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Tactile Clip Path for Fine-Motor Development in a Student With Total Visual Impairment: A Qualitative Case Study

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A B S T R A C T

This study explored the implementation of the Tactile Clip Path technique using raised letter and number paths to support fine-motor development in a student with total visual impairment at SLB PGRI Pasirjambu, Indonesia. A descriptive qualitative case-study design involved one fifth-grade teacher and one fifth-grade student, identified as T. Data were generated through six 60-minute participatory observations, semi-structured teacher interviews, and instructional documentation, then analysed through data reduction, display, and conclusion drawing. The intervention combined tactile contour tracing with clipping, folding, tearing along a pattern, and transferring small objects. Across the six sessions, the observational record documented progressively steadier clip grasp, more sustained direction while tracing raised paths, better bimanual coordination, greater precision in folding and tearing, and reduced reliance on physical guidance. The student also showed stronger task engagement, initiative, and confidence. The raised boundaries operated as self-guiding tactile cues, while graded tasks and the gradual shift from hand-over-hand support to verbal prompts promoted independent exploration. Because the evidence derives from a single case and does not establish causality, the findings should be interpreted as practice-based evidence rather than an effectiveness claim. The study contributes a low-cost, modular tactile-learning approach that integrates symbol exploration and fine-motor practice for learners with severe visual impairment.

INTRODUCTION

Visual impairment can restrict a child's access to environmental information and therefore change how spatial, object, and academic information is acquired. The World Health Organization (2019) estimates that at least 2.2 billion people live with vision impairment or blindness globally, underscoring the importance of educational environments that remove sensory barriers. For children with severe vision loss, access to learning cannot depend on visual demonstration alone; it requires purposeful use of remaining sensory channels, assistive resources, and instruction that is responsive to individual functioning (Lueck & Heinze, 2005; World Health Organization, 2019). In Indonesia, inclusive and special education is also framed by the right of learners with disabilities to receive appropriate educational services (Republic of Indonesia, 2003; Republic of Indonesia, 2016).

Touch is especially consequential for learners with total visual impairment because it provides both perceptual information and a means of acting on objects. Haptic perception integrates cutaneous and kinesthetic input with exploratory hand movements (Lederman & Klatzky, 1987; Klatzky & Lederman, 1993). Research shows that haptic exploration develops over time and is shaped by the organization of hand movements, opportunities for practice, and the characteristics of the object or display being explored (Kalagher & Jones, 2011; Schellingerhout et al., 2005). Raised-line materials can therefore serve as more than representational aids: they can structure movement, orient the fingers, and support the systematic extraction of shape information.

Fine-motor competence is central to participation in school and daily life. It supports grasping, pinching, coordinating the two hands, manipulating small objects, using educational tools, and learning literacy-related skills such as Braille. Evidence from children with visual impairment indicates that fine-motor performance can be slower and less accurate than that of sighted peers, while repeated, appropriately designed practice can support improvement (Reimer et al., 2011). More broadly, research has identified close relations between haptic function, manual dexterity, and sensorimotor performance (Tseng et al., 2019; Tseng & Hsu, 2023). These relationships justify learning activities that deliberately combine tactile discrimination with hand and finger action.

Tactile graphics and raised patterns are commonly used to support nonvisual access to shapes, symbols, and spatial information. However, children's performance depends on the exploratory procedures they use rather than on the presence of a tactile display alone. Contour following, bimanual exploration, and systematic scanning can improve the extraction of shape information, whereas unstructured touching may provide limited information (Vinter et al., 2012; Withagen et al., 2012). Practice and the severity of visual impairment also affect performance on shape-related production tasks (Vinter et al., 2018). Accordingly, tactile instructional media should offer perceivable boundaries, manageable complexity, repeated exploration, and opportunities to act independently.

At SLB PGRI Pasirjambu, an initial assessment identified three students with visual impairment: one with low vision and two with total blindness. The present case focused on T, a fifth-grade student with total visual impairment who had difficulty maintaining finger strength, coordinating both hands, following a patterned direction, and manipulating small objects. T still required considerable assistance when tracing patterns, folding paper, tearing along a line, and transferring small materials. Existing learning resources were largely limited to Braille boards and simple concrete objects, leaving limited variation in structured sensorimotor practice. Yet the student showed strong willingness to participate, suggesting that a more graded and motivating tactile medium could be feasible.

