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Empowering Families Through PECS: Enhancing Communication for Children with Autism in Saudi Arabia

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Abstract

This mixed-methods study explored the implementation of the Picture Exchange Communication System (PECS) by families of children with Autism Spectrum Disorder (ASD) in Saudi Arabia. Quantitative data were collected through a multiple-intervention (ABAB) design with five families, assessing parent implementation accuracy and child communication outcomes across baseline, online training, and in-person training phases. Results indicated steady improvement in both parent accuracy and child correct responses, with the highest gains following in-person training.

To explore broader implementation challenges, semi-structured interviews were conducted with five certified special education teachers experienced in using PECS. Thematic analysis revealed key issues related to feasibility, adherence, and acceptability, including difficulty navigating PECS protocols, limited access to culturally appropriate training, and lack of collaboration between schools and families. Despite these barriers, teachers emphasized the value of PECS in improving communication and social engagement.

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Findings underscore the need for culturally responsive training models that support both families and educators. Sustainable implementation of PECS in Saudi Arabia requires accessible resources in Arabic, shared school-home collaboration, and ongoing professional support. This study contributes to the growing body of implementation science literature by highlighting the contextual adaptations needed to enhance evidence-based autism interventions in non-Western settings.

Keywords: Autism, PECS, Implementation, Training, Barriers.

Introduction

The prevalence of ASD has been rising globally, and Saudi Arabia is no exception. Recent studies indicate a significant increase in the number of children diagnosed with ASD within the Kingdom (Alnemary et al., 2017). This growing recognition of ASD has heightened the demand for effective interventions that can be implemented not only by professionals in educational settings but also by families at home. As awareness of autism increases, so does the need for accessible, culturally appropriate strategies to support children with ASD, particularly in developing their language and communication skills.

Children with ASD often face challenges that significantly impact their ability to engage in social interactions. These challenges may include repetitive behaviors, difficulty in adapting to changes in their environment, and atypical responses to sensory experiences. Such behaviors can make it difficult for family members to foster effective communication and learning at home, which are critical for a child's overall development. At the same time, family members, much like educators, often struggle with how best to support their children with ASD, particularly in enhancing language and communication skills. A critical need exists for training that equips

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families with the knowledge and tools to implement evidence-based practices (EBPs) effectively in the home environment (Kasari, Connie, et al, 2015).

The Picture PECS is one such EBP that has been proven to improve both language and communication in children with autism (Lerna et al., 2012). PECS is an intervention strategy that enables children to initiate communication by exchanging pictures for desired objects or activities, thereby fostering greater independence and reducing frustration. Additionally, PECS is easy for family members to integrate into daily life at home.

For family members to successfully implement PECS, they need comprehensive training that not only covers the fundamentals of the system but also equips them with strategies to overcome common challenges, as highlighted in previous studies (Braun & Clarke, 2006). This study focuses on training five family members of children with ASD to use PECS effectively, evaluating how well the training prepares them to support their children's communication needs and assessing its impact on the children's ability to communicate.

Literature Review

Communication challenges among individuals with ASD and other developmental disabilities often manifest as nonverbal behaviors or limited speech, such as echolalia or fragmented verbalizations (Mirenda, 1997; Paul, 2005). For many, the absence of spoken language persists into adulthood, particularly when families lack training to support communication development (Westling & Fox, 2004). The PECS, developed by Bondy and Frost (1993, 1994), addresses these challenges through a structured, picture-based approach designed to teach functional communication skills. Unlike methods that rely on passive gestures or signs, PECS emphasizes active initiation by training individuals to approach a partner, gain attention,

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and exchange a picture symbol a process that reduces reliance on external observation and enhances communicative clarity (Chiang & Carter, 2008; Koegel, 2000).

Research underscores the efficacy of PECS in improving communication skills across diverse populations, including children with ASD and other developmental disabilities (Homlitas et al., 2014; Koudys et al., 2021). However, the system's success is closely tied to caregiver involvement. While approximately 25% of autistic children may never acquire spoken language (Alsayedhassan, 2021), studies demonstrate that family-implemented PECS training can foster skill generalization across settings, such as home and school environments (Carre et al., 2009; Chaabane et al., 2009). For instance, Chaabane et al. (2009) reported successful generalization of PECS use across stimuli, though their study highlighted a critical gap: the absence of long-term maintenance data. This limitation was highlighted by Cooper et al. (2020), who emphasized the need for extended follow-ups to determine whether communication development is sustained after interventions.

Historically, PECS training has been administered primarily by speech language professionals and special educators (Ganz et al., 2013; Howlin et al., 2007). Yet, emerging evidence suggests caregivers, when adequately trained, can implement PECS with high fidelity, leading to positive outcomes for children (Carson et al., 2012; Koudys et al., 2021). For example, structured training programs for caregivers and teachers have improved both treatment adherence and child communication outcomes. However, some studies, such as Koudys et al. (2021), have focused on caregiver skills without measuring child responses. More recently, innovations like the caregiver-mediated model explored by Esteves et al. (2024) aim to expand family-centered approaches, addressing gaps in scalability and sustainability.

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Despite these advancements, several critical questions remain unanswered. While PECS effectively promotes spontaneity and reduces communication barriers, the literature lacks comprehensive reviews on family training methodologies (Frost & Bondy, 1994, 2002; Preston & Carter, 2009).

