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Strengthening Sensory Teaching Material Management and Production for Inclusive Education at IGTKI Biringkanaya

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Abstract

Purpose: This community engagement program aimed to strengthen IGTKI Biringkanaya's institutional management and teachers' competence in developing inclusive sensory teaching materials for children with special needs.

Method: A participatory approach was implemented through needs mapping, training, demonstrations of appropriate technology, collaborative production, classroom mentoring, and monitoring and evaluation.

Practical Applications: The program involved 40 teachers from 11 early childhood education institutions. Teachers' mean knowledge score increased from 30% on the pretest to 90% on the posttest. The activities produced 20 sensory teaching materials, 20 integrated daily lesson plans, and a 97-page printed and digital ISBN-registered guidebook.

Conclusion: The program improved teachers' knowledge and practical capacity while establishing shared documentation and learning resources for IGTKI. Participants rated the activities highly and recommended advanced training covering planning through learning evaluation.

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Introduction

Inclusive early childhood education is not merely the placement of children with diverse abilities in the same classroom. It requires institutions and teachers to remove barriers to participation, adapt learning experiences, and provide resources that respond to individual needs. Ainscow (2020) emphasizes that inclusion is sustained through coordinated changes in culture, policy, and practice rather than isolated classroom adjustments. At the teacher level, self-efficacy in inclusive instruction, behavior management, and collaboration is fundamental to consistent practice (Sahli Lozano et al., 2023; Sharma et al., 2012). Community engagement programs in early childhood education should therefore combine pedagogical capacity building with institutional systems that support planning, documentation, monitoring, and continuous improvement.

Sensory teaching materials are relevant in inclusive early childhood settings because some children with developmental differences show varied patterns of sensory response, attention, movement, and participation. Multisensory activities can provide structured opportunities for children to use visual, auditory, tactile, and kinesthetic information during play and learning (Shidqi & Budi, 2023). Community-based initiatives in Indonesia have also shown that sensory play media can be introduced through practical activities using readily available materials for children with special needs (Annisa et al., 2024). Nevertheless, sensory materials must be selected carefully. Evidence varies across intervention types, and outcomes are influenced by children's needs, the intended educational function, safety, implementation quality, and ongoing evaluation (Bodison & Parham, 2018; Piller et al., 2025; Randell et al., 2022). Sensory materials in early childhood education should therefore be positioned as adaptive learning resources rather than substitutes for individualized clinical assessment or therapy.

Teacher readiness is a central factor in the safe and purposeful use of these materials. Training that combines conceptual explanation, demonstration, guided practice, peer feedback, and classroom mentoring enables teachers to translate knowledge into concrete instructional decisions. Research on inclusive teacher efficacy indicates that teachers need confidence not only in adapting instruction but also in collaborating and managing classrooms (Sahli Lozano et al., 2023). Similarly, learning-media development is more sustainable when teachers participate in the design process and can use simple technology to produce, revise, and document resources independently (Litta et al., 2023). Visual, auditory, and kinesthetic planning can also help early childhood teachers create more engaging learning environments when aligned with learning objectives and children's characteristics (Litta & Budiarty, 2020).

The program partner was the Biringkanaya District branch of the Indonesian Kindergarten Teachers Association (Ikatan Guru Taman Kanak-Kanak Indonesia, IGTKI), Makassar City. The partner profile recorded 64 members and a broad network of early childhood education, kindergarten, and playgroup institutions (PAUD/TK/KB). The organization routinely coordinates professional meetings and reports its activities to the Makassar City Education Office. This network gives IGTKI strategic potential to serve as a center for teacher development and the dissemination of inclusive teaching practices. Initial field observations, however, revealed a gap between this organizational potential and the availability of learning resources responsive to sensory needs. Most participating teachers had general experience in early childhood education, but many had not received specialized preparation in special education or structured sensory learning for children with special needs.

Photo 1. Ongoing professional development activities of IGTKI Biringkanaya



Source: Private Documentation, 2026.