Previous studies have established the value of haptic exploration, multisensory learning, and practice for children's shape understanding and manual activity (Gori et al., 2024; Kalagher & Jones, 2011; Vinter et al., 2012). Studies of tactile materials for learners with visual impairment have often concentrated on recognition, representation, or the accessibility of graphics (Schellingerhout et al., 2005; Vinter et al., 2018; Withagen et al., 2012). Less attention has been given to a classroom medium that intentionally integrates raised letter and number paths with multiple manipulative actions, namely clipping, folding, tearing, and moving small objects, while progressively reducing physical assistance. This creates a practical gap between tactile-symbol learning and comprehensive fine-motor exercise.

The Tactile Clip Path technique was designed to address this gap. The medium uses raised letter and number paths with contrasting textures and tactile boundaries that guide the fingers. Its self-guiding edges are intended to give immediate directional feedback without continuous hand-over-hand control; its modular layout permits progression from wider to narrower paths; and its activities connect tactile exploration with functional hand actions. The novelty of the study lies not in claiming a new universal therapy, but in documenting a context-sensitive instructional configuration that joins symbol-path exploration, tactile self-correction, graded manipulation, and fading teacher assistance for a student with total visual impairment.

This study therefore aimed to describe (a) the implementation of the Tactile Clip Path technique on raised letter and number paths and (b) the observed development of T's fine-motor skills during its use. The study is urgent because accessible, low-cost, and adaptable learning media remain important for special-school teachers who must align instruction with individual sensory and motor profiles. Its anticipated contribution is a practice-based model that teachers can adapt to strengthen independent tactile exploration, fine-motor participation, and readiness for academic and everyday activities.

METHODS

Research design and setting.

This descriptive qualitative case study was conducted at SLB PGRI Pasirjambu, Indonesia, from 15 to 31 July 2026. A qualitative design was selected to document the learning process, the teacher's instructional decisions, and changes observed during the intervention in the student's natural classroom context (Creswell & Poth, 2018).

Participants and ethics.

Participants were one fifth-grade teacher and one fifth-grade student with total visual impairment, identified by the initial T to protect confidentiality. Participants were selected purposively because they could provide information directly relevant to the implementation of the technique (Palinkas et al., 2015). The school granted research permission, and the student's parent or guardian provided informed consent. Participation was voluntary, anonymized, and designed not to disrupt regular instruction.

Learning medium and procedure.

The Tactile Clip Path medium comprised raised letter and number paths with textured boundaries, clips, folding paper, patterned paper for tearing, and small objects for transfer. Teaching proceeded through preparation, tactile orientation, teacher demonstration, guided practice, independent practice, and reflection. In the early sessions, the teacher used hand-over-hand guidance when needed; this support was gradually replaced with verbal prompts. Six sessions were observed, each lasting approximately 60 minutes.

Data generation and analysis.

Data were collected through participatory observation, semi-structured interviews with the teacher before, during, and after implementation, and documentation of lesson activities and student products. The observation focused on clip grasp and finger strength, hand coordination, tracing precision, folding and tearing accuracy, small-object manipulation, engagement, and assistance required. Data were reduced, organized in matrices and narrative displays, and interpreted iteratively following the interactive logic of qualitative analysis (Miles et al., 2014). Credibility was supported through triangulation of methods and sources, repeated observation across sessions, and confirmation of interpretations with the teacher (Lincoln & Guba, 1985).

RESULTS AND DISCUSSION

Implementation of the Tactile Clip Path Technique

The implementation of the Tactile Clip Path technique began with instructional planning based on the results of the student's preliminary fine-motor assessment. The teacher identified four principal areas requiring support: finger-muscle strength, coordination between both hands, accuracy in maintaining movement direction, and the ability to manipulate small objects. These areas were translated into learning activities involving raised-path tracing, clipping, folding, tearing along tactile patterns, and transferring small objects. The activities were arranged progressively so that Student T could begin with simple movements before completing tasks requiring more complex coordination and precision. The teacher also determined the type and level of assistance that would be provided during each stage of instruction.

The learning medium consisted of raised letter and number paths equipped with tactile boundaries that could be distinguished from the main pathway. The boundaries had a rougher texture, whereas the principal tracing path had a smoother surface. This contrast was intended to help Student

T differentiate the correct route from its surrounding area through touch. The teacher also prepared clips, folding paper, tactile tearing patterns, small objects, and containers for transfer activities. The raised-path components were designed to be modular so that their width, length, direction, and complexity could be adjusted according to the student's developing ability. Wider and simpler paths were introduced first, followed by narrower paths and symbols containing curves or changes in direction.

