

Developing Adaptive Piano Teaching Strategies for Visually Impaired Beginner Piano Students

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DOI: <https://doi.org/10.47772/IJRISS.2026.100700960>

Received: 06 August 2026; Accepted: 11 August 2026; Published: 18 August 2026

ABSTRACT

Visually impaired learners often encounter barriers in traditional piano education, where teaching practices frequently depend on visual information such as musical notation, teacher demonstration, and observation of physical movements. Although previous studies have explored various adaptive approaches, limited attention has been given to how adaptive piano teaching strategies can be systematically developed from learners' identified needs. This study aimed to explore the learning needs of visually impaired beginner piano students and develop adaptive piano teaching strategies based on these needs.

An exploratory sequential mixed-methods design was adopted. Qualitative data were collected through semi-structured interviews, Classroom Observation, and focus group discussions involving visually impaired students, piano teachers, parents/caregivers, and music education experts. The qualitative findings were analysed through thematic analysis, and the identified needs were transformed into pedagogical responses for strategy development.

The findings revealed three major categories of learning needs: perceptual needs, cognitive needs, and emotional and psychological needs. Based on these findings, the study developed six core dimensions of adaptive piano teaching strategies: auditory guidance, tactile assistance, kinesthetic and bodily involvement, layered and step-by-step teaching, emotional support and motivation, and technology and assistive tools.

This study contributes to inclusive music education by demonstrating a needs-based process for developing adaptive piano teaching strategies. Rather than viewing adaptation as isolated techniques, the study highlights the importance of connecting learners' experiences with responsive pedagogical approaches. The findings provide practical guidance for piano teachers seeking to create more accessible and inclusive learning environments for visually impaired students.

Keywords: Adaptive piano teaching; visually impaired students; inclusive music education; special music education; multisensory learning; piano pedagogy

INTRODUCTION

Inclusive education has increasingly shaped educational practices by emphasising accessibility, participation, and equal learning opportunities for students with diverse needs (Booth & Ainscow, 2011; UNESCO, 2020). Within music education, inclusive practice requires educators to consider how teaching approaches and learning environments can be adapted to support diverse learners (Jellison, 2015). Music education researchers have increasingly highlighted the importance of creating accessible learning environments for students with disabilities (Darrow, 2006; Jellison, 2015). However, piano education represents a particularly important context for examining inclusive practices because conventional piano instruction is strongly dependent on visual information. Printed music reading, teacher demonstrations, observation of hand movements, and visual monitoring of performance techniques remain central components of traditional piano learning. For visually

impaired beginner students, these visually oriented practices may create significant barriers during the early stages of musical development.

Previous research has demonstrated that visually impaired learners can develop meaningful musical abilities when appropriate adaptations are provided (Baker, 2014; Darrow, 2006). Previous studies have explored auditory, tactile, and technological approaches for improving accessibility in music learning. These approaches have expanded possibilities for inclusive music education by allowing learners to access musical information through alternative sensory pathways. However, the current literature remains largely technique-oriented. Many studies introduce specific instructional methods or supportive tools, but provide limited discussion of how these approaches can be systematically selected, organised, and developed according to learners' specific educational needs.

This limitation is particularly significant in beginner piano education, where early learning experiences influence students' technical development, independence, and confidence. Visually impaired beginner piano students often encounter interconnected challenges involving keyboard orientation, hand positioning, spatial understanding, movement coordination, music memorisation, and emotional adjustment. These challenges involve multiple dimensions of learning, including sensory access, physical coordination, cognitive understanding, and emotional engagement. Research on multisensory learning suggests that combining different sensory pathways can enhance learning by allowing individuals to construct knowledge through multiple forms of experience (Shams & Seitz, 2008). Therefore, adaptive piano teaching requires more than the application of individual strategies; it requires a systematic process that begins with identifying learners' needs and translating these needs into appropriate pedagogical responses.

Although previous studies have contributed valuable insights into adaptive music instruction, an important gap remains in understanding how adaptive piano teaching strategies can be developed from learners' actual experiences and educational needs. Existing research has explored various adaptive approaches, including auditory guidance, tactile support, accessible learning resources, and assistive technologies (Baker, 2014; Gadiraju et al., 2021). However, much of the existing literature has focused on specific instructional approaches rather than the systematic development of teaching strategies that respond to learners' identified needs.