Management problems were identified in five interconnected areas. First, annual programs were still dominated by general pedagogical activities and had not been systematically designed around the specific learning needs of children with special needs. Second, teacher-development activities were largely incidental and were not linked to a measurable medium-term roadmap. Third, teaching materials remained dispersed across individual schools, limiting shared access and replication. Fourth, monitoring and evaluation focused more on attendance than on teacher competence, product quality, classroom use, or children's participation. Fifth, administrative records, activity reports, and documentation of learning products were managed manually and inconsistently. These conditions reduced the organization's ability to sustain and scale successful practices.

The production aspect was equally important. Teachers still depended on individual creativity and used conventional materials that were not always designed for specific sensory learning purposes. Their experience was limited in selecting child-safe materials, standardizing product functions, documenting production procedures, linking media to lesson plans, and evaluating classroom use. A contextual guidebook was also unavailable. Without a shared reference, sensory activities risk becoming attractive craft products without clear learning objectives, adaptation procedures, safety checks, or assessment guidance. The partner's challenge was therefore not simply a lack of media, but the absence of an integrated production and management system.

Photo 2. Examples of teacher-made learning media within the partner network



Source: Private Documentation, 2026.

To address these interrelated challenges, the program integrated two areas of empowerment: institutional management and the production of sensory teaching materials. The management component included needs-based planning, a teacher-development roadmap, standardized reporting formats, shared physical and digital repositories, and performance-oriented monitoring. The production component included workshops on inclusive sensory learning, selection of safe materials, design and production using simple appropriate technology, integration into lesson plans, classroom trials, and the preparation of printed and digital guidebooks. This integrated model was intended to strengthen IGTKI as an organization

while ensuring that each teacher could apply program outputs in daily practice.

Accordingly, this community engagement program aimed to strengthen the institutional management of IGTKI Biringkanaya and improve teachers' competence in designing, producing, implementing, and evaluating inclusive sensory teaching materials. The targeted changes included a needs-based organizational program, improved teacher knowledge and production skills, standardized sensory teaching materials, integration into lesson plans, a contextual guidebook, and sustainable documentation and dissemination mechanisms. This article describes the program implementation and evaluates its verified outcomes.

Method

The program employed a participatory and collaborative community-empowerment approach. IGTKI administrators and teachers were active partners in problem identification, solution design, implementation, evaluation, and sustainability planning. The program was implemented over eight months and included eight partner visits. Participants comprised 40 teachers representing 11 PAUD/TK/KB institutions, together with IGTKI administrators. The university team included lecturers in social welfare, education, and social sciences, supported by two students who assisted with administration, logistics, documentation, and field activities.

The first stage involved program orientation and needs mapping. The team coordinated with IGTKI administrators, explained the program objectives, mapped teachers' initial experience, identified available sensory materials and facilities, and documented institutional management practices. Data were collected through partner discussions, a brief needs questionnaire, document review, and field observation. The findings were used to agree on priorities, participant composition, the training schedule, product categories, and success indicators. This stage also established role distribution, communication channels, documentation procedures, and consent for activity photographs and the aggregate use of evaluation data.

Table 1. Program Stages, Main Activities, And Evaluation Evidence

Stage	Main activities	Expected evidence
Needs mapping	Coordination, questionnaire, observation, and document review	Needs map, agreed priorities, schedule, and baseline data
Capacity building	Inclusive education, sensory-learning principles, safety, and instructional design	Attendance, pretest-posttest, and design worksheets
Collaborative production	Appropriate-technology demonstration, group production, and rubric review	Standardized sensory teaching materials and revision notes
Classroom integration	RPP/RPPH integration, mentoring, and classroom trials	Lesson plans, observation notes, and implementation evidence
Institutional strengthening	Roadmap, monitoring instruments, repository, guidebook, and dissemination	Formal partner documents, guidebook, and physical/digital archives

Source: Author’s Work, 2026.

