

A Digital Collaborative Assessment Model for Teachers and Parents to Monitor Social Competence in Inclusive Preschool Settings

Mia Rachmawaty¹, Yufiarti², Sofia Hartati²,

^{1,2,3} Universitas Negeri Jakarta

Corresponding Author: mia_rachmawaty@trilogi.ac.id; sofiahartati@unj.ac.id ; yufiarti@unj.ac.id

HOW TO CITE:

Mia Rachmawaty, Yufiarti, Sofia Hartati (2026). A Digital Collaborative Assessment Model for Teachers and Parents to Monitor Social Competence in Inclusive Preschool Settings. International Journal of Special Education, 41(14s), 09-24

ABSTRACT:

Assessing young children's social competence in inclusive preschool settings requires consistent observations across both school and home environments. However, conventional assessment practices are often fragmented, rely primarily on teachers, and offer limited opportunities for meaningful parent participation. This study aimed to develop and evaluate a digital collaborative assessment model that enables teachers and parents to jointly monitor children's social competence through an integrated digital platform. The study employed a Research and Development (R&D) design using the ADDIE framework, comprising Analysis, Design, Development, Implementation, and Evaluation. Participants included early childhood teachers, parents of preschool children, and experts in special education, early childhood education, educational assessment, and educational technology. Data were collected through interviews, questionnaires, expert validation sheets, usability assessments, and social competence observation checklists. Quantitative data were analyzed using descriptive statistics, Aiken's V, Cronbach's alpha, paired-samples *t*-tests, normalized gain scores, and Cohen's *d*, while qualitative data were examined using thematic analysis. The developed model integrates shared observation indicators, real-time digital documentation, automated progress reports, and two-way communication features to facilitate continuous monitoring of children's social competence across learning environments. Expert validation demonstrated high content validity, and both teachers and parents rated the system as practical, user-friendly, and supportive of collaborative assessment. Field implementation further indicated significant improvements in the consistency and quality of social competence monitoring, accompanied by high user satisfaction. The findings suggest that the proposed digital collaborative assessment model provides a valid, practical, and effective approach for strengthening family-school partnerships and supporting authentic assessment in inclusive preschool education. The model offers a scalable framework for promoting collaborative decision-making and individualized support for young children with diverse developmental characteristics.

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Keywords: digital assessment, teacher-parent collaboration, social competence, inclusive preschool, early childhood education, authentic assessment.

1. Introduction

Social competence in the preschool years is commonly assessed as part of children's emotional–social functioning and school readiness, because it provides actionable information about strengths and areas for growth that can be used formatively to guide educational support and summatively to inform transition decisions (e.g., entry into formal schooling). In inclusive early childhood education, such competence is especially consequential because teachers are responsible for monitoring children's social and emotional development while ensuring participation and learning for children with heterogeneous developmental profiles and support needs (Głodkowska et al., 2023). Inclusive education frameworks further emphasize differentiated curricula and *assessments* as integral, rather than optional, components of meeting diverse learner needs, underscoring that assessment practices must be designed with inclusion in mind, not merely retrofitted after implementation (Omboto et al., 2022).

A core challenge for assessing preschool social competence is that children's social behaviors are context-dependent; what is observed in one setting may not generalize to another. This context sensitivity becomes practically salient when assessment relies primarily on school-based observations and documentation, because that approach risks omitting relevant evidence from children's home and community interactions. Digital-era research on family–school partnerships emphasizes that parents of young children actively use digital platforms (including social media and search tools) to exchange experiences and participate in discussions about children's cognitive and social development, illustrating that meaningful developmental information often resides outside the classroom and can be accessed through family engagement mechanisms (Hsu & Chen, 2023). At the same time, studies of home–school collaboration indicate that the *frequency and quality* of teacher–parent contact can be associated with children's social competence and behavior, implying that assessment and support for social competence can be strengthened when information is shared

across home and school contexts rather than collected in isolation (Griffiths et al., 2022).

Contemporary inclusive education perspectives position families as partners in educational processes, including monitoring and individualized planning. Work on inclusive teacher preparation explicitly frames effective interaction with families raising children with special educational needs as part of educators' responsibilities, linked to monitoring students' psychophysical and social development and tailoring individual programs (Głodkowska et al., 2023). In parallel, literature focused on autistic learners highlights that home–school collaboration can enhance broader educational outcomes and reduce behavioral concerns, while also noting that teacher–parent relationships (including contact frequency/quality) relate to social competence and adjustment (Griffiths et al., 2022). However, evidence from pandemic-era and related research suggests that building and sustaining such partnerships can be difficult in practice, particularly when communication channels are limited or when educators and families face competing demands; these constraints can weaken consistent information exchange needed for ongoing, authentic assessment (Womack & Monteiro, 2022).

Digital technologies create new opportunities to operationalize collaborative assessment by enabling more continuous communication and documentation. Research on digital technologies in children's lives notes that digital tools are part of preschoolers' everyday ecologies and can enhance communication with family and friends, providing a basis for capturing socially relevant behaviors and interactions in situ (Gužíková et al., 2022). Studies specifically examining digital platforms in family–school partnerships report that digital tools can expand communication possibilities, accommodate parents' preferences and needs, and improve teacher–parent communication, thereby supporting parental engagement and students' academic advancement (Hsu & Chen, 2023). From an inclusive education standpoint, scholarship argues that "digital education" should be understood not simply as device provision but as requiring careful attention

to curriculum design, pedagogy, and *assessment* design, precisely the domains implicated when constructing technology-mediated systems for monitoring social competence (Carrim & Bekker, 2022). Related work on ICT integration in special/specialist settings similarly emphasizes that ICT can transform teaching, learning, and assessment practices, supporting the rationale for digitizing assessment workflows where inclusion is a priority (Omboto et al., 2022).