This limitation suggests that adaptive piano teaching requires more than the application of individual techniques. Instead, there is a need for research that establishes a connection between learners' experiences, identified learning needs, and the development of adaptive teaching strategies.

To address this gap, this study adopts an exploratory sequential mixed-methods design, which is appropriate when qualitative exploration is used to develop concepts or strategies that are subsequently examined through additional evidence (Creswell & Plano Clark, 2018). The study first explores the learning needs and educational experiences of visually impaired beginner piano students through qualitative inquiry involving students, piano teachers, parents, and music education experts. The identified themes subsequently inform the development of a systematic set of adaptive piano teaching strategies organised into six core dimensions: auditory guidance, tactile assistance, kinesthetic and bodily involvement, layered and step-by-step teaching, emotional support and motivation, and technology and assistive tool strategies. By establishing a connection between learners' identified needs and the development of adaptive teaching strategies, this study contributes to inclusive piano pedagogy by offering a structured and evidence-informed approach for supporting visually impaired beginner piano students.

LITERATURE REVIEW

Inclusive Piano Education and the Learning Needs of Visually Impaired Students

Inclusive education has increasingly emphasised accessibility, participation, and the removal of barriers that prevent learners from fully engaging in educational experiences (Booth & Ainscow, 2011; UNESCO, 2020). Within music education, inclusion extends beyond providing opportunities for participation; it requires

educators to consider how instructional approaches, learning environments, and educational resources can be adapted to support learners with diverse needs (Jellison, 2015).

Piano education presents particular challenges for visually impaired learners because traditional teaching practices often rely heavily on visual information. Sighted beginners commonly learn through printed musical notation, teacher demonstrations, and visual observation of hand movements. However, students with visual impairment need alternative pathways to access musical information and develop instrumental skills. Previous research has demonstrated that learners with disabilities can achieve meaningful musical development when appropriate educational adaptations are provided (Darrow, 2006; Baker, 2014).

For visually impaired beginner piano students, learning challenges are not limited to accessing musical notation. Previous studies have identified difficulties related to keyboard orientation, spatial understanding, physical coordination, independent practice, and confidence development (Chen, 2020; Hu, 2018). These challenges suggest that adaptive piano teaching requires attention to multiple dimensions of learning, including sensory accessibility, physical development, cognitive understanding, and emotional engagement.

Therefore, inclusive piano education requires a shift from adapting existing materials alone toward understanding learners' specific needs and developing teaching approaches that respond to these needs. This learner-centred perspective provides an important foundation for developing effective adaptive piano teaching strategies.

Adaptive Approaches in Piano and Music Education

Previous research has explored various approaches to improving accessibility for visually impaired learners in music education. Auditory-based approaches have highlighted the importance of verbal explanation, listening activities, and sound-based learning experiences as alternative pathways for accessing musical information. These approaches recognise that auditory perception can become an important resource for developing musical understanding when visual information is unavailable.

Tactile approaches have also been widely discussed in relation to visually impaired music learning. Through physical guidance, tactile exploration, and embodied experiences, learners can develop understanding of keyboard structures, spatial relationships, and movement patterns. Similarly, accessible music notation and alternative learning resources can provide additional pathways for visually impaired musicians to access musical information.

In addition, technological developments have expanded possibilities for adaptive music education. Assistive technologies and digital resources have also expanded possibilities for improving accessibility and independence among students with visual impairment (Gadiraju et al., 2021). Research on multisensory learning further suggests that combining different sensory pathways can enhance learning by allowing individuals to construct knowledge through multiple forms of experience (Shams & Seitz, 2008).

Recent studies have further highlighted the importance of learner-centred adaptation in supporting visually impaired musicians. These studies suggest that effective adaptive teaching requires consideration of learners' individual characteristics, educational contexts, and learning processes rather than relying on fixed instructional approaches.

