

## **Effectiveness of AI-Based Speech-to-Text Tools for Slow Learners**

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### **Abstract**

*Artificial Intelligence (AI) technology has revolutionized education by offering personalized and inclusive learning experiences for all learners. Among the AI-based educational technologies, speech-to-text tools have shown a high potential to support slow learners in overcoming their writing difficulties, including writing fluency, spelling, idea formulation, and classroom participation. This qualitative study aimed to examine the impact of AI-powered speech-to-text technologies on slow learners' writing, engagement, motivation, participation and confidence in the classroom. A case study design was used. The study involved classroom observations, semi-structured interviews with teachers and learners, and document analysis of learners' writing tasks, pre- and post-intervention. Thematic analysis identified that speech-to-text technology effectively decreased students' writing anxiety, enhanced their ability to express their ideas, improved their engagement in writing tasks, and fostered classroom inclusion. Teachers observed that students felt more confident in independently performing writing tasks, and were more willing to engage in classroom activities. But challenges in implementation were identified in terms of pronunciation, technical infrastructure and teacher training. This study demonstrates that speech-to-text tools powered by AI are an effective assistive learning strategy for slow learners when combined with planned instruction and inclusive pedagogies.*

**Keywords:** Artificial intelligence, speech to text, slow learners, assistive technology, inclusive education, writing, educational innovation

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## Introduction

Advancements in Artificial Intelligence (AI) have a profound impact on education globally by facilitating adaptive, personalized and inclusive learning experiences. AI-based technologies are increasingly being deployed in the classroom to cater to individual learners of different academic skill levels and special needs. A particularly significant development in this area is speech-to-text (STT) technology, which uses automatic speech recognition to transcribe speech into text. This technology has been shown to be especially helpful to learners with difficulties in text composition and language production.

Slow learners are a population of students who generally have lower academic performance than their peers, but do not meet criteria for intellectual disability. They may experience difficulties with writing speed, spelling, organizing ideas, attention and working memory processing. Their specific needs are often not met in conventional teaching methods, leading to less engagement in the classroom and reduced self-esteem. As a result, emerging technologies such as speech-to-text may hold some potential to benefit their learning.

Speech-to-text tools eliminate reliance on handwriting and typing proficiency by enabling learners to communicate their ideas through voice. By doing so, learners can concentrate on understanding ideas rather than writing. Ok et al. (2020) noted that speech recognition technologies enhance writing productivity and learner engagement for students with learning disabilities. Likewise, MacArthur (2019) noted that speech-to-text tools enable learners with difficulties in written expression to communicate effectively by offering alternative modes of communication.

The use of AI-based speech-to-text tools also supports global educational objectives around inclusive learning and equal opportunities in education. Inclusion classrooms should use teaching methods that cater to learners with different learning needs, and the use of assistive technologies is crucial in this context. As such, exploring the impact of AI-based speech-to-text tools for slow learners is critical to champion inclusive teaching and learning approaches and enhance student learning outcomes.

## Concept of Slow Learners

Slow learners are students who progress more slowly in their learning than others due to slow cognitive processing, low working memory, and poor organisation skills. But such learners can still succeed academically with the right teaching strategies and learning materials. Slow learners are not students with intellectual disabilities but have average intelligence and need more time and repetition to learn. These learners are frequently found

to be impaired in writing tasks, such as spelling, grammar, sentence formation and organisation. This impacts their classroom engagement and learning. Educational psychologists highlight that slow learner can benefit from multisensory teaching strategies, scaffolded feedback and tools that eliminate mechanical learning challenges (Swanson et al., 2018). Speech-to-text is an example of an educational innovation that facilitates alternative ways of presenting knowledge and promotes independence.

Additionally, slow learners tend to have lower academic self-efficacy, as a result of failure experiences in conventional learning settings. Adaptive AI-based assistive technologies can address these issues by offering supportive and adaptive learning opportunities to increase motivation (Sidra et al., 2025).

### **Artificial Intelligence in Education**

Artificial Intelligence (AI) is the use of computer systems to perform tasks that typically require human intelligence, including speech recognition, decision-making, text-to-speech and adaptive learning. AI-based technologies are increasingly integrated into educational settings for personalized learning, automated assessment and supporting students with special educational needs.