Nevertheless, existing practice may remain constrained by teacher-centered documentation and uneven readiness or capacity to use digital tools effectively. Research on special education service delivery during COVID-19 indicates that shifting services to technological platforms and building partnerships with parents introduced stressors for staff and families, suggesting implementation barriers that can undermine sustained collaborative practices if not addressed in design and support planning (Womack & Monteiro, 2022). Broader studies also highlight persistent challenges in communication between schools and families and in producing reliable digital measurement and assessment, reinforcing the idea that digitization alone does not guarantee valid, equitable assessment outcomes (Ermez et al., 2023). Access and capability constraints at the family level, such as limited access to technology and variable proficiency with online platforms, have also been documented as barriers to engaging families in virtual learning environments, which may, in turn, limit family participation in digital assessment unless inclusively designed (Concha et al., 2024).

Taken together, the literature supports the need for a systematic, digitally enabled framework that (i) treats assessment as a designed component of inclusion (Omboto et al., 2022); (ii) leverages family–school partnerships as a mechanism to improve the completeness and ecological validity of information about children's social functioning across contexts (Hsu & Chen, 2023); and (iii) anticipates practical constraints (e.g., communication burdens, technology access, and reliability of digital measurement) that shape feasibility in real preschool communities (Womack & Monteiro, 2022). Yet, despite

evidence that preschool social–emotional competence can be assessed in structured ways to inform educational decisions (Munnik et al., 2025) and that digital platforms can strengthen family–school communication (Hsu & Chen, 2023), research integrating these strands into a *collaborative digital assessment model* focused specifically on social competence in inclusive preschool settings remains limited, motivating the present focus.

The present study addresses this gap by developing a Digital Collaborative Assessment Model that positions teachers and parents as equal partners in monitoring children's social competence through an integrated digital platform. The proposed model incorporates standardized observation indicators, shared digital documentation, real-time progress monitoring, automated developmental reports, and two-way communication features to support collaborative decision-making. The assessment framework is designed to accommodate the diverse developmental characteristics of children in inclusive preschool classrooms while promoting authentic assessment across multiple learning environments. By integrating observations collected at both school and home, the model seeks to improve the accuracy, consistency, and usefulness of assessment information for educational planning and individualized intervention.

The study contributes to the literature in several important ways. First, it extends family–school partnership research by conceptualizing collaborative assessment as a continuous and shared responsibility rather than a periodic exchange of information. Second, it contributes to the growing body of research on digital assessment by developing an integrated platform specifically tailored to the needs of inclusive preschool education. Third, it advances inclusive assessment practices by incorporating multiple informants, authentic observation, and technology-supported monitoring of children's social competence. Finally, the study provides empirical evidence regarding the validity, practicality, and effectiveness of the proposed model, offering practical guidance for educators,

families, school administrators, and policymakers seeking to strengthen inclusive assessment systems through digital innovation.

Based on these considerations, this study aims to: (1) develop a digital collaborative assessment model for teachers and parents to monitor young children's social competence in inclusive preschool settings; (2) examine the content validity of the model through expert evaluation; (3) evaluate its practicality from the perspectives of teachers and parents during implementation; and (4) investigate its effectiveness in improving collaborative monitoring of children's social competence within inclusive early childhood education.

2. Methodology

2.1 Research Design

This study used a Research and Development (R&D) design to create a digital collaborative assessment model for monitoring preschoolers' social competence in inclusive settings, using established teacher-rated social competence measures to inform indicator selection. Specifically, social competence indicators were aligned with constructs assessed in the Social Competence and Behavior Evaluation Scale-30 (SCBE-30) social competence subscale and the Social Competence subscale of the Early School Behavior Scale (e.g., positive peer interaction/"plays well with other children") (Ren et al., 2021; Uyar et al., 2025). Multidisciplinary expert review was conducted before field use, followed by pilot and classroom implementation to test usability and data capture. Model evaluation emphasized psychometric validation of the assessment instrument, applying standard instrument-development procedures: sampling adequacy and factorability checks (KMO; Bartlett's test), exploratory factor analysis, and confirmatory factor analysis using split samples to cross-validate the factor solution (Veronese & Pepe, 2022). Findings from implementation and validation informed iterative refinement of

indicators, scoring, and reporting workflows (Veronese & Pepe, 2022; Uyar et al., 2025; Ren et al., 2021).

2.2 Research Setting and Participants

The study was conducted between January and September 2025 in six inclusive preschools in Depok, Indonesia, that had implemented inclusive early childhood education programs for at least 3 years. These schools enrolled children with diverse developmental characteristics, including typically developing children and children with mild developmental disabilities, language delays, autism spectrum disorder, and attention-related difficulties.

Participants were selected using purposive sampling according to predefined inclusion criteria. The study involved 18 preschool teachers, 90 parents, and 90 children aged 4–6 years who were enrolled in the participating inclusive classrooms. In addition, six expert validators participated during the product validation stage, representing the fields of special education, early childhood education, educational assessment, educational technology, developmental psychology, and inclusive curriculum development. Teachers were required to have at least two years of teaching experience in inclusive preschool education. Parents were eligible if they were the primary caregivers and agreed to participate in collaborative observations throughout the study. Children were included only after written informed consent had been obtained from their parents or legal guardians.

2.3 Development Procedures

The digital collaborative assessment model was developed systematically using the ADDIE framework. The development process comprised five sequential stages, ensuring that the model was grounded in identified needs, refined through expert validation, and evaluated for its practicality and effectiveness in inclusive preschool settings (see Figure 1).