However, although these studies have provided valuable insights into specific adaptive approaches, much of the existing literature remains focused on individual techniques or resources. Limited attention has been given to how different adaptive approaches can be systematically organised and developed according to learners' identified needs, particularly in the context of beginner piano education.

From Individual Techniques to Systematic Strategy Development

The existing literature demonstrates that adaptive approaches can improve accessibility and participation for visually impaired music learners. However, a critical limitation remains: previous research has largely

examined what adaptive techniques can be used, while providing less explanation of how adaptive teaching strategies should be developed.

This distinction is important because effective teaching strategies involve more than selecting individual methods. They require a clear relationship between learners' challenges, educational objectives, and appropriate pedagogical responses. Without such a relationship, teachers may have access to various techniques but lack guidance regarding when and how these approaches should be integrated into teaching practice.

A systematic strategy development process may provide a stronger foundation for inclusive piano education. Such an approach aligns with inclusive education principles by recognising learner diversity and adapting educational practices according to individual needs rather than expecting learners to adjust to existing systems (Booth & Ainscow, 2011).

Therefore, this study addresses the existing gap by shifting attention from isolated adaptive techniques toward the development process of adaptive piano teaching strategies. By identifying the learning needs of visually impaired beginner piano students and transforming these needs into pedagogical responses, this study aims to develop a systematic set of adaptive piano teaching strategies that support more inclusive piano learning experiences.

METHODOLOGY

Research Design

This study adopted an exploratory sequential mixed-methods design to develop adaptive piano teaching strategies for visually impaired beginner piano students. An exploratory sequential design is appropriate when researchers seek to explore a phenomenon qualitatively and subsequently use the findings to inform further development or examination (Creswell & Plano Clark, 2018).

This design was selected because the development of adaptive piano teaching strategies requires an in-depth understanding of learners' experiences and educational needs before determining appropriate instructional responses. Therefore, the qualitative phase served as the foundation for identifying learning challenges and generating themes, while subsequent quantitative and qualitative evidence supported the refinement and examination of the developed strategies.

Rather than treating adaptive teaching approaches as predetermined solutions, this study adopted a needs-based approach in which strategies were developed through a systematic connection between learners' experiences and pedagogical responses.

Participants and Data Collection

The study involved multiple stakeholder groups to explore and develop adaptive piano teaching strategies for visually impaired beginner piano students. Participants were selected through purposive sampling to ensure that they possessed relevant experiences related to visual impairment, piano learning, teaching practices, or inclusive music education. The inclusion of multiple participant groups enabled the study to examine adaptive piano education from different perspectives, including learners' experiences, teachers' instructional practices, family support, and professional evaluation.

The qualitative phase involved semi-structured interviews with four participant groups: visually impaired beginner piano students, piano teachers, parents or caregivers, and special education music teachers. The student participants were beginner piano learners with total or severe visual impairment, aged between 6 and 15 years old. Piano teachers were selected based on their experience in teaching visually impaired students or their background in inclusive music education. Parents or caregivers contributed information regarding students' learning experiences, emotional responses, and home practice support, while special education music

teachers provided professional perspectives on the feasibility and educational value of adaptive teaching strategies.

Semi-structured interviews were adopted because this approach allows researchers to explore participants' experiences while maintaining consistency across key research areas (Kallio et al., 2016). The interviews focused on students' learning challenges, teachers' instructional experiences, existing adaptive approaches, and suggestions for improving inclusive piano education. All interviews were conducted in quiet environments with informed consent obtained from participants. The interviews were audio-recorded and transcribed verbatim for subsequent thematic analysis.

Additional data were collected through Classroom Observation and focus group discussions. Eight piano lessons involving four beginner students with total visual impairment were observed through a non-participant observation approach. The observed lessons included both individual instruction and small-group support sessions, focusing on teachers' implementation of adaptive strategies, students' responses, and classroom interaction. Observation data were recorded through structured observation notes, lesson implementation records, and teacher adjustment records.

Four focus group discussions were conducted, including two teacher groups and two student groups. Each group consisted of approximately 6–8 participants, with discussions lasting approximately 60–90 minutes. The focus groups explored participants' perceptions of the practicality, effectiveness, and possible improvement of the developed adaptive piano teaching strategies. Focus group discussions provided additional perspectives regarding how the strategies were experienced and interpreted by different stakeholders.