Furthermore, more research is needed to understand how well skills are maintained after the intervention and to explore the broader societal impact of caregiver-led PECS programs. Future studies should focus on assessing lasting outcomes and creating standardized training frameworks that equip families to support ongoing communication development effectively.

In conclusion, PECS represents a transformative tool for individuals with communication difficulties, but its full potential will be reached if families are integrated into the intervention process. By bridging the gap between clinical practice and home-based implementation, caregiver-mediated PECS training not only improves immediate communication outcomes but also fosters the development of expressive language skills in students with ASD (Esteves et al., 2024).

The purpose of the study

Families of children with ASD play a vital role in supporting their child's development, especially in communication and social functioning. However, many families in Saudi Arabia face significant challenges in accessing and implementing effective evidence-based practices (EBPs) in home environments. Although training programs exist for teachers, they often lack a strong focus on EBPs, leaving both educators and families underprepared (Alghamdi A.S, 2024).

The PECS is a widely recognized EBP that enhances language and communication skills in children with autism. Despite its proven effectiveness, there is a notable gap in culturally

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relevant and accessible training for family members who are often the primary source of day-to-day support and generalization of learned skills outside clinical or educational settings.

In Saudi Arabia, where awareness of autism has been steadily increasing (Alnemary et al., 2017), the demand for family-centered, culturally appropriate interventions remains largely unmet. To address this gap, this study explored not only the impact of PECS training on child communication outcomes but also examined implementation variables such as feasibility, cultural adaptation, parental adherence, and acceptability. To provide a deeper understanding of these implementation factors, qualitative interviews were conducted with five special education teachers following the intervention.

Research Questions

This study was guided by the following research questions:

1- What key challenges do family members face when implementing the PECS with their children at home?
2- How effective are the online Autism Focused Intervention Resources and Modules (AFIRM) in improving family members' ability to use PECS to support their child's communication development?
3- What impact does the use of PECS at home, following family training, have on the communication skills of children with ASD?
4- What insights do special education teachers provide regarding the feasibility, acceptability, and cultural adaptation of PECS implementation in Saudi Arabia?

Conceptual Framework

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The conceptual framework for this study draws from well-established theories in special education, communication development, and implementation science related to autism interventions. The primary focus of the study is on understanding how evidence-based practices particularly the PECS are implemented by families to support children with ASD, with special attention to cultural context, feasibility, and sustainability.

This framework connects key variables including training quality, implementation challenges, and cultural adaptation, and it is organized into three components:

First, the study emphasizes the importance of using evidence-based practices (EBPs) that have been empirically validated to improve outcomes for individuals with ASD (Wong et al., 2015). PECS is one such practice that supports functional communication in non-verbal or minimally verbal children (Bondy & Frost, 1994). In this context, the study explores how families understand and apply PECS at home, and the extent to which its core principles are maintained during implementation. This also includes family perceptions of acceptability and relevance of PECS within their daily routines.

Second, training is recognized as a critical factor in the successful implementation of EBPs both for educators and family members (Stahmer et al., 2015). Inadequate or overly theoretical training can limit effective application (Odom et al., 2010). This component examines the effectiveness of PECS training provided to families, specifically through AFIRM modules and in-person sessions. It also assesses the feasibility of delivering these trainings in the Saudi context and how well families are able to adhere to PECS protocols after receiving support.

Third, the framework addresses known challenges that impact the implementation of PECS, such as time constraints, limited resources, and the difficulty of adapting interventions to

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diverse home settings (Charlop-Christy et al., 2002). These barriers are explored both through parental feedback and qualitative interviews with five special education teachers, offering external insights into the real-world implementation of PECS. Themes such as confusion, preparation, cooperation, and learning methods are used to analyze implementation fidelity and identify areas for future adaptation and support. By integrating quantitative outcomes with qualitative insights, this framework supports a broader understanding of what makes PECS implementation effective and sustainable in culturally specific environments such as Saudi Arabia.

Quantitative Method

A multiple intervention design was applied to assess changes and evaluate the participants' progress in using PECS to improve communication with their child with ASD. The design consisted of four phases following an ABAB structure: (A) Baseline Phase, (B) Online Training Intervention, (A) Withdrawal Phase (to assess retention without ongoing support), and (B) In-Person Training and Generalization. Each phase required stability before transitioning to the next (Kratochwill et al., 2012).

The baseline phase was conducted over one week and consisted of four 1-hour sessions (two sessions per day over five days). Participants were given a PECS steps sheet and a data collection form but received no feedback. These sessions, totaling five hours, were used to assess participants' initial PECS implementation with their child. After the baseline, participants completed an open-ended questionnaire to evaluate their understanding of the PECS phases and steps.

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In the online training intervention phase, participants accessed the AFIRM PECS training modules, along with data sheets and visual aids for tracking progress. This phase lasted two weeks, consisting of four sessions per week, totaling eight hours. After completing this phase, participants filled out the same open-ended questionnaire used in the baseline phase to assess their progress and understanding.

The in-person training intervention was conducted over two weeks, with five consecutive days per week, and each session lasted three hours. Participants and their children attended classroom-based sessions to review and demonstrate the six PECS phases. The trainer guided parents step-by-step through each phase using practical examples. Parents were shown how to initiate communication, build sentence structures, and teach their child to respond to questions and make comments using PECS. Ongoing support was provided to ensure parents felt confident in implementing PECS correctly with their child.