The second stage consisted of training and capacity building. The material covered inclusive early childhood education, characteristics of children with special needs, basic principles of sensory learning, distinctions between educational stimulation and clinical therapy, child safety, material selection, instructional design, and classroom assessment. Delivery combined concise presentations, demonstrations, case discussions, design worksheets, and guided production. Participants completed a pretest and posttest covering the same knowledge domains so that change could be summarized descriptively. The assessment was not intended to diagnose professional competence but served as a program-monitoring instrument.

The third stage involved the application of appropriate technology and collaborative production. Teachers worked in groups to develop sensory teaching materials using accessible tools and materials, including laminating equipment, cutting tools, child-safe fasteners, fabrics, textured media, boards, containers, and simple mechanical components. Each product was required to state its learning objective, targeted sensory modality, recommended age or functional level, materials, production steps, safety precautions, adaptation options, use procedures, and observation indicators. Products were reviewed using a rubric covering safety, function, durability, visual clarity, adaptability, and documentation quality. Feedback was provided before finalization.

The fourth stage comprised integration into lesson plans, mentoring, and classroom implementation. Teachers linked selected products to lesson-plan components (RPP/RPPH), including objectives, activity sequences, differentiation, observation, and follow-up. The team observed or reviewed implementation evidence, discussed practical constraints, and supported revisions to products and instructions for use. The guidebook was compiled from validated designs and included conceptual foundations, identification of sensory learning needs, examples of tactile, visual, auditory, and movement-based activities, production guidance, sample lesson plans, safety checks, evaluation forms, and partner best practices. Printed and editable digital versions were prepared for shared use.

The fifth stage involved monitoring, evaluation, and sustainability planning. Quantitative information included attendance, numbers of sessions and visits, pretest and posttest scores, numbers and types of products, integrated lesson plans, guidebook specifications, and dissemination reach. Qualitative information included observation notes, participant reflections, product-review comments, and partner testimonials. Quantitative data were summarized using frequencies, percentages, means, and absolute score changes. Qualitative information was grouped into themes of benefits, feasibility, constraints, adaptation, and sustainability. The program concluded by establishing a five-person management team for the IGTKI sensory-material repository, preparing a medium-term development roadmap, standardizing administrative formats, and planning routine dissemination through meetings and digital media.

Photo 3. Prototype Sensory Teaching Materials And Guidebook Design



Source: Private Documentation, 2026.

Result

The program was implemented at the IGTKI Biringkanaya Secretariat and involved 40 teachers from 11 PAUD/TK/KB institutions, five IGTKI administrators, and five university team members. A two-day face-to-face workshop and eight mentoring and monitoring visits were conducted. Participant attendance reached 100%, and all 40 teachers completed the pretest and posttest. The activity sequence included partner coordination, needs mapping, training on inclusive sensory learning, guided production, integration into lesson plans, classroom implementation, product revision, guidebook preparation, and dissemination.

Photo 4. Training and Mentoring Activities With Teachers From IGTKI Biringkanaya





Source: Private Documentation, 2026.

The initial needs assessment showed that teachers' understanding of sensory learning remained limited. The most frequently reported difficulties concerned identifying the needs of children with special needs and distinguishing sensory learning from motor learning, which participants had often treated as the same concept. Organizational documents also indicated that sensory learning had not been specifically incorporated into daily lesson plans or learning-evaluation reports. Following the training, teachers were able to prepare daily lesson plans and evaluation components aligned with sensory-learning standards for early childhood education. Before the production workshop, existing teacher-made media were generally grouped under motor-learning activities and lacked documentation of materials, tools, procedures, and intended benefits. After the workshop, teachers independently produced documented sensory teaching materials that specified materials and tools, procedures for use, and educational benefits. These findings confirmed the need to link institutional management with product development rather than conduct a stand-alone workshop.

Within the institutional-management component, the partner completed a Sensory Learning Guidebook for Children with Special Needs in Early Childhood Education. A five-person management team was appointed to maintain the repository and agree on the guidebook content. The partner's documentation system now includes activity archives, the guidebook, lesson plans, and records of sensory teaching-material production.