AI-powered teaching tools enhance the efficiency of teaching and allow teachers to track students' learning progress. Such technologies facilitate personalized learning by delivering instruction based on learners' performance (Holmes et al., 2022). Voice recognition is a key area of AI application in education. This technology allows users to control digital learning platforms through voice commands and facilitates the creation of accessible learning systems that support inclusive learning experiences. AI in education also supports the realization of Sustainable Development Goal 4 (SDG-4), which targets the quality, equitable and inclusive education for all learners, regardless of their abilities. Hence, AI-driven speech-to-text technologies are integral to inclusive learning.

### **Speech-to-Text Technology: What it is and How it Works**

Speech-to-text technology employs automatic speech recognition (ASR) systems to transcribe spoken words into text. These technologies process speech signals, detect phonetic patterns, and produce real-time text representations of speech. Today's speech-to-text systems use machine learning algorithms, which learn from user interactions and context to improve the accuracy of speech transcription. They cater for various languages and accents, making them appropriate for diverse classrooms.

The speech-to-text process has three main steps:

1. Speech input recognition
2. Interpretation and understanding
3. Text output generation

This involves learners speaking their thoughts and seeing the text being formed on a computer screen in real time. Studies have shown that speech-to-text tools boost writing productivity for students with learning disabilities (MacArthur & Cavalier, 2004).

### **Benefits of Speech-to-Text Tools for Slow Learners**

Speech-to-text tools offer several advantages for slow learners in the classroom by overcoming writing difficulties and promoting participation in classroom tasks. Slow learners may find it difficult to express ideas in written form because of poor spelling skills and slow writing speed. Voice-activated technology allows learners to express ideas through speech, rather than struggling with the task of transcribing. Additionally, these tools promote inclusive learning by enabling learners to independently complete their writing tasks. Learning independence plays an important role in boosting confidence and engagement. Speech-to-text technologies also benefit learners with dysgraphia, dyslexia and processing disorders by offering an alternative means of written communication (Ok et al., 2020).

### **How Speech-to-Text Technology can Enhance Writing**

Writing is a complex skill in slow learners. It involves the interplay of cognitive processing, spelling, grammar and handwriting. Speech-to-text tools make this easier by untangling ideation and transcription. Research demonstrates that students prefer longer, more engaging writing responses when using speech-to-text tools than when writing conventionally (Almgren Bäck et al., 2025).

Using speech-to-text tools also enhances sentence structure and vocabulary choices by enabling learners to concentrate on generating ideas rather than writing mechanics. Additionally, the instant feedback provided by real-time transcription allows for immediate revisions, leading to more accurate and well-organised writing.

### **Impact on Academic Engagement**

Academic engagement is learner involvement in class activities. Slow learners tend to have low engagement because of their struggles with writing and fear of error. Engagement is boosted by speech-to-text tools, which create safe learning spaces for learners to confidently share their ideas, free from concerns about spelling errors. Educators observe higher engagement by learners who use speech-to-text tools for writing

and speaking in class discussions (MindShift, 2021). Greater engagement leads to improved learning outcomes and motivation.

### **Reduction of Cognitive Load**

According to cognitive load theory, learners have limited working memory capacity. Multitask processing of several cognitive processes is often required for writing tasks and imposes a high cognitive load on slow learners. Speech recognition tools offload cognitive load by enabling learners to concentrate on content rather than transcribing. This enhances understanding and task performance (Sweller et al., 2019).

### **Contribution to Inclusive Education**

An inclusive classroom is one in which all learners have equal access to the learning environment. Speech-to-text tools promote inclusive education by allowing learners with writing issues to be actively engaged in learning activities.

1. Technology helps to remove the barriers to learning that hinder learners' potential.
2. Speech-to-text technologies can be used by teachers to individualise instruction.
3. Boost to Self-Confidence and Motivation
4. Low-progress learners often suffer from low levels of self-confidence as a result of their failure experiences.
5. Use of speech-to-text tools enhances motivation as successful task completion increases motivation.
6. Task success promotes academic self-efficacy and increases classroom engagement.