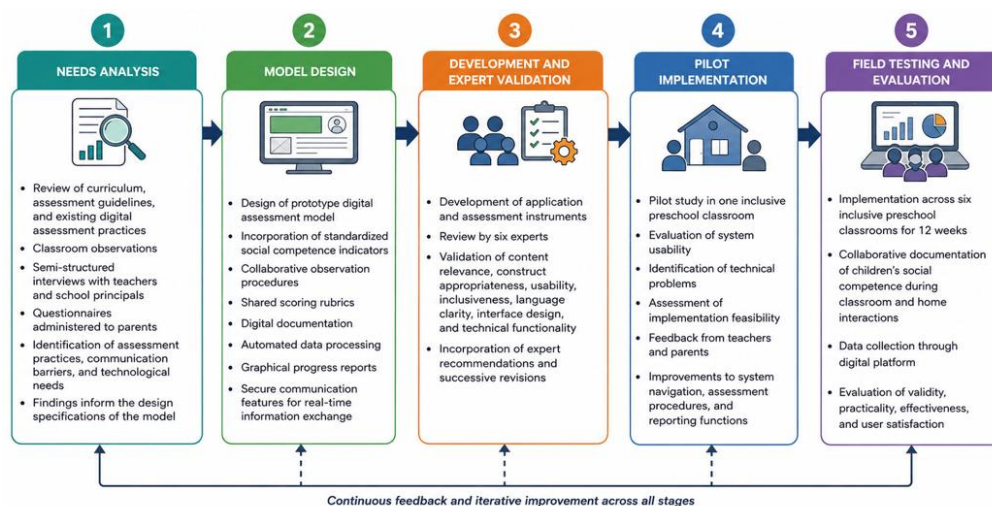


Figure 1. Development Process of the Digital Collaborative Assessment Model (ADDIE)

2.4 Research Instruments

Multiple quantitative and qualitative instruments were employed to support model development and evaluation. These instruments assessed needs

analysis, expert validation, practicality, usability, and children's social competence, providing comprehensive evidence regarding the validity, practicality, and effectiveness of the digital collaborative assessment model (see Table 1).

Table 1. Research Instruments

Instrument	Purpose	Main Components	Scale/Analysis
Needs Analysis Questionnaire	To identify existing assessment practices, communication patterns, digital readiness, and implementation challenges	Current assessment practices, teacher–parent communication, digital literacy, technological needs, perceived barriers	Five-point Likert scale; descriptive statistics
Semi-Structured Interview Guide	To explore participants' experiences and expectations regarding collaborative assessment	Social competence assessment practices, teacher–parent collaboration, digital assessment needs, and implementation challenges	Thematic analysis
Expert Validation Sheet	To evaluate the quality of the developed model and digital platform	Content relevance, instructional design, inclusiveness, language clarity, interface design, technical functionality, usability	Five-point Likert scale; Aiken's V
Teacher Practicality Questionnaire	To assess teachers' perceptions of the developed model	Ease of use, clarity, efficiency, usefulness, accessibility, satisfaction	Five-point Likert scale; descriptive statistics; Cronbach's α

Parent Practicality Questionnaire	To assess parents' perceptions of the developed model	Ease of use, communication support, accessibility, usefulness, satisfaction	Five-point Likert scale; descriptive statistics; Cronbach's α
System Usability Scale (SUS)	To evaluate the overall usability of the digital platform	Ten standardized usability items covering effectiveness, efficiency, and satisfaction	SUS scoring (0–100)
Social Competence Observation Checklist	To assess children's social competence collaboratively in home and school settings	Cooperation, communication, empathy, emotional regulation, self-control, peer interaction	Four-point rating scale; ICC, paired-samples <i>t</i> -test, N-gain, Cohen's <i>d</i>

2.5 Data Collection Procedures

Data were collected in five stages, consistent with user-centered development and feasibility/usability evaluation practices that emphasize needs assessment, formative testing, and post-implementation feedback (Helminski et al., 2024). (1) Needs analysis used interviews, classroom observations, document review, and teacher/parent questionnaires to identify assessment challenges and inform design requirements, consistent with end-user involvement approaches in digital intervention development (Benedict et al., 2021). (2) Multidisciplinary experts reviewed the prototype and instruments, paralleling heuristic/expert evaluation methods used to identify usability problems against predefined guidelines (Engelsma et al., 2024). (3) A pilot test in one inclusive classroom examined usability and practicality, reflecting recommendations that feasibility studies prioritize usability/practicality indicators and formative refinement (Kawi et al., 2022). (4) The revised platform was implemented for 12 weeks in six inclusive preschool classrooms, with teachers and parents completing standardized digital observations; comparable work highlights piloting instruments and confirming technical functionality before broader rollout (Biggs, 2022). (5) Postimplementation practicality questionnaires, usability assessments (e.g., standardized usability scales), observation logs, and participant feedback were collected, aligning with ISO-guided usability dimensions

(efficiency, satisfaction) and common usability instrumentation (Bruschetta et al., 2024).

2.6 Data Analysis

Quantitative analyses were conducted in IBM SPSS Statistics (v29). Participant characteristics and questionnaire responses were summarized using descriptive statistics (means, standard deviations, frequencies, and percentages). Content validity of the model and instruments was quantified using Aiken's *V*, an approach reported for establishing content validity alongside internal consistency testing in educational instrument development (Safitri et al., 2024). Internal consistency reliability was assessed using Cronbach's alpha; coefficients ≥ 0.70 were considered acceptable, consistent with common psychometric practice in applied educational and health measurement studies (Pov & Kawai, 2024). Agreement between teacher and parent ratings was evaluated using the intraclass correlation coefficient (ICC), a widely used statistic for quantifying rater agreement/reliability in psychometric validation studies (Fathima & Nosenoor, 2026). Model effectiveness was assessed by comparing pre- and post-implementation scores with paired-samples *t*-tests, and the magnitude of change was summarized using effect-size indices (e.g., Cohen's *d*), consistent with reporting practices in school-based intervention evaluation (Watson & Hayes, 2024).

Qualitative interview and open-ended responses were analyzed using an iterative coding-to-

themes process with independent coding and consensus discussions, consistent with qualitative feasibility research practices (Kawi et al., 2022). Quantitative and qualitative results were integrated using a mixed-methods triangulation logic to strengthen interpretive completeness, consistent with mixed-methods usability/evaluation approaches (Wong et al., 2021).