In the quantitative phase, questionnaire surveys were conducted with piano teachers, inclusive education teachers, and music education experts to examine the applicability and perceived effectiveness of the developed strategies.

Data Analysis and Strategy Development Process

The qualitative data collected from semi-structured interviews and focus group discussions were analysed using thematic analysis. Thematic analysis was selected because it provides a systematic approach for identifying, analysing, and interpreting patterns within qualitative data (Braun & Clarke, 2006). This approach was considered appropriate for the present study because the purpose of the qualitative phase was not only to describe participants' experiences but also to identify underlying learning needs that could inform the development of adaptive piano teaching strategies.

The analysis process involved several stages. First, all interview and focus group transcripts were carefully reviewed to achieve familiarity with the data. Second, initial codes were generated by identifying meaningful segments related to students' learning difficulties, instructional challenges, support needs, and adaptive teaching experiences. Third, related codes were organised into broader themes representing key dimensions of visually impaired beginner piano students' learning needs. The themes were subsequently reviewed and refined to ensure that they accurately reflected participants' experiences and were relevant to the research objectives.

Following thematic analysis, the identified themes were further examined to establish connections between learning needs and pedagogical responses. Rather than treating teaching techniques as isolated approaches, the study developed adaptive piano teaching strategies by linking specific learning challenges with appropriate instructional responses. For example, difficulties in accessing visual musical information informed the development of auditory and tactile strategies, while challenges in skill progression and confidence building contributed to the development of layered teaching and emotional support strategies.

To enhance the credibility of the findings, data triangulation was applied by integrating evidence from multiple sources, including semi-structured interviews, questionnaire responses, Classroom Observation, and focus group discussions. Triangulation allows researchers to examine a phenomenon from different perspectives and strengthen the credibility of qualitative interpretations (Denzin, 1978). In this study, the combination of

different data sources enabled the researchers to compare participants' reported experiences with classroom practices and broader evaluations of the developed strategies.

The final stage involved organising the developed strategies into six core dimensions of adaptive piano teaching strategies: auditory guidance strategy, tactile assistance strategy, kinesthetic and bodily involvement strategy, layered and step-by-step teaching strategy, emotional support and motivation strategy, and technology and assistive tool strategy. This process ensured that the strategies were grounded in learners' identified needs and supported by multiple sources of empirical evidence.

FINDINGS

Learning Needs Identified Through Qualitative Findings

The qualitative findings revealed that visually impaired beginner piano students experienced diverse and interconnected learning needs during the early stages of piano learning. Through thematic analysis of semi-structured interviews with visually impaired students, piano teachers, parents, and music education experts, three major categories of learning needs were identified: perceptual needs, cognitive needs, and emotional and psychological needs. These findings highlight that adaptive piano teaching should address not only access to musical information but also students' learning processes and emotional experiences.

Perceptual Needs: Accessing Musical Information Through Alternative Sensory Pathways

The first identified category was perceptual needs, including auditory guidance, tactile support, and spatial orientation. Since visually impaired students cannot rely on visual information during piano learning, they depend heavily on hearing and touch to understand musical concepts and locate the keyboard.

The findings indicate that traditional visually oriented piano instruction may create accessibility barriers for visually impaired beginners. Instead, students require alternative sensory pathways that allow them to construct musical understanding through auditory and tactile experiences. Therefore, adaptive piano teaching should intentionally incorporate multisensory approaches rather than simply replacing visual materials.

Cognitive Needs: Developing Musical Understanding Through Structured Learning

The second category concerned cognitive needs. Participants reported that visually impaired beginner piano students often experienced difficulties in understanding abstract musical concepts, including rhythm, pitch, hand coordination, and musical structure.

The findings further indicated that students benefited from concrete explanations, scaffolded instruction, and repeated practice to develop stable understanding and memory. These results suggest that adaptive piano teaching requires carefully organised learning processes that transform abstract musical knowledge into more accessible learning experiences.