Bandura's theory of self-efficacy states that successful learning experiences enhance confidence and motivation (Bandura, 1997).

### **Role in Supporting Language Development**

Another way speech-to-text tools help slow learners learn languages is through improved vocabulary and sentence writing skills. Students can see the visual representation of their oral responses in text, which increases their awareness of grammar and language accuracy. Visual representations also enhance spelling recognition. So, speech-to-text tools help to develop both expressive and receptive language skills.

### **Research Objectives**

Research objectives of the study were as follows:

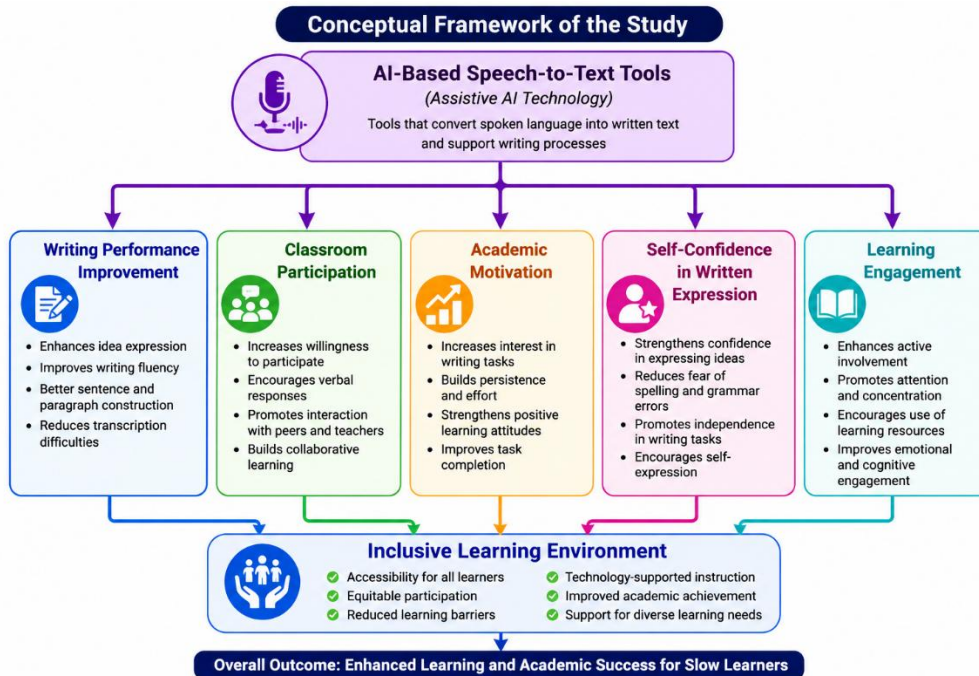
1. To explore the role of AI-based speech-to-text tools in improving the writing performance of slow learners.
2. To examine how speech-to-text tools influence classroom participation of slow learners during writing activities.
3. To investigate learners' perceptions regarding their academic motivation when using speech-to-text tools in classroom learning tasks.

### Research questions

1. How do AI-based speech-to-text tools support the improvement of writing performance among slow learners during classroom writing activities?
2. In what ways do speech-to-text tools influence classroom participation of slow learners during writing activities?
3. What are slow learners' perceptions regarding their academic motivation when using AI-based speech-to-text tools in classroom learning tasks?
4. What changes do teachers observe in learners' participation after using speech-to-text tools?

### Conceptual framework of the Study

Figure 1 Conceptual framework of the study



The conceptual framework of the current study demonstrates the role of AI-powered speech-to-text technologies as the key assistive teaching tool aimed at helping slow learners to overcome the writing-related learning difficulties and to improve their engagement in classroom learning. The framework identifies speech-to-text technology as the key independent variable that enables the transformation of speech into text, which alleviates the mechanical aspects of handwriting and spelling challenges. This assistance helps slow learners to concentrate on their idea development, sentence writing and conceptual comprehension while writing.