Selection of participants

Five parents were recruited to participate in this study. All parents have children who were diagnosed with autism. As part of the inclusion criteria, all children were required to be between the ages of 6 and 10 and have a diagnosis of autism, specifically within the mild range of the spectrum. Additionally, children had to be capable of responding to basic instructions, such as sitting at a table and following directions from their parents. For the exclusion criteria children who exhibit severe problematic behavior when given demands or fall within the severe range of the spectrum and not being between the ages range were excluded from this study. All parents must be above the age of 25 and had experience working with their child with autism.

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Parents who are do not have a child with ASD or lacked experience working with a child with autism or never access to a computer or tablet were also excluded from this study.

Dependent Variables Measurement

The study's dependent variables included the accuracy of PECS implementation by parents and the percentage of correct child responses. Parent implementation was assessed based on adherence to each PECS step, with errors marked if steps were skipped or performed incorrectly. If a child independently responded correctly, certain steps (e.g., Steps 5 and 6) were marked as N/A. A correct child response was defined as answering correctly within 5 seconds of instruction. Data were recorded on paper sheets, and percentage was used to measure accuracy, calculated by dividing correct responses by total trials and multiplying by 100.

Data collection

The data collection involves measuring the accuracy of three parents in implementing the PECS intervention and their targeted child responses across different phases. Starting with baseline (no training), initial online training, in-person training, and finally post-training. During each phase, accuracy is assessed through observational recording, where each instance of correct and incorrect implementation is noted, including each child correct responses with their parent. Accuracy percentages are calculated for each session to track changes over time, allowing for analysis of the effectiveness of each training phase on the parents' ability to accurately use the PECS intervention.

Baseline

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During the one-week baseline phase, all participants were introduced to the PECS phases and steps sheet, which included a list of required steps and a data collection sheet. No feedback was provided to participants during this phase. The baseline phase consisted of four 1-hour sessions spread over five days, totaling five hours. These sessions were observed and recorded to assess participants' initial levels of PECS implementation with their child with ASD. After completing the baseline phase, each participant filled out an open-ended questionnaire designed to evaluate their current understanding of the PECS phases and steps.

PECS Intervention (Online Training)

During this two-week online training phase, participants accessed the Autism Focused Intervention Resources and Modules (AFIRM) for PECS, requiring a computer, an internet connection, and the AFIRM modules themselves. Participants received digital copies and printouts of PECS data sheets to track progress. Visual aids and stimuli, such as digital images and videos, were utilized to enhance learning. Each parent had access to the module content, their own data sheets, and a method for note-taking, either digitally or with a pen and paper. Additionally, the facilitator had access to a phases and steps checklist specific to the PECS intervention.

Throughout the two-week training period, family member participants were required to complete the modules before implementing PECS with their child. The training consisted of four sessions per week, totaling eight hours across the two weeks. All correct implementations and child responses were observed and collected.

After completing this phase, each participant filled out the same open-ended questionnaire used in the baseline phase. The goal of this questionnaire was to compare

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participants' prior knowledge of the PECS steps with their progress and ensure they fully understood the instructional content. Additionally, it provided insights into the effectiveness of the training. All sessions were recorded through a secure classroom camera for review and further analysis.

PECS Intervention (In-person Training)

This two-week in-person training intervention was conducted in a classroom setting with all participants who had completed the online training phase, along with their targeted child with ASD. The sessions aimed to review and demonstrate the six PECS phases in greater detail, providing practical implementation tips and addressing any questions parents might have. During each session, parents were guided step-by-step through the six PECS phases using practical examples:

- Phase 1: Parents learned how to help their child communicate by exchanging a picture for a desired item, with the trainer modeling the process.
- Phase 2: Parents were taught how to encourage their child to approach them and initiate communication.
- Phase 3: The trainer demonstrated how to help the child choose the correct picture from multiple options.
- Phase 4: Parents were shown how to build simple sentence structures, such as "I want" + desired item, using picture strips.
- Phase 5: The focus shifted to teaching children how to answer questions like “What do you want?”

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- Phase 6: Parents learned how to encourage commenting, enabling their child to use pictures to express observations such as (I see, I like, or I hear)

Ongoing support and feedback were provided to ensure that parents felt confident and capable in using PECS effectively with their child.

This in-person training was conducted over two weeks, with five sessions per week, each lasting three hours, covering both training and implementation. All correct implementations and child responses were observed and recorded.

Generalization probes

Generalization probes were conducted before and after training (pre- and post-training sessions) to assess how well parents and children could apply PECS skills beyond the structured training environment. A 30-minute session was conducted at the end of Week 1 (following the last baseline session) to assess initial generalization. Another 30-minute session took place at the end of Week 6 (after the final post-training session) to evaluate generalization after training.

The same procedures used in the baseline phase were applied, with one key exception: parents were taught a different target skill than the one they had been teaching their child during training. For example, generalization to new targets or stimuli was assessed after parents had already taught their child to respond correctly in the presence of multiple stimuli. This was achieved by introducing new picture stimuli during the assessment phase stimuli that had not been previously introduced during training.