Emotional and Psychological Needs: Building Confidence and Motivation

The third category related to emotional and psychological needs. Participants reported that visually impaired beginner piano students may experience learning anxiety during the learning process and therefore require encouragement, positive feedback, and confidence-building support.

These findings demonstrate that adaptive piano teaching should consider not only students' technical and cognitive development but also their emotional experiences. Creating a supportive learning environment is essential for maintaining motivation and encouraging continued engagement in piano learning.

Summary

Overall, the qualitative findings revealed that the learning needs of visually impaired beginner piano students were multidimensional. Students required support in accessing musical information, developing spatial and

physical understanding, engaging in structured learning processes, and maintaining confidence throughout piano study. These findings provided the foundation for developing adaptive piano teaching strategies.

Rather than selecting teaching techniques independently, the development of adaptive piano teaching strategies should begin with a clear understanding of learners' actual needs. The identified learning needs therefore served as the basis for organising and developing the six core dimensions of adaptive piano teaching strategies.

Development of Adaptive Piano Teaching Strategies

Based on the learning needs identified in the qualitative phase, this study developed a systematic set of adaptive piano teaching strategies for visually impaired beginner piano students. The development process was not based on the selection of isolated teaching techniques; rather, it involved establishing connections between students' identified challenges and appropriate pedagogical responses.

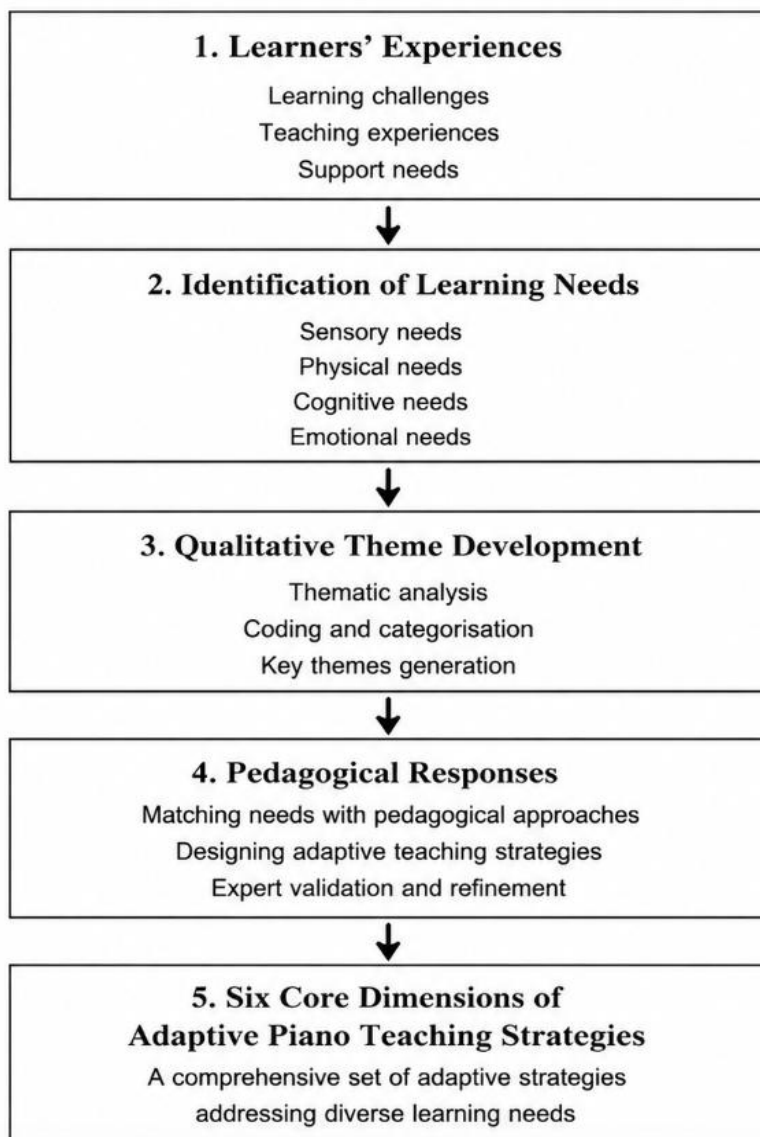


Figure 1. Development Process of Adaptive Piano Teaching Strategies for Visually Impaired Beginner Piano Students

As illustrated in Figure 1, the development process followed three stages: (1) identifying learners' experiences and challenges, (2) analysing and categorising learning needs through thematic analysis, and (3) transforming these needs into adaptive teaching strategies. This process ensured that the developed strategies were grounded in learners' actual experiences and supported by evidence from multiple data sources.