The model also shows that the adoption of speech-to-text technology plays a vital role in enhancing students' writing skills by improving their ability to articulate ideas effectively. Voice-supported writing tasks enhance learners' skills in sentence and paragraph formation and eliminates the problems encountered in handwriting by facilitating the conversion of speech to text. By doing so, speech-to-text technology offers a new path for expressing ideas in writing for learners who have difficulties with traditional writing approaches. The model also suggests that speech-to-text systems also enhance academic motivation by promoting learners' interest in writing activities and improving their persistence towards classroom writing tasks. Positive experiences with assistive technology promote the acquisition of positive learning attitudes and engagement in the learning tasks. Learners' motivation toward learning tasks then increases as they start to feel their writing has improved.

## **Research Methodology**

The current study employed a qualitative exploratory approach to investigate the use of AI-powered speech-to-text tools for slow learners. The study adopted qualitative research since it allows for a detailed exploration of participants' responses, views, and interaction dynamics in their classrooms where they use assistive technologies (Creswell & Poth, 2018). The study followed the interpretive research paradigm as it focused on participants' understandings of their learning experience with speech-to-text tools. This enabled the researcher to understand how learners used the assistive technologies for writing and how teachers interpreted differences in learners' classroom participation (Merriam & Tisdell, 2016).

## **Data Collection**

The research was undertaken in elementary classrooms where slow learners engaged in writing tasks using speech-to-text technologies as part of their regular teaching and learning activities. The classroom setting allowed naturalistic observations of students using assistive technologies (Yin, 2018). Slow learners were selected on the basis of

teacher recommendations and school records of academic performance that showed difficulties in writing. Interviews were conducted with classroom teachers who used speech-to-text tools to give teaching insights into the use of technology (Patton, 2015).

A purposive sampling approach was adopted to identify participants with specific traits pertinent to the research questions such as decreased writing fluency and minimal engagement in class (Etikan et al., 2016).

## **Data Collection Methods**

Several methods of qualitative data collection were employed for triangulation purposes.

### **Classroom Observations**

Observations in the classroom focused on student participation and engagement and the use of speech-to-text tools during writing tasks. Observations gave an insight into changes in learner behavior with the use of assistive technologies (Merriam & Tisdell, 2016).

### **Semi-Structured Interviews with Students**

Semi-structured interviews investigated students' beliefs about their comfort, confidence and motivation to write with speech-to-text support. Interviews provided an opportunity for learners to share their thoughts verbally (Creswell & Poth, 2018).

### **Teacher Interviews**

Teacher interviews gave insight into challenges in implementing instruction and improvements in learner engagement and writing performance with the use of speech-to-text tools (Patton, 2015).

### **Document Analysis**

Learners' written assignments created using speech-to-text tools were analysed to explore benefits in sentence structure, word choice, and organizational strategies. Document analysis triangulated qualitative data (Bowen, 2009).

## **Data Analysis technique**

Thematic analysis was employed to analyze qualitative data from classroom observations, interviews and document analysis. Thematic analysis allows for the

discovery of potential learning patterns across sources of data (Braun & Clarke, 2006). Steps in the coding process included data familiarization, identifying themes, categorizing data, and analyzing emerging learning patterns in relation to the use of speech-to-text technology (Nowell et al., 2017).

## Results

### Research Question 1

How do AI-based speech-to-text tools support the improvement of writing performance among slow learners during classroom writing activities?

Table 1

#### *Thematic Analysis of Writing Performance Improvement*

| <b>Participant Responses</b>                               | <b>Initial Codes</b>       | <b>Categories</b>     | <b>Theme</b>                 |
|--|----------------------------|-----------------------|------------------------------|
| “Students expressed ideas more easily using voice typing.” | Easy idea expression       | Idea development      | Improved writing performance |
| “Learners wrote longer sentences than before.”             | Increased sentence length  | Sentence construction | Improved writing performance |
| “Students completed writing tasks faster.”                 | Faster task completion     | Writing fluency       | Improved writing performance |
| “Less hesitation during paragraph writing.”                | Reduced writing hesitation | Confidence in writing | Improved writing performance |
| “Spelling mistakes reduced during writing activities.”     | Reduced spelling errors    | Writing accuracy      | Improved writing performance |

The thematic analysis findings show that speech-to-text tools helped learners communicate ideas more easily and write longer sentences without transcription challenges. Learners showed an increase in writing speed and decreased writing apprehension. This suggests that speech-to-text tools remove mechanical writing obstacles and allow learners to find ways to express their ideas.

