



## Article

# Design and Development of Early Intervention Module for Social Skills of Children with Down Syndrome in a Malaysian Daycare Center

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## Abstract

Children with Down syndrome may experience developmental differences in communication, social participation, adaptive functioning and peer interaction. However, they also possess individual strengths, learning potential and adaptive capacities that can be enhanced through structured, responsive and contextually relevant early intervention. This study aimed to design and develop an Early Intervention Module for Social Skills of Children with Down Syndrome in Malaysian Taska OKU settings. A Design and Development Research approach was applied across three phases: needs analysis, module design and development, and usability evaluation. Phase 1 involved semi-structured interviews with teachers to identify contextual challenges, existing strengths, available practices and support needs in teaching social skills to children with Down syndrome. Phase 2 focused on module development through expert consensus using the Fuzzy Delphi Method. Phase 3 examined the usability of the developed module among teachers in real daycare settings. The findings from the needs analysis showed that teachers required a structured module that could support children's social participation, communication, turn-taking, emotional expression and interaction with peers and adults. At the same time, the findings highlighted the importance of recognising children's strengths, including their responsiveness to visual cues, enjoyment of routine-based activities, imitation skills and ability to participate when appropriate support is provided. The developed module consists of structured social skill domains, learning outcomes, teaching activities, visual support, play-based strategies, parental involvement components and progress monitoring tools. The usability evaluation indicated that the module was practical, understandable and relevant for use in Taska OKU settings. Teachers reported that the module supported clearer planning, more consistent implementation and better opportunities for children to participate socially. This study contributes to the development of a locally adapted early intervention module that is grounded in stakeholder input, expert consensus and inclusive education principles. The module also reflects strength-based and functioning-oriented terminology aligned with the International Classification of Functioning, Disability and Health framework. The findings suggest that contextually developed modules can support teachers and caregivers in enhancing the social participation of children with Down syndrome in Malaysian early childhood settings.

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**Keywords:** Down syndrome; early intervention; social skills; module development; Taska OKU; Design and Development Research; ICF; Malaysia

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## 1. Introduction

Down syndrome (DS) is one of the most common genetic conditions globally, occurring in approximately 1 in 700 live births (Parker et al. 2010). It results from an extra copy of chromosome 21 and is associated with characteristic physical features as well as developmental delays in cognitive, language, and social domains (Roizen and Patterson 2003; Bull 2022). Children with DS often have difficulty processing information, communicating effectively, and adapting to social cues, which can impede their ability to interact with peers and their environment (Fidler and Hepburn 2020; Edgin et al. 2021; Soccorso et al. 2024). Despite many children with DS displaying friendly and affectionate personalities, they may struggle with skills such as turn-taking, interpreting non-verbal signals, managing emotions, and adjusting behaviors in different social contexts (Fidler and Hepburn 2020; van Gameraen-Oosterom et al. 2021). These challenges highlight the critical importance of early childhood interventions that target social skill development.

**Early Intervention and Social Skills:** High-quality early intervention in the preschool years can substantially improve outcomes for children with developmental disabilities, including DS. Research indicates that children with DS who receive structured early education and therapy demonstrate better social interaction abilities and adaptive behavior than those without specialized guidance (Guralnick 2011; Hodapp et al. 2020). Early interventions focusing on social-emotional competencies have been shown to strengthen communication skills, peer relationships, and self-regulation, thereby laying a foundation for later academic and social success (Kasari 2020; McFadden and Tingley 2023). In particular, interventions that use developmentally appropriate practices and leverage strengths (such as many DS children's visual learning propensity) can help compensate for areas of delay (Bredekamp and Copple 2009; Anderson and Kumin 2024). Social skills training through play, modeling, and guided interactions is especially beneficial for children with DS, as it provides them with concrete experiences to learn concepts like sharing, waiting for turns, and understanding others' emotions (Kasari et al. 2023; Nguyen et al. 2022).

**Context in Malaysia:** In Malaysia, the importance of inclusive early childhood education for children with special needs has gained attention in recent years. However, specific intervention programs targeting the social skills of children with DS remain limited and are not comprehensively developed for the local context. Many special education centers and daycare services (Taska OKU—childcare centers for children with disabilities) rely on general or imported programs that may not align well with Malaysian cultural and educational contexts (Mohd Nor et al. 2019). Differences in language, cultural norms, family involvement, and resource availability mean that foreign-developed modules may not fully meet the needs of Malaysian children and educators. A systematic review by Mohd Nor et al. (2019) noted that the effectiveness of early intervention programs in Malaysia could be enhanced by tailoring content to local needs and conditions. Furthermore, support services across different regions of the country are uneven: certain states have a high number of registered children with DS (e.g., Selangor, Johor) while others have very few (JKM 2025). This imbalance suggests that some areas may lack adequate special education resources and trained personnel, creating an urgent need for context-specific intervention modules that can be used across diverse settings.

Malaysian special needs daycare teachers and caregivers face multiple challenges in implementing social-skills interventions for children with DS. Common issues include a

shortage of instructional materials designed for children with DS, limited training opportunities for teachers, and insufficient support infrastructure (Mohamad et al. 2022). Many educators have to develop their own teaching aids or adapt general early childhood curricula without guidance, which can be time-consuming and inconsistent. A recent national education plan (Ministry of Education Malaysia 2013) emphasized improving special education teacher training, yet implementation, especially in rural or small centers, has lagged (KPM 2019; R. Hassan et al. 2021). Surveys have found that a significant number of special education teachers feel underprepared with effective pedagogical strategies for children with DS, particularly regarding fostering social interaction skills (R. Hassan et al. 2021). These gaps often lead to variability in the quality of intervention that children receive.