3. Results

4.1 Needs Analysis

A preliminary needs analysis was conducted to identify current practices, challenges, and expectations regarding the assessment of young children's social competence in inclusive

preschool settings. Data were obtained through questionnaires, classroom observations, interviews with teachers and school principals, and parent surveys (see Table 2). The findings consistently indicated that although teachers regularly assessed children's social behaviors, parents were rarely involved in systematic assessment activities. Communication between teachers and parents primarily occurred during scheduled meetings or through messaging applications, resulting in fragmented developmental information. Both teachers and parents expressed a strong need for an integrated digital system that would facilitate collaborative observations, continuous progress monitoring, and timely communication.

Table 2. Needs Analysis Results

Indicator	Teachers Agree (%)	Parents Agree (%)
Social competence should be monitored collaboratively	100.0	98.9
The current assessment system is inadequate	88.9	86.7
Parent participation in the assessment is limited	94.4	92.2
Digital assessment would improve communication	94.4	95.6
Real-time progress reports are needed	100.0	97.8
Willing to use a digital collaborative platform	94.4	96.7

The findings demonstrate a substantial need for a collaborative digital assessment model that integrates observations from both teachers and parents. Participants perceived the existing assessment process as fragmented and largely teacher-centered. High levels of willingness to adopt digital technology further supported the feasibility of developing a collaborative assessment platform for inclusive preschool education.

4.2 Development of the Digital Collaborative Assessment Model

The Digital Collaborative Assessment Model was developed following the five phases of the ADDIE framework. The final platform integrates assessment activities conducted at school and at home through a secure cloud-based system. The platform includes separate user interfaces for teachers and parents while maintaining synchronized child assessment records. The completed model consists of five integrated components (see Figure 2)

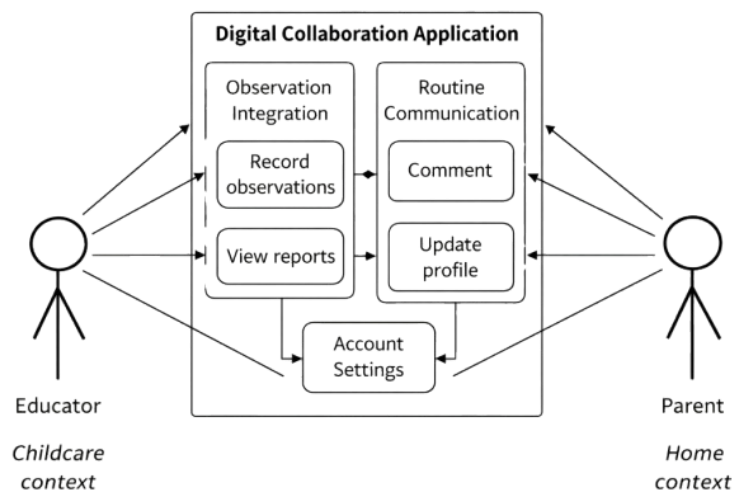


Figure 2. The Digital Collaborative Assessment Model, developed to facilitate continuous, collaborative monitoring of young children's social competence in inclusive preschool settings

Figure 2 illustrates the Digital Collaborative Assessment Model, developed to facilitate continuous, collaborative monitoring of young children's social competence in inclusive preschool settings. The model comprises five interconnected components: secure user authentication and child profile management; standardized social competence indicators; shared digital observation forms; automated scoring and developmental reporting; and two-way communication between teachers and parents. Social competence is assessed across six domains, cooperation, communication, empathy, emotional regulation, self-control, and peer interaction, using standardized indicators completed independently in both home and school environments. The system integrates these

observations through a secure cloud database to generate comprehensive developmental profiles, graphical progress reports, and evidence-based recommendations. This integrated approach strengthens teacher–parent collaboration, enhances the accuracy and consistency of assessment, and supports informed educational decision-making and individualized interventions for children in inclusive preschool settings.

4.3 Expert Validation

The prototype was evaluated by six experts representing special education, early childhood education, educational assessment, educational technology, developmental psychology, and curriculum studies (see Table 3).

Table 3. Expert Validation Results

Evaluation Aspect	Aiken's V	Category
Content relevance	0.95	Very High
Assessment indicators	0.94	Very High
Inclusive assessment principles	0.96	Very High
Interface design	0.92	Very High
System usability	0.93	Very High
Language clarity	0.94	Very High
Technical functionality	0.95	Very High
Overall	0.94	Very High

Expert recommendations primarily concerned simplifying several observation descriptors, improving navigation between assessment pages, enlarging interface icons for mobile devices, and refining automated developmental feedback. These revisions were incorporated before pilot implementation. Overall, the model demonstrated excellent content validity, indicating that the assessment framework adequately represented the intended constructs

of collaborative social competence assessment in inclusive preschool settings.

4.4 Practicality Evaluation

Following expert revision, the digital assessment model was implemented in one pilot classroom before large-scale field testing. Both teachers and parents evaluated the practicality of the platform after completing the pilot implementation (see Table 4).

Table 4. Practicality Evaluation

Indicator	Teachers Mean $\pm$ SD	Parents Mean $\pm$ SD
Ease of use	4.05 $\pm$ 1.06	4.59 $\pm$ 0.44
Navigation	3.94 $\pm$ 0.93	4.54 $\pm$ 0.47
Assessment efficiency	4.72 $\pm$ 0.36	4.63 $\pm$ 0.40
Communication support	4.78 $\pm$ 0.31	4.71 $\pm$ 0.35
Report clarity	4.74 $\pm$ 0.33	4.66 $\pm$ 0.38
Overall practicality	4.70 $\pm$ 0.34	4.63 $\pm$ 0.39

The average System Usability Scale (SUS) score reached 88.4, indicating excellent usability.

Teachers reported that the platform reduced administrative workload while improving documentation accuracy and communication with parents. Parents indicated that the application was easy to operate and increased their understanding of their children's social development. These findings demonstrate that the developed model is highly practical and

suitable for routine implementation in inclusive preschool settings.

4.5 Effectiveness of the Digital Collaborative Assessment Model

The effectiveness of the model was evaluated by comparing collaborative assessment quality before and after implementation. Improvements were measured using a standardized collaborative assessment quality rubric (see Table 5).