### Research Question 2

In what ways do speech-to-text tools influence classroom participation of slow learners during writing activities?

Table 2

#### *Thematic Analysis of Classroom Participation*

| <b>Participant Responses</b>                           | <b>Initial Codes</b>          | <b>Categories</b>      | <b>Theme</b>                     |
|--|-------------------------------|------------------------|----------------------------------|
| “Students were more willing to attempt writing tasks.” | Increased willingness         | Task participation     | Enhanced classroom participation |
| “Learners interacted more with the teacher.”           | Teacher interaction increased | Classroom interaction  | Enhanced classroom participation |
| “Students responded more confidently in class.”        | Confident responses           | Verbal participation   | Enhanced classroom participation |
| “Group work participation improved.”                   | Active group engagement       | Collaborative learning | Enhanced classroom participation |
| “Students volunteered answers more frequently.”        | Increased volunteering        | Active involvement     | Enhanced classroom participation |

Our study shows that speech-to-text tools boosted learners' engagement in classroom writing activities. Better interaction with teachers and peers suggests that assistive technology decreases learners' fear of writing and encourages active participation in classroom learning tasks for slow learners.

### Research Question 3

What are slow learners' perceptions regarding their academic motivation when using AI-based speech-to-text tools in classroom learning tasks?

Table 3

## Thematic Analysis of Academic Motivation

| <b>Participant Responses</b>                      | <b>Initial Codes</b>              | <b>Categories</b>    | <b>Theme</b>                  |
|---|-----------------------------------|----------------------|-------------------------------|
| “Students enjoyed writing activities more.”       | Increased enjoyment               | Interest in writing  | Increased academic motivation |
| “Learners completed assignments more willingly.”  | Assignment completion willingness | Task persistence     | Increased academic motivation |
| “Students showed excitement using speech tools.”  | Technology excitement             | Learning enthusiasm  | Increased academic motivation |
| “Learners requested more writing activities.”     | Request for additional tasks      | Learning interest    | Increased academic motivation |
| “Students participated regularly during lessons.” | Regular participation             | Classroom engagement | Increased academic motivation |

The findings show that speech-to-text technology enhanced learners' motivation for writing and improved persistence on learning activities in the classroom. Students showed interest in technology-enhanced teaching, which led to higher engagement and motivation in their learning activities.

**Research Question 4**

What changes do teachers observe in learners' participation after using speech-to-text tools?

Table 4

*Thematic Analysis of Teachers' Observations Regarding Participation Changes*

| <b>Teacher Responses</b> | <b>Initial Codes</b> | <b>Categories</b> | <b>Theme</b> |
|--------------------------|----------------------|-------------------|--------------|
|--------------------------|----------------------|-------------------|--------------|

|   |                            |                             |                                 |
|---|----------------------------|-----------------------------|---------------------------------|
| “Students attempted writing tasks independently.”         | Independent task attempt   | Writing independence        | Improved participation behavior |
| “Learners showed confidence during classroom activities.” | Increased confidence       | Participation confidence    | Improved participation behavior |
| “Students interacted more with peers.”                    | Peer interaction increased | Collaborative participation | Improved participation behavior |
| “Less hesitation was observed during writing sessions.”   | Reduced hesitation         | Behavioral engagement       | Improved participation behavior |
| “Students became active contributors in lessons.”         | Active lesson contribution | Classroom involvement       | Improved participation behavior |

Use of speech-to-text technology Learners showed greater autonomy, self-confidence and social engagement in writing activities. This suggests that the speech-to-text tools promote inclusion in the classroom and remove barriers to conventional writing practices.

