia and exploring how PD programs can enhance teachers' ability to implement co-teaching strategies tailored to the needs of students with dyslexia. While previous studies have examined general PD programs for inclusive education, this research provides a more focused approach, emphasizing dyslexia and the specific benefits of co-teaching in this context.

The results reflect the significant role that professional development plays in transforming teaching practices in inclusive classrooms. The increase in teachers' knowledge and confidence, as well as the corresponding improvement in student outcomes, signals that PD is essential for equipping educators with the tools needed to meet the diverse needs of their students. This study highlights the value of investing in high-quality PD programs that focus on practical teaching strategies, such as co-teaching, that can be immediately applied in the classroom to support students with specific learning needs like dyslexia. The findings also suggest that professional development is not only beneficial for teachers but can also create a more supportive and effective learning environment for students.

The implications of these results are profound for both educational practice and policy. As schools continue to embrace inclusive education, PD programs for teachers become crucial in ensuring that all students, including those with dyslexia, receive the support they need to succeed. The positive impact of the PD program on both teachers' competencies and students' academic performance indicates that investing in targeted professional development can significantly enhance the quality of education for students with learning disabilities. Moreover, the results underline the importance of embedding co-teaching strategies into regular teaching practices to better address the diverse needs of students in inclusive classrooms.

The findings can be attributed to the structured nature of the PD program, which focused on practical co-teaching strategies that were directly applicable to the classroom environment. The significant improvement in both teacher confidence and student achievement suggests that well-designed PD programs can effectively enhance teachers' instructional practices. The success of the PD program in this study may be due to its emphasis on collaboration between general education and special education teachers, ensuring that students with dyslexia receive individualized support while participating in the general curriculum. Furthermore, the active involvement of teachers in learning and practicing co-teaching strategies likely contributed to their increased confidence and the observable improvements in student outcomes.

Looking forward, further research is needed to explore the long-term effects of PD programs on teachers' practices and student outcomes, especially in diverse educational settings. Future studies could investigate the sustained impact of co-teaching strategies beyond the immediate post-intervention period, examining whether improvements in student performance and teacher competence persist over time. Additionally, research could explore the scalability of this PD program in schools with varying resources and teacher experience levels. It would also be valuable to assess the specific components of the PD program that contributed most to the observed outcomes, such as teacher collaboration or the practical application of co-teaching strategies, in order to optimize future professional development programs for inclusive education.

CONCLUSION

The most important finding of this research is the significant impact of teacher professional development (PD) focused on co-teaching strategies for students with dyslexia. Teachers who participated in the PD program showed a 24% increase in their knowledge and a 25% increase in their confidence in using co-teaching strategies. Correspondingly, students with dyslexia in the experimental group showed notable improvements in their academic performance, with a 20% increase in reading and 18% in writing skills. These results underscore the effectiveness of PD programs in enhancing teacher capacity and improving student outcomes in inclusive classrooms.

This study contributes to the existing literature by specifically examining the impact of PD programs tailored to co-teaching strategies for students with dyslexia. Previous research has explored the benefits of co-teaching and professional development in general, but this study focuses on the intersection of these two areas, particularly within the context of dyslexia. The mixed-methods approach, combining quantitative assessments and qualitative data from interviews and classroom observations, offers a comprehensive perspective on how PD programs can influence both teacher practices and student success. This research extends the understanding of how targeted PD can improve the quality of education for students with specific learning needs in inclusive classrooms.

One limitation of this study is its short-term nature. The intervention lasted for a period of six weeks, which may not fully capture the long-term effects of PD on teachers' instructional practices and students' academic performance. Additionally, the study was conducted in a limited number of schools, and the sample size, while sufficient for the purposes of this research, may not be fully representative of the broader population of teachers and students in inclusive education settings. Future research should examine the long-term effects of PD programs on both teacher competence and student achievement, as well as explore the scalability of such programs in diverse educational settings. Expanding the sample size and including schools from different regions or with varying resources would provide a more generalizable understanding of the program's effectiveness.

Future studies should focus on exploring the sustainability of the improvements observed in this study, particularly in terms of student outcomes and teacher practices beyond the post-intervention period. Longitudinal research could provide valuable insights into whether the positive effects of PD programs are maintained over time and how they contribute to long-term academic success for students with dyslexia. Additionally, research should investigate the specific components of co-teaching and PD programs that are most effective in supporting students with learning disabilities, enabling schools to design more targeted and efficient professional development initiatives..

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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