Qualitative Methods

Sampling and Participants

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To explore cultural and practical aspects of PECS implementation, this study included a qualitative component involving interviews with five Saudi special education teachers. These teachers were purposefully selected using expert sampling, based on their professional credentials in special education and documented experience using PECS with students with ASD. All participants held certification in special education with a concentration in ASD and had practical classroom experience implementing PECS.

Data Collection

The goal of the interviews was to gain insights into the feasibility, acceptability, adherence, and cultural adaptation of PECS when applied in local educational settings. A semi-structured interview protocol was used, allowing consistency across interviews while enabling follow-up questions to explore emerging themes. Interviews were conducted in Arabic via Zoom, each lasting approximately 45 to 60 minutes, and were audio-recorded with participant consent. Transcripts were shared with participants for member checking to ensure credibility and accuracy.

Data Analysis

Thematic analysis was applied using an inductive approach, following Braun and Clarke's (2015) six-phase model. After transcription and familiarization, open coding was used to identify patterns and group data into themes. The final themes were reviewed, refined, and defined to reflect key aspects of implementation. Teacher responses highlighted several areas of concern related to the real-world use of PECS, organized into five main themes.

Study Timeline

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Phase	Duration	Description
Week 1	Baseline Phase (2 sessions over 5 days)	Parents are given PECS steps and data collection sheets without feedback. Child performance is observed. Open-ended questionnaires are completed to assess prior knowledge.
Weeks 2-3	Online Training Phase (2 weeks, 4 sessions)	Parents complete AFIRM PECS` training modules, receive instructional videos, and track progress. Pre- and post-training assessments are conducted.
Weeks 4-5	In-Person Training Phase (5 days per week, 2-hour sessions)	Parents participate in live demonstrations of PECS implementation, receive direct feedback, and practice with their child in structured settings.

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Week 6	Post-Training Generalization & Evaluation (Final week, 2 sessions)	Parents implement PECS in natural home settings with minimal guidance. Final assessments, observations, and open-ended questionnaires are completed.
Week 7-8	Five semi-structured interviews each lasting approximately 45 to 60	The semi-structured interviews were conducted in a setting that was determined in advance by the researcher and participant.

Quantitative Findings

The findings revealed that parents demonstrated a mean accuracy of 46.46% (SD = 21.03%) across all phases, with the highest variability observed in the post-training phase (SD = 11.81%) and the most consistent performance during the Baseline phase (SD = 2.89%). Children showed a slightly lower mean accuracy of 41.67% (SD = 18.18%), with their highest variability also occurring in the post-training phase (SD = 13.23%) and their most consistent performance during both the Baseline and In-Person Training phases (SD = 2.89%). Across all phases, both

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parents and children exhibited progressive improvement, with parents generally achieving higher mean accuracy scores than children. However, the post-training phase showed the highest variability for all participants, suggesting differences in skill retention and implementation consistency.

Participants accuracy Summary?

Phase	Parent Mean	Parent SD	Child Mean	Child SD
Baseline	18.33	2.89	18.33	2.89
Training Phase 1	40.0	10.0	35.0	5.0
In Person Training	56.67	10.41	48.33	2.89
Post Training	70.83	11.81	65.0	13.23

However, as training progressed, parents' accuracy increased to 40.0% (SD = 10.0) in the first training phase and further improved to 56.67% (SD = 10.41) following in-person training. This progression was reflected in children's correct responses, which rose from 18.33% (SD = 2.89) at baseline to 35.0% (SD = 5.0) after initial training and 48.33% (SD = 2.89) post in-person training.

The most significant improvements occurred after training was completed, with parents achieving a mean accuracy of 70.83% (SD = 11.81) and children reaching 65.0% (SD = 13.23) in the post-training phase. These results highlight the positive impact of structured, phased training programs, reinforcing the importance of parental involvement and interactive learning in improving intervention effectiveness.

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The following graphs illustrate the accuracy levels of participants' implementation scores across the Baseline and Intervention sessions. Results indicate a significant improvement in parents' ability to implement the PECS strategy, which correlated with a notable increase in their children's correct responses. Compared to the Baseline phase, where accuracy levels were inconsistent, post-training assessments revealed a steady upward trend in both parental implementation accuracy and child response rates.

Figure 1. Presents Parent 1's accuracy levels in implementing the PECS intervention, along with their child's correct response rate across different phases. The figure illustrates a clear improvement in both the parent's implementation accuracy and the child's responses following training.