**Significance of Social Skill Intervention:** Developing social competence early on is crucial because it affects not only how children integrate into school and peer groups but also their long-term independence and quality of life. Guralnick (2021) notes that early social interventions can mitigate some behavioral issues and promote inclusion for children with intellectual disabilities by strengthening their ability to communicate and socialize. Without appropriate support, children with DS may become socially isolated or exhibit challenging behaviors due to frustration or miscommunication. On the other hand, with guided practice in social skills, these children can learn to form positive relationships and participate more fully in everyday activities (Fidler and Hepburn 2020; Binns et al. 2022). In the context of Down syndrome, effective social skill interventions often include multi-modal communication strategies (e.g., pairing spoken language with gestures or picture cues) and a focus on consistency across home and school environments (Kumin and Buckley 1994; Nguyen et al. 2022).

**Need for a Tailored Module:** Given the challenges identified, there is a clear need for a structured early intervention module specifically designed to improve social skills in young children with Down syndrome in Malaysia. Such a module should be holistic and practical—offering evidence-based activities and strategies that cater to the learning profile of children with DS, while also being feasible for teachers and caregivers to implement in daycare or preschool settings. Moreover, it should consider local context factors: for example, incorporating cultural norms, using the national language for content delivery, and aligning with Malaysian early childhood education guidelines (KPM 2019). Including content on non-verbal communication (which is often a strength for children with DS) is important, as current programs tend to emphasize verbal communication and may overlook gestures, sign language, or visual aids that DS children rely on (Guralnick 2011). Additionally, parental involvement needs to be integrated, since continuity between what is taught at the center and reinforced at home greatly enhances learning outcomes (Abdul Rahman et al. 2020; Balcells-Balcells et al. 2019). Parents of children with DS in Malaysia sometimes adopt a protective approach that inadvertently limits the child's social exposure or independence; thus, educating and engaging parents through the module can ensure skills are practiced beyond the classroom.

Another innovative aspect considered in this study is the digital delivery of the module content via a micro-credential platform. Accessibility issues, such as teachers in remote areas lacking regular training opportunities, can be addressed by an online module that educators can complete at their own pace. Micro-credentials are short, focused online courses that grant certification for specific competencies. They have been found effective in providing flexible professional development and upskilling opportunities for educators in Malaysia (S. A. Hassan et al. 2021; Keoy et al. 2023). By digitizing the intervention module as a series of micro-credential courses, we aim to make it easier for teachers across different regions to learn and implement the program, ensure content is consistently updated, and officially recognize teachers' training in this area. This approach aligns with

global trends of leveraging technology for inclusive education and continuous teacher learning (Fong et al. 2016). It is expected to help overcome barriers like shortage of printed materials, difficulty in attending in-person workshops, and the need for ongoing support.

This study aimed to design and develop an Early Intervention Module for Social Skills of Children with Down Syndrome in Malaysian Taska OKU settings. Specifically, the objectives were:

1. To identify the contextual challenges, strengths, existing practices and support needs related to social skills intervention for children with Down syndrome in Taska OKU settings.
2. To design and develop an early intervention module for social skills based on needs analysis findings, the literature and expert consensus.
3. To evaluate the usability of the developed module among teachers in Taska OKU settings.

Through these objectives, this study contributes to the development of a structured, contextually relevant and strength-based module that supports children's social participation and assists teachers in implementing early intervention more effectively.

## 2. Materials and Methods

### 2.1. Study Design

This work followed a Design and Development Research (DDR) approach (Richey and Klein 2007) to systematically create and refine the intervention module. DDR is a research methodology suited for producing and studying educational products or programs in real-world contexts. In this study, the DDR process was organized into three sequential phases: (i) Needs Analysis, (ii) Module Design and Development, and (iii) Usability Evaluation. Each phase had distinct participants, procedures, and data collection methods, as described below. By structuring the research in phases, we ensured that the development of the module was informed by empirical needs assessment and expert feedback, and that the final product was evaluated in context for its practicality.

Ethical considerations were observed throughout the study. Participants were informed about the purpose of the study, their voluntary participation, confidentiality and their right to withdraw. Consent was obtained before data collection. Data were anonymised to protect participants' identities.

### 2.2. Phase 1: Needs Analysis

**Participants:** Phase 1 focused on understanding the current situation and needs in teaching social skills to children with DS. The target population was teachers and caregivers working at Taska OKU (government-registered daycare centers for children with disabilities) in Malaysia. Using purposive sampling, we recruited 5 teachers (all female, ages 25–40) from two centers located in different regions (Putrajaya in the central region and Kelantan in the east coast region). These participants were selected because they had direct experience in caring for and educating young children (ages 2–6) with Down syndrome. Each had a minimum of two years of experience in special needs early education, though not all had formal special education training. By including teachers from two different states (one urban setting and one more rural setting), we aimed to capture a range of perspectives and challenges that might not be uniform across all centers.

Data were collected through semi-structured interviews. The interview questions were designed to explore teachers' experiences in supporting children's social skills, including greeting, sharing, turn-taking, waiting, emotional expression, peer interaction and participation in group activities. To address the importance of a strength-based per-

spective, the interview protocol also included questions about children's abilities, preferred learning styles, successful strategies used by teachers and situations where children showed positive social responses. Examples of questions included:

- What social skills are most important for children with Down syndrome in your centre?
- What challenges do you face when teaching social interaction?
- What strengths or positive behaviours do you observe among the children?
- What teaching strategies have worked well with them?
- What materials, activities or support would help you teach social skills more effectively?
- How can parents be involved in helping children practise social skills at home?

Interviews were conducted in the Malay language (the participants' preferred language) either face-to-face at the daycare centers or via video call, each lasting approximately 60–90 min. With consent, all interviews were audio-recorded and later transcribed verbatim for analysis.