Teachers' knowledge increased from a mean pretest score of 30% to a mean posttest score of 90%, representing an absolute increase of 60 percentage points. The largest improvement occurred in the sensory teaching-material domain, while the smallest occurred in the institutional management and teacher-competence domain. Beyond the test scores, the team observed that participants became more systematic in defining learning objectives, identifying targeted sensory modalities, selecting safe materials, and explaining how products could be adapted to different children's needs.

The collaborative production stage generated 20 sensory teaching materials. Eleven representative product groups were selected for detailed documentation and dissemination: (1) Number Garden; (2) Fruit Order Market; (3) Vehicles; (4) Learning Numbers and Kids; (5) Needs Communication Cards, Sensory Path, Color Fingers, and Spinning Sun; (6) Sensory Busy Board, Squeeze Ball, and Button Matching; (7) Rainbow Cloud; (8) Water Cycle (Hydrology); (9) ABA Learning Aid; (10) Smart Box; and (11) Multipurpose Box. Product assessment showed that IGTKI Biringkanaya teachers were able to produce sensory teaching materials independently and demonstrated strong creativity in adapting materials to learning purposes.

Photo 5. Sensory Teaching Materials Produced by Participants In The Early Childhood Education Workshop



Source: Private Documentation, 2026.

A total of 20 RPP/RPPH documents integrated sensory teaching materials into learning objectives, activity sequences, differentiation strategies, and observation indicators. Classroom application was reviewed during eight mentoring visits and included children identified by their schools as requiring additional learning support. Teachers reported that the materials were particularly useful for supporting sensory engagement and participation. Practical constraints included storage space, preparation time, cleaning, individual variation, and the need for additional adult support for some children after the activity.

The guidebook was finalized as an ISBN-registered printed and digital publication accessible to IGTKI Biringkanaya and the wider public. It contains 97 pages organized into nine chapters and was distributed to 11 participating institutions. Its contents include principles of inclusive learning, sensory-learning objectives, product-design standards, safety guidance, production steps, sample lesson plans, observation forms, and partner best practices.

Overall partner responses were in the highly satisfactory and high-understanding categories. Participants rated the relevance of the material at 90%, facilitator clarity at 100%, production feasibility at 100%, and the likelihood of future use at 100%. Their principal recommendation was to provide advanced activities covering the complete sensory-learning cycle, from instructional planning to learning evaluation. Table 2 summarizes the planned indicators and verified implementation results.

Table 2. Planned indicators and verified implementation results

Indicator	Planned target	Verified result
Teacher participation	At least 35 teachers or 80% of invited representatives	40 teachers from 11 early childhood education institutions participated.
Program visits/meetings	At least eight visits during the program period	Eight visits were completed at partner institutions in IGTKI Biringkanaya.
Sensory teaching materials	At least 20 documented products	Twenty sensory teaching-material products were documented.
Integrated RPP/RPPH	At least 20 lesson plans	Twenty RPP/RPPH documents integrated sensory teaching materials.
Guidebook	One printed and digital guidebook of at least 60 pages	A 97-page ISBN-registered guidebook was produced in printed and digital formats.
Institutional management	Program document, roadmap, monitoring and evaluation instruments, and digital archive	Management procedures, monitoring instruments, and documentation were incorporated into the guidebook and partner repository.

Source: Author's Work, 2026.

Discussion

The verified increase from 30% to 90% indicates that structured training combined with guided practice strengthened teachers' conceptual and procedural readiness for inclusive sensory learning. This interpretation is consistent with research on teacher efficacy, which identifies knowledge, opportunities for practice, and collaborative support as important components in building confidence for inclusive teaching (Sahli Lozano et al., 2023; Sharma et al., 2012). In this program, the value of training was reflected not only in higher test scores but also in teachers' improved ability to connect products with learning objectives, safety considerations, adaptation options, and observation indicators.