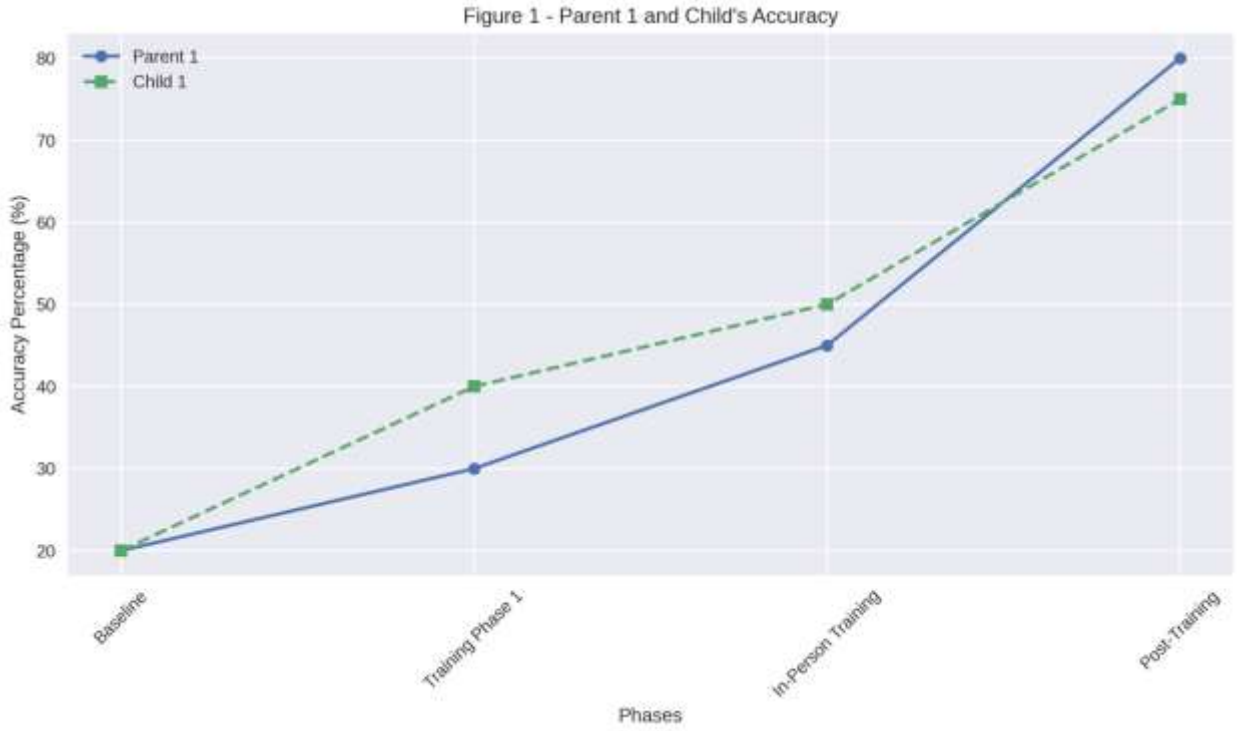

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Figure 1. illustrates Parent 1's accuracy in implementing the PECS intervention with their child. During the Baseline phase, the parent demonstrated low and inconsistent accuracy, with fluctuations and no clear trend in either direction. When the initial training phase began, the parent's accuracy improved slightly, reaching 30%.

Following in-person training, accuracy increased to 45%, showing moderate improvement. However, after completing the full in-person training phase, the parent's accuracy rose sharply to 80% and remained stable in all subsequent sessions. These findings suggest that in-person training was particularly effective in helping the parent implement the PECS intervention accurately and consistently.

Child of Parent 1. During the Baseline phase, with the parent's low and inconsistent use of the PECS intervention, the child's correct responses remained low, ranging between 20–30%. When the parent reached 30% accuracy in the initial training phase, the child's correct responses improved slightly, reaching 40%.

After in-person training, as the parent's accuracy increased to 80%, the child's correct responses rose significantly, reaching 75%. This suggests that more consistent reinforcement from the parent during this phase contributed to the child's improved performance.

Figure 2. Presents Parent 2's accuracy levels in implementing the PECS intervention, along with their child's correct response rate across different phases. The figure illustrates a clear improvement in both the parent's implementation accuracy and the child's responses following training.

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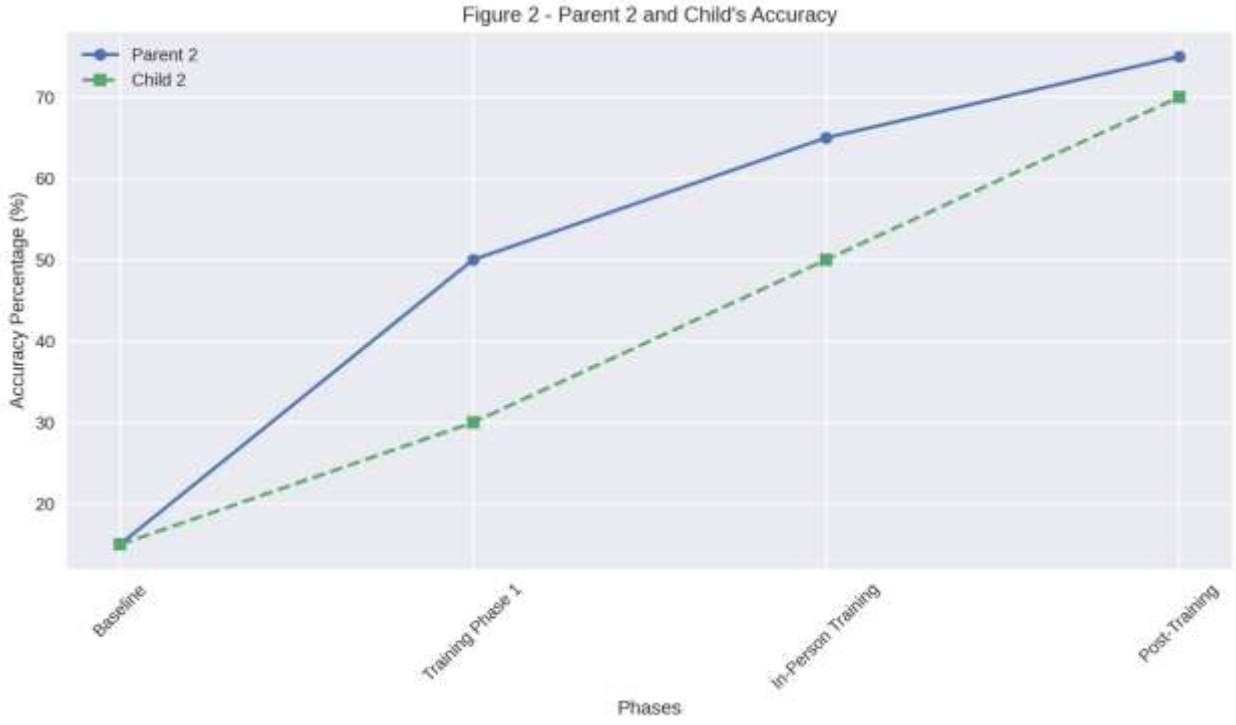