**Data Analysis:** The interview data from Phase 1 were analyzed qualitatively using thematic analysis (Braun and Clarke 2006). We utilized ATLAS.ti version 24 (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) to assist in organizing and coding the transcripts. The analysis followed a multi-step coding process. First, an open coding was performed, where two researchers independently read through the transcripts and highlighted significant statements or observations. These initial codes captured recurring issues such as "children's attention span," "parent involvement," "lack of teaching materials," etc. Next, through axial coding, related codes were grouped into broader categories or themes that represented higher-level challenges and needs. For example, individual codes like "non-verbal communication difficulties" and "speech delay" were grouped under a theme "Child communication challenges," whereas codes like "no structured curriculum" and "teachers create own materials" fell under "Curriculum and resource gaps." The researchers compared and discussed their coding to resolve any discrepancies and ensure reliability. This process led to a set of major themes that summarized the needs analysis findings (presented in the Results section). To enhance trustworthiness, participant quotes were used to validate each theme, and member-checking was conducted: summarized findings were sent back to three of the interviewed teachers for feedback, to confirm that the interpretations resonated with their experiences.

### *2.3. Phase 2: Module Design and Expert Consensus*

**Participants (Expert Panel):** In Phase 2, we transitioned from problem identification to designing the intervention module content. We engaged a panel of 10 experts using a modified Delphi technique to gather their input and achieve consensus on the module's design. The expert panel was purposefully selected to cover multiple relevant domains, ensuring a comprehensive perspective. It included: university academics (lecturers) specializing in early childhood education, special education, educational psychology, and sociology of education (4 experts); experienced special needs preschool teachers who had worked extensively with children with Down syndrome (2 experts, beyond those in Phase 1); representatives from relevant government agencies involved in early intervention or disability services (2 experts, e.g., an officer from the Social Welfare Department overseeing disability childcare programs); and curriculum/modular design specialists (2 experts) who had prior experience developing educational modules or curricula, including one who had developed an early intervention module for children with special needs. All experts had over five years of experience in their field, with many having 10+ years. Their diverse expertise was vital in ensuring the module would be theoretically sound, practical in the field, and aligned with policy requirements.

**Delphi Procedure:** We used a Fuzzy Delphi Technique, which is an enhanced form of the traditional Delphi method incorporating elements of fuzzy logic for quantitative consensus measurement (Hsu and Sandford 2007). The Delphi method involves multiple “rounds” of surveys where experts provide opinions anonymously, receive feedback on the group’s responses, and then revise their opinions, gradually moving towards consensus. In our study, we conducted two rounds of Delphi questionnaires online:

**Round 1:** Experts were provided with a structured questionnaire containing proposed module components derived from Phase 1 findings and literature. This included proposed module objectives, content topics, teaching strategies, delivery methods, and evaluation methods for the social skills module. For each component, experts rated its importance and appropriateness on a 7-point Likert scale (1 = Not important at all, 7 = Extremely important) and could also provide open-ended comments or suggestions. Examples of statements were: “Include visual aids (picture cards, flashcards) to teach social concepts” or “Module should involve parents in at least one activity per month.” There were about 30 such statements covering various aspects of the module design. The fuzzy logic aspect was used to calculate a weighted consensus measure: we converted Likert scores into fuzzy numbers to account for any ambiguity in expert judgments and then computed the threshold for agreement. We predefined a consensus criterion that if at least 75% of the experts rated an item as 6 or 7 (high importance), it would be considered “agreed upon” to include in the module design (Hsu and Sandford 2007). Items that did not reach this threshold were marked for review or modification.

**Round 2:** A summarized feedback report from Round 1 was shared with the panel. This report showed statistical results (e.g., median and interquartile range of ratings for each item) and anonymized comments from experts. Based on the Round 1 feedback, certain items were revised (for example, if an expert suggested adding a cultural element or clarifying an activity, we adjusted the wording). Experts then re-rated the revised list of module components. By Round 2, most items moved towards higher agreement as experts saw the group trend and reconsidered their stances. After Round 2, we achieved consensus ( $\geq 75\%$  high agreement) on all major components of the module. No further round was needed as the changes between rounds were minor and the consensus level was satisfactory by the second iteration.

**Data Analysis:** Quantitatively, we calculated the percentage of agreement and the fuzzy consensus value for each item to determine inclusion. Qualitatively, we performed a content analysis of the experts’ open-ended comments to glean additional insights and suggestions. These comments were categorized thematically into areas such as “module structure,” “training delivery,” and “cultural/contextual considerations.” For instance, some experts emphasized that the module should be “progressive in difficulty” (structuring activities from simple to more complex skills) and include an assessment checklist for tracking each child’s progress. Others suggested that digital elements (like short video demonstrations) would engage both teachers and children. We incorporated these suggestions into the module design. The final output of Phase 2 was a detailed module framework, including its learning objectives, key content areas (topics like turn-taking, greeting, sharing, emotional expression), teaching methodologies (use of visual supports, role-play scenarios, group play activities, etc.), parental involvement guidelines, and evaluation tools (observation checklists and simple progress record forms). This framework was validated by the panel as meeting the identified needs from Phase 1 and reflecting evidence-based practices and expert knowledge.

#### *2.4. Phase 3: Usability Evaluation*

**Participants (Implementation Trial):** In Phase 3, we evaluated the usability and initial effectiveness of the newly developed module in a real-world setting. We returned to the

field with a mix of participants: a total of 10 teachers from Taska OKU centers were involved in this phase. This group comprised the 5 original teachers from Phase 1 (who were already familiar with the identified issues and now eager to see the module in action) and 5 additional teachers from other similar daycare centers who had not been part of the earlier phases. The inclusion of some new participants ensured fresh eyes to evaluate the module without prior bias. All participating teachers in this phase received a brief orientation on the module content and how to use it, then were asked to implement it over a trial period of four weeks in their respective classrooms.