From Learning Needs to Pedagogical Responses

Table 1. Relationship Between Learning Needs and Adaptive Piano Teaching Strategies

Identified Learning Needs	Adaptive Piano Teaching Strategy	Educational Purpose
Difficulty accessing visually presented musical information	Auditory Guidance Strategy	To provide alternative pathways for understanding musical concepts through sound and verbal explanation
Difficulty understanding keyboard location and spatial relationships	Tactile Assistance Strategy	To develop physical awareness through touch-based exploration and guidance
Challenges in movement coordination and bodily awareness	Kinesthetic and Bodily Involvement Strategy	To support physical control, posture, and movement understanding
Difficulty managing complex musical tasks	Layered and Step-by-Step Teaching Strategy	To support gradual learning progression and independent skill development
Reduced confidence and motivation during learning	Emotional Support and Motivation Strategy	To strengthen persistence, confidence, and positive learning experiences
Need for additional accessibility resources	Technology and Assistive Tool Strategy	To improve access to musical information and learning materials

The findings from the qualitative phase demonstrated that visually impaired beginner piano students experienced interconnected needs across perceptual, cognitive, and emotional dimensions. These needs were subsequently translated into corresponding pedagogical responses.

For perceptual needs, particularly difficulties in accessing visually presented musical information, the study developed strategies emphasising auditory guidance and tactile assistance. These strategies aimed to provide alternative pathways for students to understand musical concepts and develop awareness of the keyboard.

For cognitive needs, including difficulties with abstract musical concepts, coordination, and musical structure, the study developed layered and step-by-step teaching strategies. These approaches focused on organising learning tasks into manageable stages and providing appropriate scaffolding during skill development.

For emotional and psychological needs, the study developed emotional support and motivation strategies to strengthen students' confidence, persistence, and engagement throughout the learning process.

Integration of Multiple Adaptive Dimensions

The development process further indicated that effective adaptive piano teaching requires the integration of multiple dimensions rather than reliance on a single instructional approach.

Although auditory guidance, tactile assistance, and assistive technologies each provide valuable support, the findings suggest that these approaches are most effective when combined with appropriate instructional organisation, physical engagement, and emotional support.

Therefore, the developed strategies were organised into six interconnected dimensions:

I: Auditory Guidance Strategy

II: Tactile Assistance Strategy

III: Kinesthetic and Bodily Involvement Strategy

IV: Layered and Step-by-Step Teaching Strategy

V: Emotional Support and Motivation Strategy

VI: Technology and Assistive Tool Strategy

These dimensions represent different but complementary responses to the diverse learning needs identified among visually impaired beginner piano students.

Contribution of the Strategy Development Process

The strategy development process extends previous research that has mainly focused on individual adaptive techniques or specific teaching resources. Instead of viewing adaptation as the application of separate methods, this study proposes that adaptive piano teaching should emerge from a systematic understanding of learners' needs.

By linking learning challenges with pedagogical responses, the developed strategies provide teachers with a more organised approach to supporting visually impaired beginner piano students. This needs-based development process represents the main contribution of the study.

4.3 Six Core Dimensions of Adaptive Piano Teaching Strategies

Following the strategy development process, six core dimensions of adaptive piano teaching strategies were identified. These dimensions represent interconnected pedagogical responses developed from the learning needs of visually impaired beginner piano students. Rather than functioning as independent teaching techniques, the six dimensions provide complementary approaches that address sensory accessibility, physical development, learning progression, emotional engagement, and technological support.