Table 5. Effectiveness of the Digital Collaborative Assessment Model

Assessment	Mean $\pm$ SD	<i>t</i>	<i>p</i>
Pre-implementation	66.82 $\pm$ 7.48		
Post-implementation	86.37 $\pm$ 5.91	22.84	<0.001

Table 5 demonstrates that the Digital Collaborative Assessment Model significantly improved the quality of collaborative assessment following implementation. The mean assessment score increased from 66.82 $\pm$ 7.48 before implementation to 86.37 $\pm$ 5.91 after implementation. The paired-samples *t*-test revealed a statistically significant difference (*t* =

22.84, *p* < 0.001), indicating that the observed improvement was unlikely due to chance. Furthermore, the N-gain score of 0.74 indicates a high level of improvement in collaborative assessment quality, while Cohen's *d* of 2.11 represents a very large effect size, demonstrating substantial practical significance. These findings indicate that the developed digital model

effectively enhanced teacher–parent collaboration, improved the consistency and quality of social competence assessment, and provided a more robust foundation for collaborative educational decision-making in inclusive preschool settings.

4.6 User Satisfaction

At the conclusion of the field implementation, participants evaluated their overall satisfaction with the developed platform.

Table 6. User Satisfaction

Satisfaction Indicator	Teachers (%)	Parents (%)
Very satisfied	77.8	73.3
Satisfied	22.2	25.6
Neutral	0.0	1.1
Dissatisfied	0.0	0.0
Very dissatisfied	0.0	0.0

Overall satisfaction scores reached **95.6%** among teachers and **94.3%** among parents. Participants highlighted several strengths, including real-time developmental monitoring, improved teacher–parent communication, automatic report generation, and the convenience of recording observations through smartphones. Parents also reported feeling more involved in their children's educational assessment, while teachers perceived greater consistency in developmental information collected across home and school contexts.

4. Discussion

Interpreting the Digital Collaborative Assessment Model through contemporary assessment theory suggests that its strongest contribution is its attempt to maximize the *utility* of assessment by jointly addressing validity evidence, reliability/consistency, educational impact, acceptability, and feasibility, dimensions that have been proposed as multiplicative determinants of assessment utility in programmatic systems (Woodworth et al., 2023). Within this framing, the study's emphasis on (i) expert-reviewed indicators, (ii) standardized documentation workflows, and (iii) routine use by end users aligns with approaches in which content-focused development and user-centered feasibility testing are treated as core validity evidence rather than optional implementation steps (Naeem et al., 2023).

A central design choice, standardizing observation indicators while enabling documentation across settings, can be understood as an effort to increase comparability and interpretability of distributed observations. In other digital domains, the need for standardized data frameworks is repeatedly linked to improved comparability and downstream usability of digitally captured information, while also foregrounding risks of demographic or behavioral bias when signals are not representative (Nishan, 2026). Analogously, using shared indicators for parents and teachers can be interpreted as a mechanism to reduce fragmentation in observational records and to strengthen cross-context interpretability, while still requiring vigilance regarding context effects and differential opportunities to observe particular behaviors (a bias concern consistent with broader digital data critiques) (Nishan, 2026).

The reported "excellent content validity" is also best interpreted in light of established instrument-development practices emphasizing systematic item generation and expert consultation. For example, rigorous development and expert review have been used to justify high content validity in digital education instruments, particularly when constructs are explicitly mapped to theoretical models and iteratively

refined with expert input (Naeem et al., 2023). Moreover, content validity index (CVI) approaches commonly operationalize "satisfactory" or "excellent" content validity via high item- and scale-level agreement (e.g., high S-CVI/Ave) in expert panels (Aljubair et al., 2024). Thus, the study's expert validation process coheres with widely used content-validity argumentation, while the strength of the inference still depends on panel composition and the transparency of rating criteria, as emphasized in content validity applications.

Usability and practicality findings are similarly interpretable through the lens that perceived usability is a major determinant of adoption and continued use in digital systems. The System Usability Scale (SUS) is frequently treated as a reliable, valid, and general-purpose tool for measuring perceived usability across diverse products (Fernandes et al., 2023), and questionnaire-based usability evaluation is widely used in digital technology adoption research because usability barriers can impede uptake, particularly among users with less experience (Baek et al., 2022). Evidence from technology acceptance syntheses further indicates that acceptance tends to be explained by perceived value relative to burden, with usability and utility featuring prominently in adoption judgments (Ramachandran et al., 2022). Related information-systems work also suggests that perceived usefulness and system usability/reliability are often stronger predictors of satisfaction and continuance intention than information quality once a baseline level is met (Nguyen, 2026). Collectively, these strands support the study's interpretation that usability-centered design (e.g., streamlined forms, accessible reporting) can be consequential for sustained collaborative engagement, not merely for initial satisfaction.

The model's emphasis on authentic, routine documentation can also be situated within literature that treats authentic assessment as a practical and valid approach to capturing young children's social development in naturalistic activity contexts. Evidence from early childhood research on authentic assessment-based

approaches indicates that such instruments can be simultaneously valid, practical, and effective for recording children's skills in contextually meaningful ways (Karta et al., 2021). From a digital measurement perspective, frequent or ongoing entries can also be linked to reliability considerations: in ecological-style mobile monitoring, minimum response-rate thresholds have been used to judge whether the collected data are sufficiently reliable for interpretation (Gumley et al., 2022). While the present study addresses early childhood rather than clinical monitoring, the broader implication is that digital collaborative assessment systems benefit from explicit expectations and supports that sustain adequate completion rates over time (Gumley et al., 2022).

Interpreting the Digital Collaborative Assessment Model through contemporary assessment theory suggests that its strongest contribution is its attempt to maximize the *utility* of assessment by jointly addressing validity evidence, reliability/consistency, educational impact, acceptability, and feasibility, dimensions that have been proposed as multiplicative determinants of assessment utility in programmatic systems (Woodworth et al., 2023). Within this framing, the study's emphasis on (i) expert-reviewed indicators, (ii) standardized documentation workflows, and (iii) routine use by end users aligns with approaches in which content-focused development and user-centered feasibility testing are treated as core validity evidence rather than optional implementation steps.