Figure 2. Presents the results for Parent 2, who demonstrated a significant improvement in implementing the PECS intervention, even during the baseline phase. Unlike Parent 1, this participant showed early progress, with accuracy increasing slightly before formal training began.

During baseline, the parent's accuracy fluctuated between 15% and 20%. However, after the first training phase, accuracy began to improve steadily. Following two sessions of online training and in-person training, the parent’s accuracy reached 75%, demonstrating a strong and lasting effect of the PECS intervention. These findings suggest that training significantly enhanced the parent's ability to implement the intervention with greater accuracy compared to the baseline phase.

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Child of Parent. As Parent 2's implementation of PECS improved, their child's correct responses also increased gradually. At baseline, the child exhibited a 20% correct response rate. However, as the parent's accuracy improved during the training phases, the child's correct responses rose to 50% after the first training session and eventually reached 65% following in-person training, where the parent achieved 75% accuracy.

These results indicate that more accurate implementation of PECS by the parent was associated with an increase in the child's correct responses, further supporting the effectiveness of the intervention.

Figure 3. Presents Parent 3's accuracy levels in implementing the PECS intervention, along with their child's correct response rate across different phases. The figure illustrates a clear improvement in both the parent's implementation accuracy and the child's responses following training.

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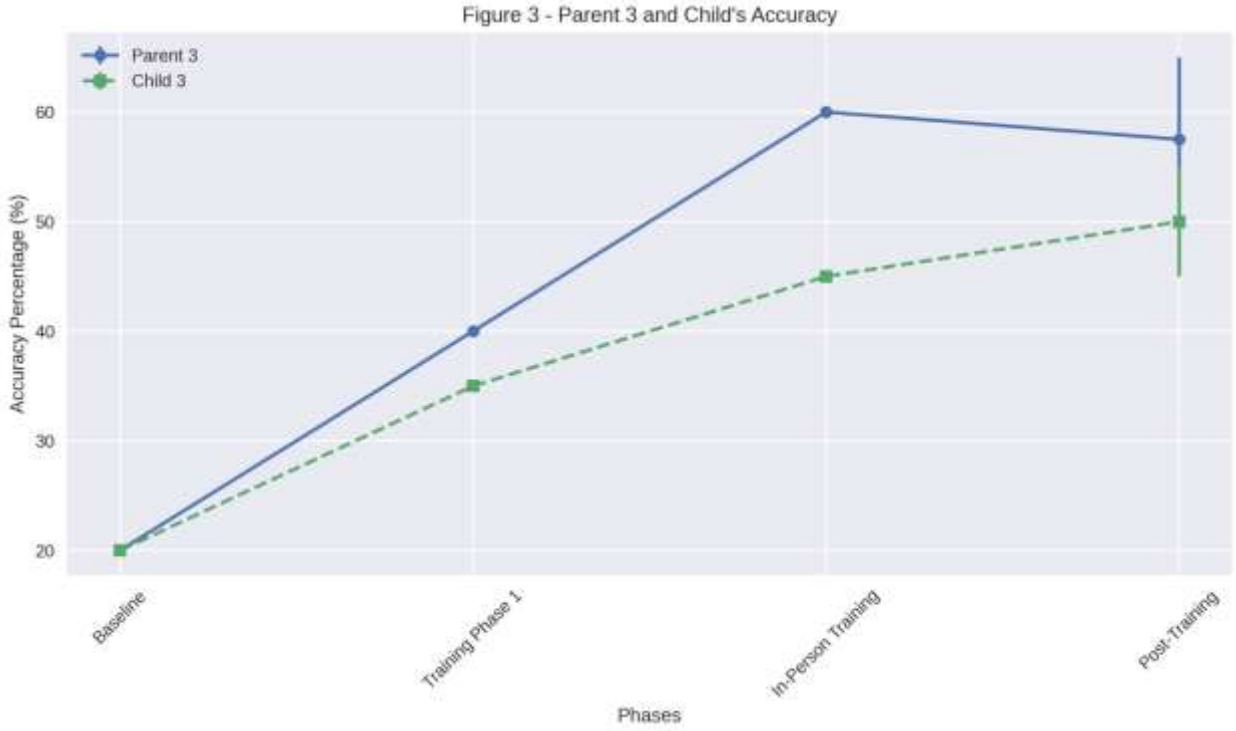

Figure 3. illustrates Parent 3's accuracy in implementing the PECS intervention with their child. During the baseline phase, Parent 3 demonstrated fluctuating accuracy levels, starting at 20% and showing moderate variability.