Table 2. Six Core Dimensions of Adaptive Piano Teaching Strategies

Core Dimension	Main Focus	Examples of Teaching Applications
Auditory Guidance Strategy	Using auditory information to support musical understanding	Verbal explanation, listening activities, sound demonstration
Tactile Assistance Strategy	Developing understanding through touch and physical exploration	Keyboard exploration, tactile guidance, physical positioning
Kinesthetic and Bodily Involvement Strategy	Supporting body awareness and movement development	Posture awareness, movement coordination, physical expression
Layered and Step-by-Step Teaching Strategy	Organising learning through gradual progression	Task breakdown, structured practice, incremental skill development
Emotional Support and Motivation Strategy	Supporting confidence and learning engagement	Encouragement, positive feedback, learner-centred interaction
Technology and Assistive Tool Strategy	Enhancing accessibility through supportive resources	Digital tools, assistive technologies, accessible learning materials

Auditory Guidance Strategy

The auditory guidance strategy was developed in response to students' perceptual needs, particularly their limited access to visually presented musical information. The findings indicated that visually impaired learners rely strongly on auditory information to understand musical concepts, receive instructional explanations, and develop musical awareness.

This strategy emphasises the intentional use of sound as a primary teaching resource rather than simply as supplementary information. Through verbal explanation, listening activities, and sound demonstrations, teachers can support students in constructing musical understanding through auditory experiences.

Tactile Assistance Strategy

The tactile assistance strategy addresses students' needs for understanding keyboard structure, spatial relationships, and physical positioning. Since visually impaired beginners cannot observe hand movements or keyboard locations visually, tactile experiences become an important pathway for developing instrumental awareness.

This strategy highlights the role of guided touch, physical exploration, and tactile feedback in helping students establish connections between musical concepts and bodily experiences.

Kinesthetic and Bodily Involvement Strategy

The kinesthetic and bodily involvement strategy focuses on the relationship between physical movement and musical learning. The findings suggested that visually impaired students require opportunities to develop body awareness, movement coordination, and physical understanding of piano performance.

By incorporating bodily experiences into instruction, teachers can support students in developing more stable motor skills and greater independence in piano playing.

Layered and Step-by-Step Teaching Strategy

The layered and step-by-step teaching strategy responds to students' cognitive needs, particularly difficulties in processing complex musical information. Instead of presenting multiple learning demands simultaneously, teachers can organise tasks into smaller, progressive stages.

This strategy supports gradual skill development by providing structured guidance, repetition, and appropriate levels of challenge. It reflects the importance of adapting not only teaching materials but also the organisation of the learning process.

Emotional Support and Motivation Strategy

The emotional support and motivation strategy emerged from participants' recognition that visually impaired beginner piano students may experience uncertainty, frustration, or anxiety during learning.

This strategy emphasises encouragement, positive feedback, and supportive teacher-student relationships. The findings demonstrate that adaptive piano teaching involves not only accessibility and skill development but also creating an environment where students feel confident and motivated to continue learning.

Technology and Assistive Tool Strategy

The technology and assistive tool strategy reflects the importance of additional resources in improving accessibility and independence. Assistive technologies and adapted learning materials can provide alternative ways for students to access musical information and support individual learning processes.

This dimension extends adaptive piano teaching beyond teacher-led instruction by recognising the potential contribution of technological resources in inclusive learning environments.

Summary

Together, these six dimensions demonstrate that adaptive piano teaching requires a comprehensive and learner-centred approach. The strategies developed in this study move beyond individual adaptations by integrating sensory, physical, cognitive, emotional, and technological considerations into a connected pedagogical approach.

The six dimensions therefore represent not a fixed teaching model, but a systematic set of adaptive strategies that can guide teachers in responding to the diverse needs of visually impaired beginner piano students.

DISCUSSION

Understanding the Multidimensional Learning Needs of Visually Impaired Beginner Piano Students

The findings of this study demonstrate that visually impaired beginner piano students experience learning needs across perceptual, cognitive, and emotional dimensions. These findings extend previous research on inclusive music education by showing that accessibility in piano learning involves more than providing alternative materials or replacing visual information with other formats.

Previous studies have highlighted the importance of auditory support, tactile approaches, and assistive resources in facilitating musical participation among learners with visual impairment (Baker, 2014; Gadiraju et al., 2021). The present study supports these findings but further suggests that sensory accessibility alone is insufficient. Effective adaptive piano teaching requires consideration of how students understand musical concepts, develop physical skills, and maintain confidence throughout the learning process.