A central design choice, standardizing observation indicators while enabling documentation across settings, can be understood as an effort to increase comparability and interpretability of distributed observations. In other digital domains, the need for standardized data frameworks is repeatedly linked to improved comparability and downstream usability of digitally captured information, while also foregrounding risks of demographic or behavioral bias when signals are not representative. Analogously, using shared indicators for parents and teachers can be

interpreted as a mechanism to reduce fragmentation in observational records and to strengthen cross-context interpretability, while still requiring vigilance regarding context effects and differential opportunities to observe particular behaviors (a bias concern consistent with broader digital data critiques) (Nishan, 2026).

The reported "excellent content validity" is also best interpreted in light of established instrument-development practices emphasizing systematic item generation and expert consultation. For example, rigorous development and expert review have been used to justify high content validity in digital education instruments, particularly when constructs are explicitly mapped to theoretical models and iteratively refined with expert input (Naeem et al., 2023). Moreover, content validity index (CVI) approaches commonly operationalize "satisfactory" or "excellent" content validity via high item- and scale-level agreement (e.g., high S-CVI/Ave) in expert panels (Aljubair et al., 2024). Thus, the study's expert validation process coheres with widely used content-validity argumentation, while the strength of the inference still depends on panel composition and the transparency of rating criteria, as emphasized in content validity applications.

Usability and practicality findings are similarly interpretable through the lens that perceived usability is a major determinant of adoption and continued use in digital systems. The System Usability Scale (SUS) is frequently treated as a reliable, valid, and general-purpose tool for measuring perceived usability across diverse products (Fernandes et al., 2023), and questionnaire-based usability evaluation is widely used in digital technology adoption research because usability barriers can impede uptake, particularly among users with less experience (Baek et al., 2022). Evidence from technology acceptance syntheses further indicates that acceptance tends to be explained by perceived value relative to burden, with usability and utility featuring prominently in adoption judgments (Ramachandran et al., 2022). Related information-systems work also suggests that

perceived usefulness and system usability/reliability are often stronger predictors of satisfaction and continuance intention than information quality once a baseline level is met (Nguyen, 2026). Collectively, these strands support the study's interpretation that usability-centered design (e.g., streamlined forms, accessible reporting) can be consequential for sustained collaborative engagement, not merely for initial satisfaction.

The model's emphasis on authentic, routine documentation can also be situated within literature that treats authentic assessment as a practical and valid approach to capturing young children's social development in naturalistic activity contexts. Evidence from early childhood research on authentic assessment-based approaches indicates that such instruments can be simultaneously valid, practical, and effective for recording children's skills in contextually meaningful ways (Karta et al., 2021). From a digital measurement perspective, frequent or ongoing entries can also be linked to reliability considerations: in ecological-style mobile monitoring, minimum response-rate thresholds have been used to judge whether the collected data are sufficiently reliable for interpretation (Gumley et al., 2022). While the present study addresses early childhood rather than clinical monitoring, the broader implication is that digital collaborative assessment systems benefit from explicit expectations and supports that sustain adequate completion rates over time (Gumley et al., 2022).

Notwithstanding these strengths, the broader digital evaluation literature cautions that usability and acceptability measurement often relies on ad hoc tools when domain-tailored validated scales are unavailable, limiting cross-study comparability (Abedi et al., 2024). Even when general tools (e.g., SUS) are available, digital literacy gaps remain a recurring constraint on feasibility and equitable participation, and they may persist despite otherwise strong interface design (Hwang et al., 2025). Work on inclusive digital services likewise emphasizes that accessibility, usability, and reliability are not simply technical properties but determinants of

whether heterogeneous user populations can benefit, making digital literacy and support structures central to implementation quality (Indama, 2022).

5. Conclusion

This study developed and evaluated a Digital Collaborative Assessment Model designed to support teachers and parents in jointly monitoring young children's social competence within inclusive preschool settings. Developed using the ADDIE research and development framework, the model integrates standardized social competence indicators, shared digital observation tools, real-time progress monitoring, automated developmental reports, and two-way communication features into a unified assessment platform. The development process responded to the need for a more comprehensive and collaborative approach to assessing children's social behaviors across home and school environments.

The findings demonstrated that the developed model possesses high content validity, excellent usability, and strong practicality according to expert evaluators, teachers, and parents. Field implementation further revealed significant improvements in the quality and consistency of collaborative assessment, accompanied by high inter-rater agreement between teacher and parent observations and very high levels of user satisfaction. These results indicate that integrating digital technology with teacher–parent partnerships can enhance authentic assessment practices by providing more comprehensive, continuous, and contextually rich information about children's social competence. The model also supports evidence-based educational decision-making by enabling timely identification of children's developmental strengths and support needs.

The study makes several important contributions to the fields of inclusive and special education. First, it advances family–school partnership research by positioning teachers and parents as equal collaborators throughout the assessment process rather than limiting parental involvement to receiving developmental reports. Second, it contributes to digital assessment literature by presenting a validated collaborative assessment framework specifically designed for inclusive preschool education. Third, the model strengthens authentic and inclusive assessment practices through the integration of multiple observers, standardized indicators, and real-time digital documentation that accommodates children with diverse developmental characteristics.

From a practical perspective, the developed model provides educators, families, school administrators, and policymakers with an innovative approach for strengthening collaborative assessment in early childhood education. The digital platform not only improves communication and documentation efficiency but also supports individualized educational planning and early intervention through continuous monitoring of children's social competence. With further refinement and implementation across broader educational contexts, the model has the potential to become a scalable framework for promoting inclusive assessment and strengthening family–school collaboration in early childhood education. Future studies should examine the long-term effectiveness of the model, evaluate its applicability in diverse cultural and educational settings, and explore the integration of emerging technologies such as artificial intelligence to further enhance personalized developmental assessment and collaborative decision-making.