At the beginning of each session, the teacher provided Student T with sufficient time to explore the learning medium before completing the assigned tasks. The student was encouraged to identify the starting point, main path, textured boundary, directional changes, and endpoint through tactile exploration. The teacher verbally described the purpose of each component and demonstrated how the index finger should move along the raised route. During the initial sessions, Student T tended to touch the medium unsystematically and frequently moved between the pathway and its surrounding area. The teacher therefore provided repeated tactile orientation to help the student develop a more systematic exploration strategy.

After the orientation stage, the teacher demonstrated the principal activities and guided Student T through the learning sequence. Hand-over-hand assistance was provided when the student experienced difficulty positioning the fingers, maintaining the direction of movement, or coordinating both hands. For instance, during the clipping task, the teacher initially helped position the thumb and index finger on the clip. During folding and tearing activities, the teacher guided one hand to stabilize the paper while the other performed the required movement. This physical support was not maintained throughout the intervention. As Student T became familiar with the activity, the teacher gradually replaced physical assistance with tactile cues, verbal prompts, corrective feedback, and opportunities for repeated independent practice.

The implementation process showed that the Tactile Clip Path technique could integrate several fine-motor activities into a connected instructional sequence. Student T did not merely trace raised letters and numbers but also performed manipulative activities associated with each tactile path. The textured boundaries gradually functioned as self-guiding cues because the student could detect when the finger moved outside the intended route and attempt to correct the movement. The teacher evaluated the student's performance during each session and adjusted path difficulty, activity duration, repetition frequency, and assistance level. Consequently, implementation remained responsive to the student's sensory and motor characteristics rather than following a uniform sequence that ignored individual progress.

Development of Fine-Motor Skills Across Six Sessions

During the first session, Student T demonstrated considerable difficulty in completing activities that required finger strength, directional control, and coordinated hand movements. The student could not maintain stable pressure when opening and closing the clip, and the fingers frequently changed position during the activity. When tracing the raised letter and number paths, the index finger often moved outside the designated route, particularly when encountering curves and changes in direction. Hand movements appeared stiff, hesitant, and frequently interrupted. The student also required intensive hand-over-hand assistance when folding paper, tearing along a tactile line, and transferring small objects because the grasp was not sufficiently stable to prevent the objects from falling.

Minor changes began to appear during the second session. Student T showed a more appropriate position of the thumb and index finger when holding the clip, although the applied pressure remained inconsistent. The student was able to maintain the tracing direction for a slightly longer period before leaving the pathway. The frequency of directional errors remained relatively high, but the student began to recognize the tactile boundary as an indication that the finger had moved away from the correct route. During paper-folding activities, Student T started to understand the direction of the fold after receiving a demonstration and repeated verbal instructions. The student also appeared more willing to try the activity again after making an error.

During the third session, the development of finger strength and bimanual coordination became more noticeable. Student T used the clip with greater stability when picking up and transferring small objects. The tracing movement became more continuous because the student no longer stopped as frequently as in the earlier sessions. One hand began to perform a stabilizing role while the other carried out the principal movement. For example, the left hand held the paper in position while the right hand folded or tore it. Tearing results were closer to the tactile pattern, although some sections still moved outside the intended line. At this stage, the teacher reduced physical guidance and provided more verbal instructions to encourage independent movement.

More substantial development was observed during the fourth and fifth sessions. Student T increasingly used the rough boundary as a tactile reference for maintaining the direction of finger movement. Tracing became smoother, and errors were less frequent than during the first three sessions. The student was able to complete repeated clipping activities without showing rapid fatigue, indicating improved finger strength and pressure control. Bimanual coordination also became more functional during folding, tearing, and object-transfer activities. By the fifth session, raised letters and numbers could be traced with minimal assistance, paper folds were more closely aligned with the tactile guide, and small objects could be moved with fewer drops. The teacher predominantly provided verbal prompts rather than direct physical assistance.

