Integrating Tomatis® Auditory Stimulation and AI-Powered Digital Tools in Inclusive Education: A Practical Framework for Students with Special Educational Needs

Daniela Agafiței[1], Gabriela Istrătescu (Neculai)[2]

Abstract: Objectives: This paper proposes a practical framework for integrating Tomatis® auditory stimulation with AI-powered digital tools in inclusive education for students with special educational needs. It explores how auditory stimulation and digitally supported personalization can be combined to address attention, language, auditory processing, communication, and engagement challenges. **Prior Work:** The framework builds on the Tomatis® Method, inclusive education principles, and research on artificial intelligence, adaptive learning, accessibility, and personalized instruction. **Approach:** The proposed model is grounded in educational practice in a special-school context and uses observation, case-study methodology, and practical classroom experience. It follows a cyclical process comprising assessment, auditory stimulation, AI-supported learning activities, teacher monitoring, student progress review, and program adjustment. **Results:** Practice-based observations indicate improvements in attention, listening, participation, motivation, communication, and the teacher's ability to personalize learning materials. **Implications:** The framework supports differentiated instruction while maintaining the teacher's central role in decision-making and monitoring. **Value:** The paper contributes an integrated, flexible model linking auditory stimulation, AI-assisted educational resources, and continuous pedagogical adjustment for learners with special educational needs.

Keywords: neuroplasticity; accessibility; adaptive learning; engagement; personalization

[1] "Constantin Pufan" Special Secondary School, Galati, Romania, Corresponding author: daniela3349@yahoo.com.
[2] "Constantin Pufan" Special Secondary School, Galati, Romania, E-mail: profesoaragabi2005@yahoo.com.

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1. Introduction

Students with special educational needs may experience interconnected difficulties involving attention, receptive and expressive language, auditory processing, communication, and sustained engagement in learning. In special and inclusive educational settings, these difficulties rarely occur in isolation. Consequently, effective intervention requires flexible educational planning, differentiated instruction, continuous observation, and adaptation to the individual learner.

The present paper examines a practical integration of two distinct forms of support: Tomatis® auditory stimulation and AI-powered digital tools used for educational personalization. The purpose is not to present artificial intelligence as a replacement for the teacher or auditory stimulation as a stand-alone solution. Instead, the paper proposes a cyclical framework in which auditory stimulation, personalized learning activities, teacher observation, and adjustment of the educational program are coordinated around the learner's needs.

The research question guiding the paper is: How can Tomatis® auditory stimulation and artificial intelligence work together to support inclusive education for students with special educational needs? The practical framework was developed from educational practice in a special-school context and is intended as a structured model that can be further tested through larger and longitudinal studies.

2. Prior Work and Conceptual Background

2.1. Tomatis® Auditory Stimulation

The Tomatis® Method is an auditory stimulation approach associated with listening skills and the use of modified sound input. Within the conceptual framework used in this paper, auditory stimulation is considered in relation to listening, neuroplasticity, and language development (Tomatis, 1991; Tomatis Développement S.A., 2024).

For students with special educational needs, listening is particularly relevant because access to instruction depends not only on hearing sound but also on maintaining attention, processing auditory information, understanding verbal messages, and responding within educational interactions. In the proposed model, Tomatis® stimulation therefore precedes or accompanies educational activities as one component of a broader pedagogical process.

2.2. Artificial Intelligence and Digital Learning

Artificial intelligence has expanded the possibilities for personalized and adaptive learning, rapid generation of educational materials, digital accessibility, and immediate feedback. Research on artificial intelligence in education has emphasized both its potential and the need to preserve pedagogical judgement, ethical responsibility, and the role of educators (Holmes, Bialik, & Fadel, 2019; UNESCO, 2021; UNESCO, 2023).

In special education, digital tools can help teachers vary task complexity, presentation format, visual support, practice opportunities, and feedback. In the practical context described here, tools such as ChatGPT, Canva AI, Gamma, Wordwall, and Quizizz can support the creation of personalized exercises, visual learning materials, interactive practice, and differentiated activities. Their educational value depends on teacher selection, adaptation, and monitoring rather than on automated use alone.

2.3. Inclusive Education and the Integration Gap

Inclusive education requires schools and teachers to respond to learner diversity by reducing barriers to participation and learning (Ainscow, 2020). This perspective is especially relevant for students whose attention, language, communication, or processing profiles require individualized pathways.

The practical gap addressed by this paper concerns the absence, within the authors' practice framework, of an integrated sequence connecting Tomatis® auditory stimulation with AI-supported learning activities and systematic teacher monitoring. The proposed model brings these components together without treating them as interchangeable.

3. The Proposed Practical Framework

The framework is organized as a cyclical and iterative process with six connected stages:

1) Assessment – identification of the learner's educational profile, needs, difficulties, strengths, and relevant learning objectives.

2) Tomatis® auditory stimulation – implementation of the auditory stimulation component according to the learner's program.

3) AI-supported digital learning – creation or adaptation of exercises, visual materials, interactive activities, and differentiated learning tasks.

4) Teacher monitoring – direct observation of attention, listening, communication, task participation, and response to educational activities.

5) Student progress review – examination of observed changes and of the learner's performance in relation to the established objectives.

6) Program adjustment – modification of activities, level of difficulty, supports, pacing, or educational strategies according to the learner's response.