References

- Abedi, A., Colella, T. J. F., Pakosh, M., & Khan, S. S. (2024). Artificial Intelligence-Driven Virtual Rehabilitation for People Living in the Community: A Scoping Review. *NPJ Digital Medicine*, 7(1). <https://doi.org/10.1038/s41746-024-00998-w>

- Aljubair, J. M., Aldisi, D., Bindayel, I. A., Aldhwayan, M., Sabico, S., Alsaawi, T. A., Alghamdi, E., & Abulmeaty, M. M. A. (2024). Translation, Cultural Adaptation, and Content Validity of the Saudi Sign Language Version of the General Nutrition Knowledge Questionnaire. *Nutrients*, 16(16), 2664. <https://doi.org/10.3390/nu16162664>
- Baek, J. Y., Na, S. H., Lee, H., Jung, H., Lee, E., Jo, M., Park, Y. R., & Jang, I. (2022). Implementation of an Integrated Home Internet of Things System for Vulnerable Older Adults Using a Frailty-Centered Approach. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-05963-9>
- Benedict, C., Dauber-Decker, K. L., King, D., Hahn, A. L., Ford, J. S., & Diefenbach, M. A. (2021). A Decision Aid Intervention for Family Building After Cancer: Developmental Study on the Initial Steps to Consider When Designing a Web-Based Prototype. *Jmir Formative Research*. <https://doi.org/10.2196/20841>
- Biggs, E. E. (2022). Preparedness, Training, and Support for Augmentative and Alternative Communication Telepractice During the COVID-19 Pandemic. *Language Speech and Hearing Services in Schools*. https://doi.org/10.1044/2021_lshss-21-00159
- Bruschetta, R., Latella, D., Formica, C., Campisi, S., Failla, C., Marino, F., Isidoro, S. I., Giambò, F. M., Bonanno, L., Cerasa, A., Quartarone, A., Marino, S., Pioggia, G., Calabrò, R. S., & Tartarisco, G. (2024). "BrainHeart": Pilot Study on a Novel Application for Elderly Well-Being Based on Mindfulness Acceptance and Commitment Therapy. *Bioengineering*. <https://doi.org/10.3390/bioengineering11080787>
- Carrim, N., & Bekker, T. (2022). Placing Inclusive Education in Conversation With Digital Education. *South African Computer Journal*, 34(2). <https://doi.org/10.18489/sacj.v34i2.1084>
- Concha, S., Sosa, A. F. S., & Bautista, D. M. P. (2024). Community English School. *Polisemia*, 20(37), 67–76. <https://doi.org/10.26620/uniminuto.polisemia.20.37.2024.67-76>
- Engelsma, T., Heijmink, S., Hendriksen, H. M. A., Visser, L. N. C., Lemstra, A. W., Jaspers, M., & Peute, L. (2024). Capturing Usability Problems for People Living With Dementia by Applying the DEMIGNED Principles in Usability Evaluation Methods: Mixed Methods Study. *Jmir Human Factors*. <https://doi.org/10.2196/54032>
- Ermez, F., Çetin, V., İnce, E. Y., & İnce, M. (2023). High School Students' Perspectives About Using Digital Technologies in Education: DigiSchools Project. *International Journal of Innovative Approaches in Social Sciences*, 7(4), 173–183. <https://doi.org/10.29329/ijiasos.2023.628.2>
- Fathima, F., & Nosenoor, M. M. (2026). Development and Psychometric Testing of a Parental Knowledge, Attitude, and Practices Questionnaire on Pentavalent Vaccine Safety. *The Indian Journal of Medical Research*. https://doi.org/10.25259/ijmr_2728_2025
- Fernandes, C. S., Neto, C., Silva, C., Dionísio, S., Oliveira, S., Amorim, I., Matos, A. D., & Martins, M. M. (2023). "The Ark of Rights": Development of a Board Game to Empower Older Adults Regarding Their Rights. *Journal of Ageing and Longevity*, 3(1), 107–115. <https://doi.org/10.3390/jal3010009>
- Głodkowska, J., Shatayeva, A., & Batayev, D. (2023). Інклюзивті Білім Беру Жағдайында Болашақ Химия Мұғалімдерін Даярлау Ерекшеліктері. *Bulletin Series of Pedagogical Sciences*, 77(1(2023)). <https://doi.org/10.51889/1728-5496.2023.1.76.015>
- Griffiths, A. J., Baker, D., Brady, J., Kennedy, K. S., Valladolid, A., Wiegand, R., & Delgado, R. (2022). Increasing Collaboration and Knowledge in School Communities to Enhance Outcomes for Autistic Students. *Advances in Autism*, 9(2), 176–191. <https://doi.org/10.1108/aia-03-2022-0014>
- Gumley, A., Bradstreet, S., Ainsworth, J., Allan, S., Álvarez-Jiménez, M., Aucott, L., Birchwood, M., Briggs, A., Bucci, S., Cotton, S., Engel, L., French, P., Lederman, R., Lewis, S., Machin, M., MacLennan, G., McLeod, H. J., McMeekin, N., Morton, E., ... Gleeson, J. (2022). The EMPOWER Blended Digital Intervention for Relapse Prevention in Schizophrenia: A Feasibility Cluster Randomised Controlled Trial in Scotland and Australia. *The Lancet Psychiatry*, 9(6), 477–486. [https://doi.org/10.1016/s2215-0366\(22\)00103-1](https://doi.org/10.1016/s2215-0366(22)00103-1)
- Gužíková, Ž., Chicevič, S., Kostrub, D., & Brychová, S. (2022). Digital Technologies and Their Application in a Child's Life. *Acta Educationis Generalis*, 12(1), 23–40. <https://doi.org/10.2478/atd-2022-0002>
- Helminski, D., Sussman, J. B., Pfeiffer, P., Kokaly, A. N., Ranusch, A., Renji, A. D., Damschroder, L. J., Landis-Lewis, Z., & Kurlander, J. E. (2024). Development, Implementation, and Evaluation Methods for Dashboards in Health Care: Scoping Review. *Jmir Medical Informatics*. <https://doi.org/10.2196/59828>