By the sixth session, Student T demonstrated the most consistent fine-motor performance recorded during the study. The student maintained a stable clip grasp and applied adequate pressure throughout the activity. Raised letter and number paths were completed with smoother and more continuous movements, while directional errors were minimal. Coordination between both hands was evident across the manipulative tasks: one hand stabilized the material, and the other performed clipping, folding, tearing, or transferring movements. Student T completed most activities independently, although occasional verbal prompts were still required to regulate pacing and confirm task direction. These changes represent progressive observations within a single case and cannot be interpreted as evidence of a controlled causal effect.

Table 1. Development of Student T's Fine-Motor Performance Across Six Sessions

Session	Finger strength and clip control	Hand coordination	Accuracy in tracing raised paths	Manipulative skills	Assistance required
1	Finger pressure was weak, and the clip grasp was unstable.	Movements of both hands were stiff and poorly coordinated.	The finger frequently moved outside the path and could not maintain direction.	Folding, tearing, and object transfer were difficult; objects were frequently dropped.	Intensive hand-over-hand assistance.
2	Clip positioning began to improve, but pressure remained inconsistent.	The student began to use both hands after teacher demonstration.	Direction was maintained for longer periods, although errors remained frequent.	The student began to understand folding and tearing directions.	Physical guidance and repeated verbal prompts.
3	Finger pressure increased, and the clip grasp	One hand began to stabilize the material while the other performed	Tracing became more continuous, with fewer pauses and	Tearing approached the tactile pattern, and small-object	Partial physical guidance and

	became more stable.	the main movement.	directional errors.	transfer became more stable.	verbal instructions.
4	The clip could be used repeatedly without rapid fatigue.	Bimanual coordination became more purposeful and consistent.	The textured boundary was increasingly used as a directional reference.	Folding, tearing, and object transfer were completed with improved control.	Minimal physical assistance and verbal prompts.
5	Finger pressure and clip control were stable during repeated activities.	Both hands worked together effectively during manipulative tasks.	Letters and numbers were traced independently with only minor errors.	Folding became neater, tearing followed the pattern more closely, and objects were transferred with fewer drops.	Primarily verbal instructions.
6	Finger strength and clip control were consistently maintained.	Bimanual coordination was evident across all activities.	Raised paths were completed smoothly with minimal directional error.	Most clipping, folding, tearing, and transfer tasks were completed independently.	Occasional verbal prompts without physical guidance.

Learning Engagement, Independence, and Implementation Constraints

At the beginning of the intervention, Student T tended to wait for the teacher's direction before touching the medium or initiating an activity. The student appeared hesitant when encountering unfamiliar textures and frequently requested assistance after making an error. Attention was also easily interrupted when an activity required prolonged finger movement or repeated attempts. Nevertheless, Student T demonstrated an initial interest in the raised letters and numbers and asked questions about the tactile forms being explored. This interest provided an important foundation for sustaining participation during the subsequent sessions.

As the activities became more familiar, Student T demonstrated greater engagement in the learning process. The student was able to maintain attention for longer periods, listened more carefully to the teacher's instructions, and responded positively to verbal reinforcement. Student T also showed a willingness to repeat unsuccessful activities instead of immediately requesting physical assistance. During tactile tracing, the student actively explored the relationship between the main path and the textured boundary. The opportunity to combine tracing with clipping, folding, tearing, and transferring objects made the learning sequence more varied than the fine-motor exercises previously used in the classroom.

The gradual reduction of teacher assistance contributed to the development of learning independence. Hand-over-hand guidance was essential during the initial sessions because Student T had not yet understood the required movements and activity sequence. However, continuous physical guidance could have limited opportunities for independent problem-solving if it had been maintained throughout the intervention. The teacher therefore reduced assistance after the student demonstrated familiarity with the task. By the final sessions, Student T could independently detect directional errors, reposition the finger, repeat an activity, and complete most tasks using verbal instructions alone. This shift indicated reduced dependence on direct physical intervention.

Student T also demonstrated increased confidence in performing fine-motor activities. During the initial sessions, errors were often followed by hesitation or a request for assistance. In the later sessions, the student was more willing to continue tracing, adjust the hand position, and repeat manipulative tasks after unsuccessful attempts. The student occasionally initiated repetition without being instructed by the teacher, particularly after successfully completing a raised path or transferring objects. The teacher observed that Student T appeared more enthusiastic and showed satisfaction after completing tasks independently. These behavioural changes accompanied the observed development in fine-motor performance and formed an important part of the overall learning outcome.