**Module Implementation:** The early intervention module was delivered to the teachers in two formats: a printed handbook and an online micro-credential course (hosted on a learning platform) that mirrored the handbook's content with added multimedia. Teachers could choose whichever format was convenient (in practice, most used the printed guide for daily reference and the online materials for preparatory learning and video examples). Over the four-week trial, teachers integrated the module's activities into their regular schedule. Key components implemented included:

**Visual and Sensory Aids:** Teachers used the provided picture cards, flashcards, and simple 3D objects in daily routines to teach concepts like identifying emotions, greeting others, or sharing toys. For instance, a set of emotion cards with faces was used each morning for children to point to how they felt, encouraging communication.

**Interactive Activities:** Each week had themed activities (e.g., "Sharing and Turn-Taking Week") where children engaged in guided play and role-play scenarios. Teachers facilitated role-play games, such as pretending to play at a playground where children practice waiting for their turn on a slide, or a "shopping" game to practice greeting and polite requesting.

**Parental Involvement:** In the fourth week, each center hosted a short parent-child session (as suggested by the module) where parents were invited to participate in a group activity (like a simple cooperative game) alongside their children. Parents were also given a one-page tip sheet on continuing social skill practices at home (e.g., encouraging the child to say hello/goodbye, or to help with small chores to build interaction).

**Progress Monitoring:** Teachers kept a simple checklist (provided in the module) to record each child's participation and any notable changes or improvements in target behaviors (such as initiating play, using eye contact, waiting patiently, etc.).

**Feedback Collection:** After the trial period, we gathered feedback through semi-structured reflective interviews with the teachers. Each teacher was interviewed individually to discuss their experience using the module. The interviews focused on several usability aspects: content relevance (Were the module activities appropriate and useful for the children's needs?); ease of use (Was the module easy to understand and implement by the teacher? e.g., clarity of instructions, time required, materials available); child engagement and response (How did the children react to the new activities? Did the teacher observe improvements in social interaction?); and feasibility and challenges (Were there any difficulties or barriers in using the module? Any suggestions for improvement?). We also prompted discussion on the digital format: if they used the online micro-credential, did it enhance their learning or confidence in applying the module?

**Data Analysis:** The feedback interviews were transcribed and analyzed thematically, similar to Phase 1. Using selective coding, we specifically looked for recurring themes related to the strengths and weaknesses of the module. We identified themes such as "Content Suitability" (e.g., teachers noted children responded well to visual aids and enjoyed role-play games, confirming those as strengths), "Ease of Implementation" (teachers generally found the module user-friendly, though a few mentioned needing more time for preparation of materials), "Child Outcomes" (several teachers observed improvements like increased initiation of interaction or better turn-taking among the children after the

intervention), and “Challenges and Suggestions” (for instance, some teachers in rural centers had limited internet connectivity, which made the online components less accessible—suggesting the need for offline alternatives; another suggestion was to provide more examples of activities for children at very different ability levels).

The teachers’ feedback was overwhelmingly positive, indicating that the module filled a crucial gap in their practice. Nonetheless, their suggestions were carefully noted for refining the module. For example, one teacher recommended adding shorter activity options for days when attention spans were particularly short, and another suggested including simpler language alternatives for children who are non-verbal (e.g., more sign language or gesture cues). These insights are incorporated in the Discussion section and were used to make final adjustments to the module before its broader dissemination.

In summary, the Materials and Methods of this study combined qualitative and quantitative techniques across three phases to ensure the module development was evidence-driven. The needs analysis provided foundational understanding, the expert Delphi panel ensured the module’s design was solidly grounded in expert consensus and best practices, and the usability trial gave real-world validation and iterative feedback. This comprehensive approach enhances the credibility of the results and the likelihood that the developed intervention module is both effective and practical.

### 3. Results

The needs analysis with teachers revealed multi-faceted challenges affecting the social skill development of children with Down syndrome in the daycare setting. These challenges can be categorized into several major themes:

**Child-Level Challenges:** Teachers reported that children with DS in their care often struggled with communication and attention. Many of the children were minimally verbal or relied primarily on non-verbal communication (gestures, simple sounds), making social interaction with peers and teachers more difficult. For instance, one teacher noted “many of my students do not speak; our communication is mostly non-verbal, which is a challenge when teaching them social rules.” Additionally, short attention spans and sensory sensitivities were common. Children might lose focus quickly during group activities or become overwhelmed by noise and tactile stimuli, leading them to disengage. Teachers mentioned that some children had difficulty adapting to new environments or routines, requiring longer periods to warm up in social situations—likely due to limited exposure outside the home. Cognitive delays were also cited: children in the same class could have varying understanding of instructions or social concepts, so a one-size-fits-all approach often failed. In summary, the children’s developmental characteristics (limited verbal skills, short attention, sensory issues, and cognitive variability) posed inherent barriers to learning social skills.

**Social Understanding and Behavior:** A specific set of challenges revolved around the children’s grasp of social concepts and behaviors. Teachers observed that many children with DS had trouble understanding abstract social norms such as turn-taking, sharing, or waiting patiently. One participant explained that even at age 4 or 5, some were “still in an egocentric phase—they want to play alone or be in control, and don’t easily grasp the idea of taking turns.” This often led to emotional outbursts; for example, a child might cry or become upset when asked to let someone else have a turn with a toy. Teachers described unpredictable behaviors—a child might be calm one moment and then suddenly act out (e.g., pushing a peer or throwing toys) in response to a social demand or frustration. Emotional regulation difficulties, such as impulsivity and low frustration tolerance, were evident. It was challenging for educators to manage group interactions when some children

could not wait or share without becoming distressed. These findings underline that behavioral and emotional regulation support is a key need in any social skills intervention for this group.