- Hsu, P.-C., & Chen, R.-S. (2023). Analyzing the Mechanisms by Which Digital Platforms Influence Family-School Partnerships Among Parents of Young Children. *Sustainability*, 15(24), 16708. <https://doi.org/10.3390/su152416708>
- Hwang, E., Ham, H., Lee, D., Kim, H., Oh, S. H., Shim, S., Lee, S., Youn, J., & Lee, J. (2025). User Experience Evaluation of Cogscreen for Screening Mild Cognitive Impairment: Formative and Summative Evaluation. *Digital Health*, 11. <https://doi.org/10.1177/20552076251406310>
- Indama, V. (2022). Digital Governance: Citizen Perceptions and Expectations of Online Public Services. *Isslp*, 1(2), 12–18. <https://doi.org/10.61838/kman.isslp.1.2.3>
- Karta, I. W., Rachmayani, I., & Rasmini, N. W. (2021). The Influence of Cooperative Learning Through Authentic Assessment-Based Jigsaw on Social Development of Early Childhood. *Jpi (Jurnal Pendidikan Indonesia)*, 10(4). <https://doi.org/10.23887/jpi-undiksha.v10i4.34353>
- Kawi, J., Yeh, C. H., Lukkahatai, N., Hardwicke, R. L., Murphy, T., & Christo, P. J. (2022). Exploring the Feasibility of Virtually Delivered Auricular Point Acupressure in Self-Managing Chronic Pain: Qualitative Study. *Evidence-Based Complementary and Alternative Medicine*. <https://doi.org/10.1155/2022/8079691>
- Naeem, N.-K., Hadie, S. N. H., Ismail, I. M., & Yusoff, M. S. B. (2023). Development and Validation of Digi-Mee Instrument Measuring Online Learning Environments in Medical Education. *Pakistan Journal of Medical Sciences*, 39(6). <https://doi.org/10.12669/pjms.39.6.8430>
- Nguyen, T. D. (2026). Understanding IS Success Through IT Business Value. *Journal of Organizational and End User Computing*, 38(1), 1–27. <https://doi.org/10.4018/joeuc.414229>
- Nishan, M. D. N. H. (2026). Digital Epidemiology: Utilizing Big Data for Public Health Surveillance and Disease Outbreak Prediction. *Journal of Public Health Research*, 15(2). <https://doi.org/10.1177/22799036261455523>
- Omboto, C. M., Kanga, A. W., & Njageh, A. R. K. (2022). Myth or Reality: Digital Literacy Programme Implementation in Primary Special Schools in Nairobi, Kenya. *European Journal of Education*, 5(2), 51–66. <https://doi.org/10.2478/ejed-2022-0004>
- Pov, S., & Kawai, N. (2024). Pre-service Teachers' Preparation for Inclusive Practices in Cambodia: Experience, Self-efficacy and Concerns About Inclusion. *Journal of Research in Special Educational Needs*. <https://doi.org/10.1111/1471-3802.12715>
- Ramachandran, H. J., Jiang, Y., Teo, J. Y. C., Yeo, T. J., & Wang, W. (2022). Technology Acceptance of Home-Based Cardiac Telerehabilitation Programs in Patients With Coronary Heart Disease: Systematic Scoping Review. *Journal of Medical Internet Research*, 24(1), e34657. <https://doi.org/10.2196/34657>
- Ren, L., Chen, J., Li, X., Wu, H., Fan, J., & Li, L. (2021). Extracurricular Activities and Chinese Children's School Readiness: Who Benefits More? *Child Development*. <https://doi.org/10.1111/cdev.13456>
- Safitri, S. Y., Suharno, S., & Fauzi, A. (2024). Computational Thinking and Scientific Modules: Effectiveness on Students' Cognitive Learning Outcomes and Critical Thinking Skills. *Jurnal Materi Dan Pembelajaran Fisika*. <https://doi.org/10.20961/jmpf.v14i1.86266>
- Uyar, R. Ö., Aslan, D., Reinke, W. M., & Arnas, Y. A. (2025). Training and Coaching Early Childhood Teachers to Foster Social, Emotional, and Behavioral Competence of Children in Turkey. *School Psychology*. <https://doi.org/10.1037/spq0000625>
- Veronese, G., & Pepe, A. (2022). Factor Structure and Psychometric Proprieties of the COVID-19 Prevention Behaviours (COV19-PB) Scale. *Current Psychology*. <https://doi.org/10.1007/s12144-022-04167-8>
- Watson, E., & Hayes, B. (2024). School Staff Delivery of a Solution Focused Intervention to Support Pupils' Behaviour. *Support for Learning*. <https://doi.org/10.1111/1467-9604.12471>
- Womack, T., & Monteiro, E. (2022). Special Education Staff Well-being and the Effectiveness of Remote Services During the COVID-19 Pandemic. *Psychology in the Schools*, 60(5), 1374–1393. <https://doi.org/10.1002/pits.22702>
- Wong, K. C., Thiagalingam, A., Kumar, S., Marschner, S., Kunwar, R., Bailey, J., Kok, C., Usherwood, T., & Chow, C. K. (2021). User Perceptions and Experiences of a Handheld 12-Lead Electrocardiographic Device in a Clinical Setting: Usability Evaluation. *Jmir Cardio*. <https://doi.org/10.2196/21186>

Woodworth, G. E., Goldstein, Z., Ambardekar, A. P., Arthur, M. E., Bailey, C., Booth, G. J., Carney, P. A., Chen, F., Duncan, M., Fromer, I. R., Hallman, M. R., Hoang, T., Isaak, R. S., Klesius, L. L., Ladlie, B. L., Mitchell, S. A., Juve, A. K. M., Mitchell, J., McGrath, B. J., ... Maniker, R. B. (2023). Development and Pilot Testing of a Programmatic System for Competency Assessment in US Anesthesiology Residency Training. *Anesthesia & Analgesia*, 138(5), 1081–1093. <https://doi.org/10.1213/ane.0000000000006667>