Once the first training phase began, the parent's accuracy improved slightly, reaching 40%. However, unlike the previous two participants, Parent 3's accuracy remained relatively stable, maintaining 40–45% without significant increases. After completing in-person training, the parent initially showed rapid improvement, achieving 60% accuracy. However, this improvement was not sustained over time. In subsequent sessions, accuracy levels fluctuated between 50% and 65%, with occasional dips below 50%, suggesting inconsistency in implementing the PECS intervention.

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Child of Parent 3. The child's correct responses mirrored the parent's inconsistent performance. At baseline, the child's accuracy was 20%. During training, when the parent reached 45% accuracy, the child's responses increased to 35%. However, due to the variability in the parent's implementation, the child's post-training responses fluctuated between 45% and 55%, showing some improvement but less consistency than observed in Parent 1 and Parent 2. While Parent 3 demonstrated some improvement with training, their accuracy in implementing the PECS intervention did not reach the consistent high levels observed in Parents 1 and 2. This pattern suggests that additional support or follow-up training may be necessary for some individuals to fully integrate the intervention with accuracy and consistency.

Overall, the results indicate that improvements in parents' accuracy with the PECS intervention directly influence their children's correct responses. Parents 1 and 2 demonstrated stable progress with training, achieving high accuracy levels, which significantly improved their children's performance. In contrast, Parent 3's variability in implementation accuracy was reflected in fluctuating child responses.

These findings suggest that while PECS intervention training can effectively enhance both parent and child performance, some parents may require additional support or follow-up training to achieve fluent and consistent implementation. This, in turn, could lead to more stable and lasting improvements in their children's communication outcomes.

Discussion

The findings of this study align with previous research demonstrating the critical role of parent training in improving communication skills in children with autism (Ganz et al., 2012). Additionally, children's communication skills significantly improved when parents actively

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participated in structured intervention programs. Likewise, Howlin et al. (2007) reported that parents receiving structured PECS training demonstrated a gradual but meaningful improvement in their ability to implement PECS techniques. This improvement, in turn, led to enhanced child communication outcomes.

As training progressed, a steady increase in parental accuracy was reported. During the first training phase, accuracy improved to 30%, leading to a corresponding rise in the child's correct responses to 40%. This suggests that even modest gains in parental understanding and application of intervention strategies can positively impact child outcomes.

Detailed Analysis of Training Phases

The in-person training phase emerged as a critical turning point in the intervention. Unlike online training, which primarily focused on theoretical knowledge, in person training provided hands on, guided instruction that allowed parents to practice PECS intervention in real settings. Parental accuracy increased to 45%, and the child’s correct responses rose to 50%. These findings underscore the importance of interactive training, as supported by Charlop Christy et al. (2002), who noted that parents learn best when training involves direct engagement and real settings feedback. In this study, parents benefited not only from step-by-step demonstrations but also from immediate correction and reinforcement, which likely contributed to their increased confidence in implementing PECS.

The post-training phase demonstrated the most substantial improvements, with parental accuracy reaching 80% and the child's correct responses increasing to 75%. This significant progress suggests that structured, multi-phase training can lead to sustained improvement in

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implementation accuracy. Notably, these findings align with Stahmer et al. (2015), who emphasized that long term retention of intervention strategies depends on comprehensive and consistent training. Parents in this study did not simply acquire new skills but retained and applied them effectively over time, further validating the effectiveness of the training approach.

Qualitative Findings

To complement the quantitative findings, semi-structured interviews were conducted with five certified special education teachers who regularly use PECS with students diagnosed with ASD. Thematic analysis of these interviews revealed five core themes that reflect teachers' perspectives on the implementation of PECS in Saudi classrooms. These themes address practical, cultural, and training-related variables including feasibility, adherence, acceptability, and adaptation highlighting both the strengths and challenges of applying PECS in real-world educational settings.

Theme 1: Difficulty Navigating PECS Phases and Protocols.

Teachers reported uncertainty about how to correctly follow and transition through the six PECS phases. Although most had used PECS before, they lacked clarity on implementation details, especially without access to Arabic resources or ongoing coaching.

"We use PECS, but we're not always sure if we're doing it right," one teacher explained.

Others noted they often improvised steps or terminology, relying on personal judgment rather than standardized procedures. This reflects a need for clear, culturally adapted training and tools to support confident and accurate PECS implementation in real-world classrooms.

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Theme 2: Limited Training and Preparation for PECS Use.

Teachers consistently reported insufficient training and preparation for effectively implementing PECS. Most described their university programs as heavily theoretical, with little to no hands-on experience.

"We learned definitions, not real strategies. I only practiced PECS after I started teaching," one teacher noted.

Professional development was also seen as lacking in depth and relevance. Several participants shared that workshops often emphasized theory over application and were led by trainers with little autism-specific expertise.

"We attend courses for certificates, not real skills," another teacher explained.

Due to the absence of structured support, many turned to self-learning through YouTube, online articles, or peer advice efforts that were often hindered by a lack of Arabic-language resources. Overall, while teachers valued PECS, they felt underprepared to use it confidently, highlighting a need

Theme 3: Practical Challenges in Daily PECS Implementation.