Despite these positive developments, several constraints influenced the implementation process. During the initial sessions, Student T experienced finger fatigue when clipping activities were performed continuously for an extended period. Each activity also required sufficient time for tactile orientation, repetition, and correction, creating challenges within the available instructional schedule. Furthermore, the limited number of media sets restricted variation in letters, numbers, textures, path widths, and difficulty levels. The teacher addressed these constraints by providing short rest periods, dividing complex tasks into smaller stages, varying the activity sequence, and adjusting the level of difficulty according to the student's performance. These findings indicate that implementing the Tactile Clip Path technique requires individualized pacing, adequate repetition, sufficient media variation, and systematic adjustment of teacher assistance.

Discussion

The central finding is that a raised-path activity can function simultaneously as an access medium and a structured fine-motor practice context. The observed shift from discontinuous to more sustained tracing is consistent with research showing that systematic haptic exploratory procedures are associated with more effective extraction of shape information (Vinter et al., 2012). The boundaries in the present medium likely reduced uncertainty by giving T a tactile point of reference during contour following. This interpretation also aligns with evidence that haptic exploration is organized through active hand movements rather than passive touch alone (Kalagher & Jones, 2011; Schellingerhout et al., 2005).

The gradual improvement in clip grasp, bimanual action, and small-object transfer is also plausibly related to repeated, meaningful manual practice. Reimer et al. (2011) documented changes in fine-motor performance among children with visual impairment following a training period, while Tseng and Hsu (2023) reported an association between haptic acuity and manual dexterity in school-age children. Although the present qualitative case does not permit causal attribution, its session-by-session observations support the practical proposition that tactile learning tasks can be designed to exercise both perceptual and manipulative components of hand use.

T's increasing use of the boundary as a self-guiding cue is important because it reduced dependence on hand-over-hand assistance. Haptic research distinguishes contour-following and other exploratory procedures as methods for obtaining detailed shape information (Lederman & Klatzky, 1987; Vinter et al., 2012). The finding also resonates with work showing that blind and sighted children can use touch effectively for object matching when task conditions allow appropriate exploration (Withagen et al., 2012). In classroom terms, raised boundaries may offer an accessible form of error feedback: the learner can detect a directional departure through touch and attempt a correction, rather than waiting for the teacher to reposition the hand.

The use of raised letters and numbers extends the activity beyond generic exercise by connecting motor practice with symbol exploration. This integration is educationally meaningful because tactile perception and academic participation are often inseparable for learners with total visual impairment. Evidence from tactile-image studies indicates that practice and the character of visual impairment influence children's performance on shape-related production tasks (Vinter et al., 2018). Likewise, Gori et al. (2024) found that visuo-haptic experience can improve children's understanding of geometric information. In the present case, the letter and number routes created a familiar, repeatable structure through which motor challenges could be embedded without becoming disconnected drills.

The fading of assistance appears to be another salient implementation condition. Early physical guidance helped T understand the task sequence, whereas later verbal prompts preserved safety and task orientation while allowing independent movement. This pattern is consistent with the need for individualized, function-oriented instruction for learners with visual impairment (Lueck & Heinze, 2005). It also reflects the developmental evidence that haptic performance depends on opportunities to organize movements and learn effective exploratory strategies (Kalagher & Jones, 2011; Schellingerhout et al., 2005). The student's increased willingness to repeat tasks may therefore be interpreted as both engagement and a source of additional practice.

Academically, this study contributes a practice-based model of tactile fine-motor instruction that specifies four connected features: structured raised paths, contrasting tactile boundaries, varied manipulation tasks, and systematically faded support. Its contribution is not a claim of therapeutic efficacy, but a theoretically informed description of how haptic exploration can be connected with school-based motor participation. The account complements Elsevier-published work on visual impairment, haptic exploration, and manual skill by translating those principles into a low-cost classroom configuration (Reimer et al., 2011; Tseng et al., 2019; Tseng & Hsu, 2023; Vinter et al., 2012; Vinter et al., 2018). Future studies should test this configuration across learners, settings, and longer periods using mixed-method or single-case experimental designs.