The production of 20 sensory teaching materials demonstrates the practical potential of appropriate technology based on locally available and accessible resources. Teacher-made products can reduce dependence on expensive commercial media and can be adjusted to classroom themes, available space, and children's responses. Community-engagement and educational studies likewise describe the value of sensory boards, multisensory media, and guided play activities in supporting engagement and learning opportunities for children with disabilities or developmental differences (Annisa et al., 2024; Shidqi & Budi, 2023). However, a product's educational value cannot be inferred from its appearance alone. The program's review process, which addressed safety, function, durability, adaptability, and documentation, was therefore a central contribution.

The program also adopted a cautious interpretation of evidence on sensory stimulation. Systematic reviews report that some sensory techniques and environmental modifications may support participation, while other approaches produce mixed or context-dependent outcomes (Bodison & Parham, 2018; Piller et al., 2025; Randell et al., 2022). More structured Ayres Sensory Integration interventions require trained professionals, individualized assessment, fidelity standards, and clinical goals (Omairi et al., 2022; Schoen et al., 2019). The materials developed by IGTKI are educational resources for classroom adaptation and

stimulation and should not be presented as clinical therapy. This distinction should be stated clearly in the guidebook and in teachers' communication with families.

Management achievements were as important as the physical products. Needs-based programming, a teacher-development roadmap, monitoring instruments, and a shared repository can prevent outputs from being lost after funded activities end. Inclusive education requires organizational routines that support teacher learning, collaboration, and evidence use (Ainscow, 2020). Completion of the Sensory Learning Guidebook shows that IGTKI can develop from an organization primarily coordinating meetings into a knowledge-sharing center. Sustainability nevertheless depends on formal endorsement, designated personnel, routine schedules, and evidence of continued use after the main training period.

The integration of 20 products into 20 lesson plans and their review through eight mentoring visits strengthened the guidebook's practical relevance. Research on learning media shows that resources become more meaningful when teachers connect visual design and technology to learning objectives rather than treating them as separate attractions (Litta et al., 2023). Multisensory planning must likewise respond to children's engagement, communication, motor, and regulation needs instead of assuming that the same stimulus benefits every child. Classroom observation and teacher reflection should therefore address individual adaptation, adult support, activity duration, cleaning and storage needs, and signs that an activity should be modified or stopped.

Several limitations should be acknowledged. First, the program involved one district-level teacher organization and may not represent early childhood institutions in other areas. Second, the pretest-posttest design without a comparison group can describe change during the program but cannot establish causality. Third, teacher-reported satisfaction and classroom observations may be influenced by positive-response bias and limited observation time. Fourth, child outcomes were not assessed using clinical sensory-processing instruments. The primary outcomes were organizational capacity, teacher competence, product quality, and classroom feasibility. Future follow-up should examine sustained use, teacher-led revisions, family feedback, and children's educational participation using ethically appropriate measures.

Despite these limitations, the integrated approach offers a replicable community-engagement model. Its contribution lies in combining organizational planning, teacher development, collaborative production, classroom mentoring, documentation, and dissemination within one empowerment cycle. Replication in other IGTKI branches should begin with local needs mapping rather than copying products without adaptation. The guidebook and repository can serve as adaptable starting points, while product safety, educational objectives, cultural relevance, and accessibility should be reassessed in each context.

Conclusion

The program strengthened IGTKI Biringkanaya's institutional management and teachers' competence in inclusive sensory learning through participatory training, appropriate technology, collaborative production, classroom mentoring, and a contextual guidebook. Teachers' mean knowledge score increased from 30% on the pretest to 90% on the posttest. The program produced 20 documented sensory teaching materials, integrated them into 20 RPP/RPPH lesson plans, completed eight mentoring visits, established a shared documentation system, and finalized a 97-page ISBN-registered printed and digital guidebook. Its practical contribution is an integrated model in which learning-media production and institutional sustainability reinforce one another. Because the program was limited to one partner network and primarily used educational and organizational indicators, future work should assess sustained use, periodic product revision, broader school participation, and children's educational participation without positioning classroom sensory activities as clinical therapy.

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