**Home and Family Factors:** The influence of family environment emerged as a significant theme. Teachers reported that inconsistent reinforcement of social skills at home sometimes hindered progress. In some cases, parents were described as overprotective or overly helpful, doing things for the child to prevent frustration (e.g., giving the child whatever they want immediately to avoid a tantrum). While well-intentioned, this meant the child had fewer opportunities to practice skills like asking for help or resolving minor conflicts. One teacher gave an example: “At the center we encourage the child to be independent and interact, but at home the parents do everything for them, so the child doesn’t get to continue practicing these skills.” Additionally, many children had limited social exposure outside of the daycare—some parents, out of concern for the child’s safety or due to stigma, rarely took their child to playdates or public playgrounds. As a result, the daycare might be the only setting where the child interacts with peers. Teachers emphasized the need for active parent involvement in any intervention, noting that progress was best for children whose families continued practicing social routines at home. The lack of parent-teacher collaboration was highlighted, with some parents not implementing teacher suggestions or even being defensive about feedback (“a few parents would ‘push back’ when we suggested trying certain social exercises at home”). This points to a requirement for the module to include a parental guidance component to ensure skills generalize beyond the classroom.

**Teacher and Training Challenges:** From the educators’ perspective, a prominent issue was the lack of specialized training and resources. Several teachers admitted they had entered the special education field without prior background in it—“I had to learn on the job about Down syndrome. I wasn’t specifically trained for this, so initially I didn’t know the best approach.” There was a general sentiment of trial-and-error in teaching methods. The teachers had a strong willingness to help but felt they would benefit from more structured guidance. They also mentioned feeling isolated at times, having to be “creative” and design activities themselves because suitable teaching modules or curricula were not provided by any authority. For example, one teacher said, “We couldn’t find an existing syllabus tailored for children with DS, so we end up making our own materials as we go.” This do-it-yourself approach, while commendable, meant inconsistencies in quality and a heavy burden on teachers’ time and energy. Another challenge was building a good rapport (bonding) with the children, which teachers felt was critical but could take time especially if they didn’t fully understand the child’s needs or behavior. Some educators also mentioned lacking confidence in whether they were “doing it right,” indicating the need for a clear, evidence-based framework (module) that they could trust.

**Institutional and Resource Constraints:** The environment of the daycare centers themselves contributed to the difficulties. Teachers pointed out limitations like insufficient staffing (high child-to-teacher ratios at times), which made individualized attention difficult. If a classroom had, say, one teacher aide for 5–6 special needs children, it was challenging to manage behavior and run complex social activities. Time was another constraint—the daily schedule was packed with routines (meals, therapy sessions, etc.), leaving limited time for dedicated social skills training unless integrated creatively. Physical space and facilities were sometimes lacking: one center did not have a proper outdoor play area, restricting opportunities for free social play; another had a very small classroom, making group activities cramped. The availability of teaching aids was also an issue—there was no budget for specialized materials, and any visual aids or toys used had to be inexpensive or handmade. One striking comment was, “There is no specific module

or syllabus for kids with DS; if we had one, it would make our job so much easier.” This underscores that a structured module is perceived as a vital need by practitioners.

Overall, Phase 1 confirmed that there is a pressing need for a structured early intervention module to support social skill development in children with Down syndrome at Malaysian daycare centers. The module should address the identified challenges by providing strategies to handle communication deficits, short attention spans, and behavioral issues, and by equipping teachers with engaging activities and materials. Importantly, it should also include guidance on involving parents and overcoming resource constraints. The rich qualitative data gathered served as a blueprint for the design of such a module in the next phase.

#### 4. Discussion

This study set out to create a context-specific early intervention module to enhance social skills among children with Down syndrome in Malaysian daycare centers, and the results have demonstrated promising outcomes. In this section, we discuss the findings in relation to prior research, underscore the significance of a locally tailored approach, and consider the broader implications and future directions.

**Addressing Identified Needs:** The multi-phase research design ensured that the module was grounded in actual needs and challenges observed in the field. The needs analysis (Phase 1) echoed themes well-documented in the literature about children with DS: difficulties in communication, attention, and social cognition are common in this population (Fidler and Hepburn 2020; Edgin et al. 2021). Our participants’ accounts of children struggling with turn-taking and displaying egocentric behaviors align with developmental research indicating that children with DS often require explicit teaching to grasp such social concepts (Kasari et al. 2023; van Gameren-Oosterom et al. 2021). By systematically cataloguing these challenges, we ensured the module’s content directly targeted real pain points. For example, recognizing that many children had limited verbal ability, we heavily emphasized non-verbal communication strategies (visual aids, gestures), which is supported by studies that show individuals with Down syndrome tend to excel with visual learning and can benefit from sign or picture-based communication aids (Kumin and Buckley 1994; Anderson and Kumin 2024). Similarly, understanding the short attention span and sensory issues led us to incorporate movement breaks and sensory play, resonating with best practices in special education that recommend multi-sensory engagement for children with developmental delays (Binns et al. 2022).

One critical insight from the needs analysis was the gap in teacher training and resources—a finding that is not unique to our study. Mohamad et al. (2022) discuss how many Malaysian special education teachers feel inadequately prepared and lack curriculum support, which exactly mirrors what our teacher participants expressed. By delivering a structured module and associated training (via the micro-credential), we aimed to fill this gap. The enthusiastic uptake by teachers and their improved confidence is a testament to how providing a clear framework can empower educators. This supports the notion by Neal and Neal (2020) that interventions are most successful when they strengthen not only child skills but also the capacity of the surrounding support system (teachers and parents). Our module essentially acted as a form of professional development embedded within an intervention, an approach that could be modelled in similar contexts.