Table 5

*Cross-Theme Synthesis of Qualitative Findings on the Effectiveness of AI-Based Speech-to-Text Tools for Slow Learners*

| Research Question   | Codes  | Categories   | Themes                       | Supporting Evidence  | Interpretation  |
|---|--|--|------------------------------|--|---|
| How do speech-to-text tools support writing performance improvement among | Easy idea expression, longer sentences, fewer spelling errors, faster writing completion | Writing fluency, sentence construction, spelling support | Improved writing performance | Learners produced longer responses and completed writing tasks independently | Speech-to-text tools reduced transcription barriers and supported idea organization |

|   |  |   |                                  |   |  |
|---|--|---|----------------------------------|---|--|
| slow learners?  |  |   |                                  |   |  |
| How do speech-to-text tools influence classroom participation during writing activities?      | Increased willingness to participate, teacher interaction, peer collaboration, active responses    | Task participation, interaction behavior, collaborative engagement      | Enhanced classroom participation | Students responded more frequently and participated in group activities     | Assistive technology increased learners' confidence to participate actively      |
| What are learners' perceptions regarding academic motivation when using speech-to-text tools? | Increased enjoyment, interest in writing, enthusiasm toward technology, persistence in assignments | Learning interest, task persistence, positive learning attitude         | Increased academic motivation    | Learners requested additional writing activities using speech tools         | Positive technology experiences strengthened motivation and engagement           |
| What changes do teachers observe in learners' participation after using speech-to-text tools? | Independent task completion, reduced hesitation, increased confidence, peer interaction            | Participation confidence, behavioral engagement, collaborative learning | Improved participation behavior  | Teachers observed active classroom contribution and reduced writing anxiety | Speech-to-text tools supported inclusive participation and learning independence |

The cross-theme synthesis matrix shows that artificial intelligence (AI) speech-to-text tools had a positive impact on various aspects of slow learners' classroom learning. The research shows that speech-to-text tools enhanced writing achievement by facilitating the expression of ideas, sentence writing and time efficiency during writing tasks. Learners

showed less hesitation in writing activities and were able to write more than when handwriting.

Learners actively participated in classroom discussions because assistive technology alleviated fear of spelling and handwriting errors. Finally, learners felt more motivated to complete writing tasks with speech-to-text technologies. The positive learning experiences increased their motivation to complete homework tasks and to persist in classroom tasks. Learners expressed interest in the use of technology for writing instruction and asked for more opportunities to use speech-based learning technologies. Teachers confirmed that learners' classroom participation improved following the use of speech-to-text tools. Teachers observed greater learner confidence, autonomy in task completion and peer engagement during the writing process. These findings suggest that speech-to-text tools promote inclusive participation in the classroom by overcoming barriers to writing instruction.

## **Findings of the Study**

### **Theme 1: Enhanced Writing among Slow Learners**

Document analysis, learner interviews, and classroom observations showed that AI speech-to-text tools greatly contributed to the improvement in writing performance among slow learners. Students showed gains in verbal expression of ideas and translation of ideas into well-formed sentences with fewer pauses when writing. Voice typing reduced spelling stress and helped learners focus on content generation rather than writing difficulties. Learners indicated voice typing allowed them to generate longer text than when handwriting. Teacher observations also showed improvement in paragraph length and on time completion of writing tasks.

**Student Voice Evidence** One student reported: "I can speak my ideas and the computer writes them fast. Before, I didn't complete my writing work on time." Another participant explained: "I think it is easier for me to create sentences because I can speak what I want to say without thinking about spelling." A third learner shared: "Voice typing allows me to write more words in class sessions than I normally do." **Teacher Voice Evidence** And teachers reported improvement in writing: "Students who normally refused to write their work because of handwriting problems began to do their work without my help after using the speech-to-text tool." Another teacher stated: "I noticed their sentence writing improved as they focused on ideas rather than on the handwriting task." **Interpretation** The results suggest speech-to-text tools remove mechanical limitations from handwriting and spelling challenges and facilitate the expression of ideas for slow learners.

This led to greater confidence and fluency in writing tasks during classroom writing activities.

### **Theme 2: Improvement in Classroom Engagement in Writing Exercises**

Classroom observations and interviews suggested that speech-to-text tools boosted learners' confidence in participating in writing-oriented classroom activities. Learners were less reluctant to respond to teachers' questions and engaged more readily with each other in collaborative writing tasks. Speech-to-text tools provided a safe space for learners to share ideas without being disciplined for spelling errors. Student Voice Evidence learner explained: "Before voice typing, I was not comfortable answering questions in class. I am now more engaged and willing to answer questions."