Teachers identified several day-to-day obstacles that limited their ability to implement PECS consistently and correctly. These included time constraints, large class sizes, limited access to materials (like printed picture cards), and a lack of designated support staff.

One participant shared:

"I have 10 students with different needs and no assistant. Even when I want to use PECS, it's hard to manage without help."

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Others noted that while they were motivated to use PECS, it often competed with other demands, such as academic testing or behavior management tasks, making it difficult to maintain regular use. Additionally, some expressed uncertainty about how to adapt PECS for children with more complex needs or limited cognitive abilities, especially without ongoing coaching or classroom modeling. These practical barriers highlight the need for better logistical support, planning time, and adaptable materials to make PECS a sustainable part of teachers' instructional routines.

Theme 4: Limited Collaboration and Support for PECS Use.

Participants reported that implementing PECS successfully required more than teacher effort it depended on collaboration with school teams and families. However, many described weak communication channels and a lack of shared understanding about how PECS works.

"Parents often don't follow through at home, not because they don't care, but because they haven't been trained," one teacher explained.

Another noted that other staff, such as teaching aides or administrators, were unfamiliar with PECS and sometimes discouraged its use in favor of more traditional or academic-focused methods. Inconsistent support across settings also made it harder to generalize communication skills, a core goal of PECS. Teachers felt that without system-wide understanding and cooperation, the long-term success of PECS was compromised. This theme highlights the importance of shared training and open communication between educators, families, and school leadership to support acceptability and long-term adherence of PECS within the Saudi context.

Theme 5: Varied Learning Preferences for Sustaining PECS Use.

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Teachers expressed a strong desire to improve their use of PECS but differed in how they preferred to receive support. Some preferred structured workshops, while others found informal peer guidance or video demonstrations more effective.

"I learn best by watching other teachers use PECS not just hearing a lecture," one participant said, *"Online videos help, but I wish there were more in Arabic,"* another added.

Several also emphasized the need for ongoing, hands-on coaching, rather than one-time training sessions, to build confidence and maintain implementation fidelity. This diversity in learning preferences highlights the importance of flexible, practical, and accessible professional development models to ensure the feasibility and sustainability of PECS in everyday classroom practice.

Implications and Future Research Directions

The findings of this study have several important implications for the implementation of PECS among families and educators of children with ASD in Saudi Arabia. The quantitative results confirmed that structured, phased training especially when incorporating hands-on, interactive elements led to steady improvements in both parent implementation accuracy and child communication outcomes. These results align with previous research supporting the use of evidence-based, skills-based interventions such as PECS (Bondy & Frost, 1994; Howlin et al., 2007; Alghamdi A.S, 2024).

At the same time, the qualitative data revealed real-world barriers to successful implementation. Teachers reported challenges related to confusion around PECS protocols, inconsistent training, limited access to Arabic-language resources, and a lack of ongoing

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professional support. These themes reflect critical implementation science variables such as feasibility, adherence, acceptability, and cultural adaptation. Despite these challenges, teachers showed strong motivation to use PECS, particularly to support their students' behavioral, social, and communication needs.

A key finding involved the lack of collaboration between schools and families. Teachers expressed that for PECS to be used effectively, it must be reinforced consistently across both home and school settings. However, many families were unfamiliar with PECS or lacked the skills to implement it effectively, and joint training opportunities were often absent. This disconnect affects the generalization of communication skills and reduces implementation fidelity. Given these challenges, training programs must adopt a gradual, culturally responsive approach. Professional development and parent training should be provided in Arabic, incorporate modeling and practice, and be tailored to different experience levels. Furthermore, shared training models that involve both families and educators are essential to ensure continuity across settings.

Future research should examine the long-term sustainability of parent- and teacher-led PECS use. While this study demonstrated short-term success, studies such as Preston & Carter (2009) suggest that without follow-up support, implementation fidelity may decline. Research should investigate whether booster sessions, digital tools, or ongoing coaching can help sustain use over time.

Additionally, more work is needed to understand how individual learning preferences, institutional resources, and training backgrounds affect successful PECS adoption. The findings

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suggest that a one-size-fits-all model is insufficient especially in under-resourced settings where teachers often lack institutional support and professional guidance.

Finally, this study emphasizes that implementation should not be viewed as a one-time event, but as a systemic, collaborative process involving educators, families, and school leadership. When training is designed to be practical, accessible, and culturally grounded, the potential for PECS to transform communication outcomes for children with ASD particularly in the Saudi context is significant.

Conclusion

This study demonstrated that structured PECS training significantly improved both parent implementation accuracy and children's communication responses. Parents who received consistent support showed the most stable improvements, confirming that targeted, phased instruction can lead to measurable gains in home-based communication support for children with ASD. Beyond these quantitative results, qualitative insights from certified teachers in Saudi Arabia provided a deeper understanding of the systemic and contextual barriers affecting PECS implementation. Issues such as limited access to culturally relevant training, confusion around intervention protocols, and a lack of collaboration between schools and families were identified as key challenges to sustained use.

Together, these findings underscore the importance of treating implementation as a dynamic, multi-context process. To achieve lasting outcomes, training models must be culturally responsive, accessible, and designed to support not only parents but also educators. Supporting both groups through ongoing coaching, resource adaptation, and collaboration efforts is essential

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for ensuring that children with ASD receive consistent, high-quality intervention across home and school environments.

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