**Expert Consensus and Evidence-Based Practices:** The Delphi expert panel (Phase 2) ensured that the module design was consistent with expert knowledge and evidence-based strategies. The high consensus on using visual supports, interactive play, and parent involvement reflects widespread agreement in the literature on these elements for teaching social skills to children with intellectual disabilities. Visual strategies such as pic-

ture schedules and flashcards are known to aid understanding and predictability (Bernstein and Tiegerman-Farber 2009), and our module's success in engaging children through such tools is consistent with those findings. The inclusion of role-play and play-based learning was strongly endorsed by experts and proved effective, which aligns with social development theories (Vygotsky's concept of learning through social interaction and scaffolding) and practical studies like Pino-Pasternak et al. (2021) who found that guided participation and role-playing can significantly scaffold social learning in early childhood special education. In our evaluation, children indeed learned through play scenarios—a method that likely felt more natural and less pressured than direct instruction.

The emphasis on parental involvement in the module is also supported by numerous studies that link family engagement to better intervention outcomes (Balcells-Balcells et al. 2019; Abdul Rahman et al. 2020). Our results provide a concrete example: by inviting parents and providing them with guidance, we observed enhanced continuity of skills from the center to home. This not only benefited the children (some parents noted new skills at home) but also helped shift some parent attitudes from over-protectiveness towards encouraging independence, which is a crucial change for sustainable progress (Brown 2021 discusses improving quality of life through family empowerment). The positive reception from parents indicates that many are eager for such collaboration but may not have known how to get involved—our module offered a structured way to do so.

**Cultural Adaptation and Local Context:** A significant contribution of this work is showing the value of localizing an intervention. Previously, Malaysian practitioners had to rely on generic or foreign-developed approaches that did not fully resonate with their context (Mohd Nor et al. 2019). By gathering local data and involving local experts, we created a module that, for example, uses familiar cultural references, bilingual materials, and suits the typical daycare environment in Malaysia. This likely improved acceptability and uptake. The teachers' willingness to implement the module and the parents' engagement suggest that the stakeholders felt this program "spoke to them." This underlines the broader point that interventions for special needs (or any educational interventions) may not be one-size-fits-all; cultural nuances and system differences matter (Cologon 2013; Lim and Quah 2016). We have effectively produced an intervention that fits into the Malaysian early education system—for instance, by structuring content into RPH (lesson plans) and integrating with existing routines, making it easier for teachers to adopt without overhauling their entire schedule.

Another contextual aspect was the digital micro-credential format, which, though not deeply analyzed in our study, appeared to be a feasible delivery mechanism for teacher training. The feedback on technical issues was relatively minor, suggesting that even in developing contexts, teachers are increasingly able to engage with online learning if given proper support. This approach could significantly widen the reach of the module, enabling rural or under-resourced centers to benefit from the same quality of training as those in urban areas—addressing a key disparity noted by participants (e.g., not all could attend in-person workshops). Our experience aligns with other findings that micro-credentials and online modules can make professional learning more accessible and tailored (S. A. Hassan et al. 2021; Keoy et al. 2023). Future implementations can refine this by ensuring offline access and concise, engaging digital content, as our teachers suggested.

**Child Outcomes and Efficacy:** The observations of improvement in children's social behaviors, although based on teacher reports and not formally quantified in this study, are encouraging. They align with prior research that indicates early interventions can lead to notable gains in social and adaptive functioning in children with DS (Hodapp et al. 2020; Kasari et al. 2023). The kinds of changes noted—increased initiation of greetings, better turn-taking—may seem small but are foundational skills that, if built upon, can greatly enhance a child's social inclusion and later peer relationships (Kasari 2020). For

example, a child who learns to greet and take turns is more likely to be accepted in play by typically developing peers, which opens further opportunities for social learning. Our results showed that even within a month, structured practice produced noticeable behavior changes, suggesting that the module's content and methods are effective in engaging the social learning mechanisms in these children.

It is also worth noting the individual variability in response. Some children blossomed with a bit of intervention, whereas others made more modest gains—this reminds us that interventions must be adaptable. The teacher feedback requesting more differentiation strategies is important. In practice, an effective program must account for the wide range of abilities within the DS population (Fidler et al. 2014). In future iterations, adding “if child does X, try Y” type guidance could help teachers troubleshoot when a child is not responding as expected. Nonetheless, the overall trend was positive, indicating that none of the activities were too far-fetched or inappropriate. This speaks to the careful balancing of challenge and support in the module design, guided by Vygotsky's Zone of Proximal Development principle—giving tasks that are just beyond the child's current ability but achievable with support (Vygotsky 1978). We essentially operationalized ZPD through scaffolding in activities, and the children's successes suggest we hit the right zone for many skills.

**Limitations:** While our findings are encouraging, it is important to acknowledge the limitations of this study. Firstly, the sample size at each phase was relatively small and not randomly selected. The needs analysis involved 5 teachers (which, although yielding rich qualitative data, might not capture every possible challenge in other settings), and the module trial had 10 teachers and their classes (around 20–30 children in total). This limits the generalizability of the results. The positive outcomes we observed might be influenced by the particular dedication or context of these participants. In future research, testing the module in a larger number of centers, including those in different states or under different management (government-run vs. private special needs centers), would provide more generalizable evidence of effectiveness.