The cycle then begins again with updated information. Its central principle is continuous adaptation. AI tools provide support for personalization, but the teacher remains responsible for interpreting learner responses and deciding what should be maintained, modified, simplified, or extended.

4. Methodology

The framework was developed in a special educational context involving students with special educational needs. The methodological basis presented in the accompanying practice material consists of observation, case-study methodology, and educational practice. The present paper should therefore be understood as a practice-based framework rather than as a controlled experimental study.

Observation focused on functional educational indicators relevant to classroom participation: attention, listening, communication, motivation, participation, and the learner's response to personalized tasks. Digital tools used in the educational workflow included ChatGPT, Canva AI, Gamma, Wordwall, and Quizizz. These tools served different functions, including generating or adapting exercises, creating visual supports, and providing interactive practice.

No sample size, standardized pre-test/post-test measures, control group, or inferential statistical analysis is specified in the source practice material. For this reason, the results reported below are presented as practical observations and should not be interpreted as evidence of causal effectiveness.

5. Practical Application

A typical learning sequence begins with a Tomatis® session as the auditory stimulation component. The educational activity that follows is then adapted to the learner. ChatGPT may be used by the teacher to generate differentiated exercises based on a selected objective; Canva AI can support the creation of visual learning sheets; Wordwall can provide interactive practice and game-based repetition. The teacher observes the learner throughout the process and records relevant responses.

For example, when a learner has difficulty sustaining attention and understanding verbal instructions, the teacher can prepare a short, visually supported task with reduced linguistic complexity and repeated practice. After the auditory stimulation session, the learner completes the personalized activity. The teacher observes time on task, need for prompts, response accuracy, communication attempts, and participation. These observations inform the next adaptation of the activity.

The value of this sequence lies in the connection between intervention and instruction. Auditory stimulation and digital learning are not treated as separate episodes; they are linked through teacher observation and an iterative decision-making process.

6. Practice-Based Results

Within the educational practice from which the framework was developed, the authors identified positive observable changes in several areas: improved attention, improved listening, increased participation, greater motivation, improved communication, and easier personalization of lessons.

These observations are pedagogically relevant because they correspond to common challenges identified at the beginning of the intervention process. However, the available practice material does not provide quantitative effect sizes or standardized outcome data. The findings should therefore be interpreted as preliminary, practice-based indications that justify systematic future evaluation rather than as generalized claims of efficacy.

For teachers, an additional practical outcome was the possibility of producing differentiated and personalized materials more efficiently. AI-supported tools can shorten parts of the preparation process and increase the range of activities available,

while teacher review remains necessary to ensure appropriateness for the individual learner.

7. Innovation and Educational Implications

The proposed framework differs from a fragmented approach in which auditory intervention, classroom instruction, and digital activities are conducted independently. It favors an integrated intervention, personalized learning, teacher decision-making supported by AI, continuous adaptation, and a multidisciplinary perspective.

For students, the expected educational benefits concern engagement, autonomy, communication, and confidence in learning. For teachers, the model supports differentiated instruction, personalized materials, and potentially reduced preparation time. These benefits should nevertheless be considered within the limits of a practice-based framework until they are tested through systematic empirical research.

AI use also requires professional judgement. Materials generated with AI should be checked for accuracy, age and developmental appropriateness, accessibility, and alignment with individualized educational objectives. The teacher therefore remains the central mediator between technology and the learner.

8. Discussion

The framework suggests that the most meaningful point of integration is not the technology itself but the adaptive cycle surrounding the learner. Tomatis® auditory stimulation represents one component of the intervention context, while AI-powered tools increase the teacher's capacity to create differentiated educational experiences. Observation connects the two by supplying the information needed for subsequent adjustment.

This model is consistent with an inclusive orientation in which teaching responds to learner variability rather than requiring the learner to conform to a single instructional pathway (Ainscow, 2020). It also reflects current discussions of AI in education, where personalization opportunities must be balanced with educator oversight and responsible use (UNESCO, 2021; UNESCO, 2023).

A major limitation is the current absence of quantitative validation. The framework cannot establish that observed changes were caused by Tomatis® stimulation, AI-supported activities, or their combination. It instead offers a structured practice model and a set of variables that future studies can measure.

9. Future Research

Future research should test the framework with larger participant samples, quantitative measures, and longitudinal designs. Pre-intervention and post-intervention measures could be used to examine attention, listening, communication, language-related performance, engagement, and task participation.

Further work could also investigate AI-assisted individualized intervention plans and implementation in mainstream inclusive schools. Comparative designs could help distinguish the contribution of auditory stimulation, AI-supported personalization, teacher-mediated adaptation, and the integrated model as a whole.

10. Conclusion

This paper presents a practical framework for combining Tomatis® auditory stimulation with AI-powered digital tools in the education of students with special educational needs. The framework is cyclical: assessment is followed by auditory stimulation, AI-supported learning, teacher monitoring, review of student progress, and adjustment of the program.

The central educational message is that technology does not replace the teacher. Tomatis® and AI-supported tools serve different functions, while professional observation and pedagogical decision-making connect them. The resulting model is practical, flexible, and potentially transferable to different special and inclusive educational contexts.

Current results are practice-based and preliminary. Larger samples, quantitative validation, longitudinal studies, and implementation in mainstream schools are necessary to establish the effectiveness and generalizability of the proposed framework.

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