CONCLUSION

The Tactile Clip Path technique was feasibly implemented with one fifth-grade student with total visual impairment through raised letter and number tracing, clipping, folding, tearing, and small-object transfer. Across six observed sessions, T showed progressively steadier grasp, more coordinated and precise hand movements, greater independence, and stronger engagement. The raised boundary and contrasting texture appeared to provide self-guiding tactile feedback, while graded repetition and fading assistance supported participation. These findings are limited by the single-student, short-duration, qualitative design, reliance on observational evidence, and absence of standardized pre-post measures or a comparison condition. Future research should examine the technique with larger and more diverse samples, longer follow-up, and objective fine-motor assessments; teachers may adapt its path width, texture, symbols, and task sequence to each learner's sensory, motor, and academic profile.

BIBLIOGRAPHY

Creswell, J. W., & Poth, C. N. (2018). Qualitative inquiry and research design: Choosing among five approaches (4th ed.). SAGE.

Gori, M., Sciutti, A., Torazza, D., Campus, C., & Bollini, A. (2024). The effect of visuo-haptic exploration on the development of the geometric cross-sectioning ability. Journal of Experimental Child Psychology, 238, 105774. https://doi.org/10.1016/j.jecp.2023.105774

Kalagher, H., & Jones, S. S. (2011). Developmental change in young children's use of haptic information in a visual task: The role of hand movements. Journal of Experimental Child Psychology, 108(2), 293–307.

Klatzky, R. L., & Lederman, S. J. (1993). Toward a framework for the study of haptic object perception. In H. H. L. Pick, P. van den Broek, & D. C. Knill (Eds.), Cognition: Conceptual and methodological issues (pp. 223–251). American Psychological Association.

Lederman, S. J., & Klatzky, R. L. (1987). Hand movements: A window into haptic object recognition. Cognitive Psychology, 19(3), 342–368. https://doi.org/10.1016/0010-0285(87)90008-9

Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry. SAGE.

Lueck, A. H., & Heinze, T. (2005). Designing intervention methods for young children with visual impairments to promote vision use. International Congress Series, 1282, 201–205. https://doi.org/10.1016/j.ics.2005.05.019

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). SAGE.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Administration and Policy in Mental Health and Mental Health Services Research, 42, 533–544. https://doi.org/10.1007/s10488-013-0528-y

Reimer, A. M., Cox, R. F. A., Nijhuis-van der Sanden, M. W. G., & Boonstra, F. N. (2011). Improvement of fine motor skills in children with visual impairment: An explorative study. Research in Developmental Disabilities, 32(5), 1924–1933. https://doi.org/10.1016/j.ridd.2011.03.023

Republic of Indonesia. (2003). Law of the Republic of Indonesia Number 20 of 2003 concerning the national education system.

Republic of Indonesia. (2016). Law of the Republic of Indonesia Number 8 of 2016 concerning persons with disabilities.

Schellingerhout, R., Smitsman, A. W., & Cox, R. F. A. (2005). Evolving patterns of haptic exploration in visually impaired infants. Infant Behavior and Development, 28(3), 360–388. https://doi.org/10.1016/j.infbeh.2005.05.007

Tseng, Y.-T., Holst-Wolf, J. M., Tsai, C.-L., Chen, F.-C., & Konczak, J. (2019). Haptic perception is altered in children with developmental coordination disorder. Neuropsychologia, 127, 29–34. https://doi.org/10.1016/j.neuropsychologia.2019.02.004

Tseng, Y.-T., & Hsu, H.-J. (2023). Not only motor skill performance but also haptic function is impaired in children with developmental language disorder. Research in Developmental Disabilities, 134, 104412. https://doi.org/10.1016/j.ridd.2022.104412

Vinter, A., Bonin, P., & Morgan, P. (2018). The severity of the visual impairment and practice matter for drawing ability in children. Research in Developmental Disabilities, 78, 15–26. https://doi.org/10.1016/j.ridd.2018.04.027

Vinter, A., Fernandes, V., Orlandi, O., & Morgan, P. (2012). Exploratory procedures of tactile images in visually impaired and blindfolded sighted children: How they relate to their consequent performance in drawing. Research in Developmental Disabilities, 33(6), 1819–1831. https://doi.org/10.1016/j.ridd.2012.05.001

Withagen, A., Kappers, A. M. L., Vervloed, M. P. J., Knoors, H., & Verhoeven, L. (2012). Haptic object matching by blind and sighted adults and children. Acta Psychologica, 139(2), 261–266.

World Health Organization. (2019). World report on vision. https://www.who.int/publications/i/item/9789241516570