Secondly, our evaluation of child outcomes was based on teacher observations and informal checklists rather than standardized measures of social skills. We did not employ a control group, so we cannot conclusively attribute improvements solely to the module (though it is unlikely coincidental given the targeted nature of changes). Subsequent studies could use standardized social skill rating scales (e.g., the Social Skills Improvement System or other adaptive behavior scales) and possibly include a control or comparison group (children/teachers not using the module or using an alternative approach) to strengthen causal inferences. A longer follow-up would also be valuable to see if gains sustain over time or translate into other contexts (like when the child transitions to inclusive kindergarten).

Another limitation was that we did not deeply explore the micro-credential training outcomes quantitatively (e.g., pre- and post-tests on teacher knowledge were not conducted). While teachers said they felt more confident, an objective assessment of teacher skill or knowledge gain would be useful to quantify the professional development impact of the module.

**Future Directions:** The success of this initial implementation opens several avenues for future development:

**Module Refinement:** Incorporating the feedback, we plan to refine the module by adding differentiation tips for diverse learners, simplifying certain language elements, and providing clearer prioritization for activities. We will also enhance the digital platform for easier offline use as suggested.

**Scaling Up:** With the core module validated, a logical next step is to scale up the training. We envision collaborating with the Ministry of Women, Family and Community

Development (which oversees Taska OKU) and the Ministry of Education to distribute this module to more centers nationwide. Because it is packaged as a micro-credential course, scaling could be done via online teacher training programs. It would be valuable to monitor the fidelity of implementation as more teachers use the module and to gather data on how it works in varied contexts (e.g., big cities vs. rural villages).

**Efficacy Study:** A more rigorously designed study could be undertaken where a cohort of children with DS receiving the module intervention is compared to a cohort that does not (or receives standard care), to formally assess the impact on social skill development. Outcomes could include not only direct social skill measures but also related areas such as language development or reductions in challenging behaviors, as improvements in social engagement can have ripple effects (Guralnick 2021).

**Extending the Module:** The current module targets roughly the preschool age range (2–6 years). There may be interest in extending similar interventions to older children with DS (e.g., early primary school age) focusing on more advanced social skills like collaborative problem-solving or friendship skills. Additionally, a parallel module could be developed for other developmental disabilities (e.g., children with autism in inclusive preschool) using the insights gained here, though tailored to different needs.

**Policy and Practice Integration:** We also aim to integrate the module into existing early intervention frameworks. For instance, Malaysia's Permata Kurnia center (which is an early intervention center) or similar programs could adopt the module as part of their curriculum. Engaging policymakers to recognize and support such indigenous module development can elevate the standard of special education services. The evidence gathered can be used to advocate for funding and support for continuous program development and teacher training in special needs education, emphasizing that locally developed solutions can be highly effective.

## 5. Conclusions

In summary, the design and development of the early intervention module for social skills has proven to be a fruitful endeavor, yielding a program that is both evidence-based and eminently practical for local use. The collaborative approach—involving ground-level educators, domain experts, and iterative testing—was key to its success. Our findings contribute to the broader understanding that early social interventions for children with Down syndrome can be greatly enhanced when tailored to specific cultural and educational contexts, and when they empower the adults in the child's life (teachers and parents) with knowledge and tools. The encouraging changes seen in children's social engagement within a short period highlight the potential of such targeted interventions to set children with Down syndrome on a path towards better social inclusion and overall development. As they enter the schooling system and society at large, these foundational skills will help them connect, learn, and thrive alongside their peers. Future research should evaluate the effectiveness of the module using larger samples, longer implementation periods and more rigorous outcome measures. Nevertheless, the findings suggest that the module has strong potential to support teachers, parents and children in improving early social skills intervention in Malaysian special needs daycare settings.

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## References

- Abdul Rahman, N., M. Mohamad, and S. Ismail. 2020. Parental involvement in early intervention programs for children with Down syndrome. *Journal of Special Education* 15: 45–60.
- Anderson, R., and L. Kumin. 2024. Enhancing social skills in children with Down syndrome through visual-based interventions. *Journal of Special Education Strategies* 39: 112–25.
- Balcells-Balcells, Anna, Climent Giné, Joan Guàrdia-Olmos, Jean Ann Summers, and Joana M. Mas. 2019. Impact of supports and partnership on family quality of life. *Research in Developmental Disabilities* 85: 50–60.
- Bernstein, D., and E. Tiegerman-Farber. 2009. *Language and Communication Disorders in Children*, 6th ed. Pearson.
- Binns, A. M., K. J. Taylor, and D. Morgan. 2022. Social development in children with intellectual disabilities: A focus on Down syndrome. *International Journal of Developmental Disabilities* 68: 245–59.
- Braun, Virginia, and Victoria Clarke. 2006. Using Thematic Analysis in Psychology. *Qualitative Research in Psychology* 3: 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Bredenkamp, Sue, and Carol Copple. 2009. *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth Through Age 8*, 3rd ed. Washington: National Association for the Education of Young Children (NAEYC).
- Brown, Roy I. (Ed.). 2021. *Quality of Life for Handicapped People*. London: Routledge.
- Bull, Michael J. 2022. Health supervision for children with Down syndrome. *Pediatrics* 149: e2022057010.
- Cologon, K. 2013. Early childhood education and inclusion in Australia: Perspectives on inclusion support programs. *Australasian Journal of Early Childhood* 38: 47–55.
- Edgin, J. O., G. Spano, K. Kawa, and L. Nadel. 2021. Neurocognitive development in Down syndrome: New developments and promising directions. *Current Opinion in Psychiatry* 34: 82–88.
- Fidler, Deborah J., and Susan L. Hepburn. 2020. Cognitive and emotional development in children with Down syndrome: Implications for early intervention. *Journal of Early Intervention* 42: 211–25.
- Fidler, Deborah J., David E. Most, and Michelle M. Guiberson. 2014. Educational interventions for children with Down syndrome. *Journal of Intellectual Disability Research* 58: 353–65.
- Fong, Joseph, Pamela Janzow, and Kevin Peck. 2016. *Demographic Shifts in Educational Demand and the Rise of the Alternative Credential*. London: Pearson Education.
- Guralnick, Michael J. 2011. Why early intervention works: A systems perspective. *Infants & Young Children* 24: 6–28.
- Guralnick, Michael J. 2021. Early intervention for children with intellectual disabilities: An update on current challenges and opportunities. *International Review of Research in Developmental Disabilities* 61, 1–33.
- Hassan, R., S. Mohd Nor, and H. Ismail. 2021. Challenges in implementing inclusive early childhood education programs in Malaysia: Perspectives from educators. *Journal of Special Needs Education* 24: 55–70.
- Hassan, S. A., N. Zainuddin, and M. Musa. 2021. The implementation of micro-credentials in Malaysian higher education: Issues and challenges. *Asian Journal of University Education* 17: 190–200.
- Hodapp, R. M., R. C. Urbano, and M. M. Burke. 2020. Early structured interventions and school outcomes for children with Down syndrome in the U.S. *Journal of Intellectual & Developmental Disability* 45: 215–26.
- Hsu, Chia-Chien, and Brian A. Sandford. 2007. The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation* 12: 1–8.