This finding aligns with inclusive education principles, which emphasise adapting educational practices according to learners' needs rather than expecting learners to adjust to existing systems (Booth & Ainscow, 2011). In the context of piano education, this suggests a shift from a deficit-oriented perspective, which focuses on students' limitations, toward a learner-centred perspective that identifies appropriate pathways for musical development.

From Individual Adaptations to a Needs-Based Strategy Development Process

A major contribution of this study lies in demonstrating how adaptive piano teaching strategies can be developed from learners' identified needs. Previous research has provided valuable examples of adaptive practices, including auditory guidance, tactile support, accessible learning resources, and assistive technologies. However, these approaches have often been discussed as individual techniques rather than as part of a systematic developmental process.

The present study extends previous research by proposing a needs-based approach in which learners' experiences are first identified, analysed, and then transformed into pedagogical responses. This process highlights that adaptive teaching is not simply the application of alternative techniques but a continuous process of understanding learner characteristics and designing appropriate instructional responses.

The development process identified in this study also contributes to inclusive music education by providing a clearer connection between learner needs and teaching strategies. Rather than offering a fixed teaching method, the developed strategies provide a flexible set of pedagogical responses that teachers can adapt according to different learning contexts.

Implications for Piano Teachers and Inclusive Music Education

The findings of this study have several practical implications for piano teachers working with visually impaired learners. First, teachers should recognise that effective adaptive instruction requires multiple forms of support, including auditory, tactile, kinesthetic, emotional, and technological approaches.

Second, teacher preparation programmes should provide greater attention to adaptive pedagogical knowledge. Many traditional piano teaching approaches are developed around visual demonstration and imitation; therefore, teachers may require additional training to develop alternative communication and instructional strategies.

Third, the six dimensions identified in this study may provide practical guidance for teachers seeking to create more accessible learning environments. Rather than applying all strategies in the same way, teachers can select and combine different approaches according to individual students' needs and learning conditions.

Limitations and Future Research

This study has several limitations. First, the research focused specifically on visually impaired beginner piano students; therefore, the findings may not be directly generalisable to learners with other disabilities or more advanced levels of piano study.

Second, although multiple data sources were incorporated, the study was conducted within specific educational contexts, and future research could examine the applicability of the developed strategies across different cultural and institutional settings.

Future studies may further investigate the long-term effectiveness of these adaptive piano teaching strategies through longitudinal research or experimental designs. Additional research could also explore how similar needs-based strategy development approaches may be applied to other areas of inclusive music education.

CONCLUSION

This study explored the learning needs of visually impaired beginner piano students and developed adaptive piano teaching strategies based on these identified needs. Using an exploratory sequential mixed-methods design, the study examined learners' experiences and perspectives from multiple stakeholders, including visually impaired students, piano teachers, parents, and music education experts.

The findings revealed that visually impaired beginner piano students experienced interconnected learning needs across perceptual, cognitive, and emotional dimensions. These needs demonstrated that traditional visually oriented piano teaching approaches may not sufficiently address the diverse learning experiences of visually impaired learners. Instead, effective adaptive piano teaching requires attention to multiple sensory pathways, structured learning processes, and supportive learning environments.

A key contribution of this study is the development process of adaptive piano teaching strategies. Rather than presenting isolated teaching techniques, this study established a systematic connection between learners' identified needs and corresponding pedagogical responses. The resulting six dimensions of adaptive piano teaching strategies—auditory guidance, tactile assistance, kinesthetic and bodily involvement, layered and step-by-step teaching, emotional support and motivation, and technology and assistive tools—provide practical directions for creating more inclusive piano learning experiences.

This study contributes to inclusive music education by demonstrating that adaptive teaching should be understood as a learner-centred and needs-based process. For piano teachers, the findings highlight the importance of developing flexible instructional approaches that respond to individual learners rather than relying solely on traditional visual teaching methods.

Future research may further examine the long-term implementation and effectiveness of these adaptive piano teaching strategies across different educational contexts and with broader groups of learners with diverse needs.

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