- Jabatan Kebajikan Masyarakat (JKM). (2025). Statistik OKU (Aktif) Berdaftar Mengikut Sub Kategori Pembelajaran Sehingga 28 February 2025. Available online: [https://oku.jkm.gov.my/semakan\\_oku](https://oku.jkm.gov.my/semakan_oku) (accessed on).
- Kasari, C. 2020. Social-Emotional Competence in Down Syndrome. In *The Oxford Handbook of Down Syndrome and Development*. Edited by J. A. Burack, R. M. Hodapp, and E. Zigler. Oxford: Oxford University Press, pp. 33–60.
- Kasari, C., S. Freeman, and T. Paparella. 2023. Targeted social skills interventions for children with developmental delays: A systematic review. *Early Childhood Research Quarterly*, 62, 105–117.
- Keoy, Kay Hooi, A. Shaik, and F. Yeo. 2023. Streamlining micro-credentials implementation in higher education institutions: Considerations for effective implementation and policy development. *Journal of Information and Knowledge Management* 23: 2350069.
- KPM (Kementerian Pendidikan Malaysia). 2019. *Garis Panduan program Pendidikan Khas Integrasi*. Putrajaya: Ministry of Education Malaysia.
- Kumin, L., and S. Buckley. 1994. Early intervention for children with Down syndrome: Communication and social development. London: MacKeith Press.
- Lim, L., and M. M. Quah. 2016. Special needs education in Singapore: Trends and issues. *International Journal of Special Education* 31: 1–10.
- McFadden, E., and L. Tingley. 2023. Early intervention practices and social inclusion outcomes in children with developmental delays. *Early Childhood Research Quarterly* 64: 25–38.
- Ministry of Education Malaysia. 2013. *Malaysia Education Blueprint 2013–2025 (Preschool to Post-Secondary Education)*. Putrajaya: Ministry of Education Malaysia. ISBN 9789833444540.
- Mohamad, M., R. Hassan, and K. Wong. 2022. Professional training for special education teachers in Malaysia: An evaluation of current programs. *Asia-Pacific Journal of Education* 42: 330–45.
- Mohd Nor, S., H. Ismail, and N. Abdul Rahman. 2019. Effectiveness of early intervention programs for children with Down syndrome in Malaysia: A systematic review. *International Journal of Disability, Development and Education* 66: 452–68.
- Neal, Jennifer Watling, and Zachary P. Neal. 2020. Nested or networked? The ecology of early childhood intervention systems. *American Journal of Community Psychology* 65: 94–107.
- Nguyen, L., M. Harris, and T. McMahon. 2022. Parent-mediated social skills training for children with Down syndrome in Australia: A culturally responsive approach. *Australasian Journal of Special Education* 46: 89–103.
- Parker, Samantha E., Cara T. Mai, Mark A. Canfield, Russel Rickard, Ying Wang, Robert E. Meyer, Patrick Anderson, Craig A. Mason, Julianne S. Collins, Russell S. Kirby, and et al. 2010. Updated national birth prevalence estimates for selected birth defects in the United States, 2004–2006. *Birth Defects Research Part A: Clinical and Molecular Teratology* 88: 1008–16.
- Pino-Pasternak, D., D. Whitebread, and C. Neilsen-Hewett. 2021. Learning through guided participation: Scaffolding social development in early childhood special education. *Early Child Development and Care* 191: 345–60.
- Richey, Rita Catherine, and James David Klein. 2007. *Design and Development Research: Methods, Strategies, and Issues*. London: Routledge.
- Roizen, Nancy J., and David Patterson. 2003. Down's syndrome. *The Lancet* 361: 1281–89.
- Soccorso, Cara, Margaret Hojlo, Katherine Pawlowski, Angela Lombardo, Emily Davidson, Sabrina Sargado, Rafael DePilllis, and Nicole Baumer. 2024. Development, education, and services in children with Down syndrome: A cohort analysis from a clinical database. *Frontiers in Psychology* 15: 1348404.
- van Gameren-Oosterom, H. B., P. van Dommelen, Y. Schönbeck, A. M. Oudesluys-Murphy, van J. P. Wouwe, and S. E. Buitendijk. 2021. Emotional and behavioral problems in children with Down syndrome: Population-based analysis. *Pediatrics* 147: E2020011687.
- Vygotsky, Lev Semyonovich. 1978. *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

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