Another student stated: "I talk and they are written on the screen. I feel good in class." Another student stated: "I have a greater tendency to put up my hand because it is easier to write now." Teacher Voice Evidence Teachers reported changes in behavior: "Learners who often remained silent in writing sessions, started to join the class discussions after using speech-to-text tools." Another teacher noted: "Students began to collaborate with their peers during class writing activities."

Interpretation on the learners' responses indicate that speech-to-text technology supports inclusive participation by alleviating writing stress and motivating more interaction with learning activities in the class. Enhanced participation is indicative of increased confidence and accessibility in learning tasks.

### **Theme 3: Academic Motivation towards Writing Tasks**

Thematic analysis showed that speech-to-text tools had a positive impact on learners' motivation to complete writing tasks in the classroom. Students were motivated to complete their assignments and showed enthusiasm and interest in using technology-based writing tools. Observations supported that learner persisted on tasks and were motivated to engage in writing activities using assistive technology. Voice-activated technology turned writing tasks into a pleasant experience for learners who had previously been reluctant to engage in writing tasks. Student Voice Evidencing One participant stated: "Using voice typing makes writing interesting for me as I can complete my work quickly." Another learner explained: "It is fun to use speech tools to write." A student further reported: "I would like to use this again in my next writing lesson."

Teacher Voice Evidence Teachers reported improvements in motivation: "Pupils were excited about using speech-to-text tools when writing." Another teacher observed: "This increased learner interest by motivating students who normally avoided doing their

assignments to complete them.”. Interpretation on this study shows that speech-to-text tools increase learners' motivation to engage in writing tasks, as they facilitate positive learning experiences. This heightened interest leads to greater engagement and persistence with classroom instruction tasks.

#### **Theme 4: Enhancement in Self-Efficacy in Writing**

Based on the responses from the learners, we found that speech-to-text technology greatly improved learners' self-confidence in expressing their ideas when writing. Learners were less concerned about spelling errors and more independent in writing tasks. Access to speech-to-text tools enabled learners to express their ideas freely. Student Voice Evidence One learner explained: “No longer am I worried about my spelling because I use the computer to type my words.” Another student stated: “I feel brave to speak and see my words on the computer.” A participant also shared: “Before I was timid to write, but now I try to write more.”

Teacher Voice Evidence Teachers observed confidence development: “I noticed a significant increase in confidence for students to share their ideas when writing.” Another teacher reported: “Students became more independent in writing tasks after using speech-to-text tools”.

Interpretation Elevated confidence suggests speech-to-text tools alleviate the fear found with traditional writing and help learners develop independence in their writing. Improved confidence levels positively affect learners' engagement in education.

#### **Theme 5: Greater Learning Engagement in Classroom Writing Tasks**

Observational data from the classroom indicated that speech-to-text technology increased learners' engagement (behavioral and cognitive) during writing activities. Students had higher levels of attention, engagement with the task, and engagement with the materials. The speech-to-text tool fostered a positive environment that allowed students to stay focused and engaged during writing sessions. Student Voice Evidence One learner reported: “I am able to maintain focus when using voice typing as it allows me to finish my work promptly.” Another participant stated: “I find using the microphone to write is engaging.” Teacher Voice Evidence Teachers confirmed engagement improvement: “When speech-to-text technology is used, students are engaged in writing lessons.” Another teacher explained: “Students were more engaged in class than usual writing lessons.” Interpretation at the results above show that speech-to-text technologies promote engagement by making participation with writing tasks more accessible. Engagement supports participation in learning for slow learners in inclusive classrooms.

## Discussion

The study suggests that speech-to-text tools are effective in aiding slow learners' writing performance by overcoming transcription challenges and enhancing involvement in the writing process. This is consistent with other studies that have shown the benefits of using assistive devices in inclusive classrooms (MacArthur & Cavalier, 2004).

Speech-to-text tools also boosted learners' motivation and confidence in writing by allowing them to communicate ideas verbally, rather than just through handwriting (Ok et al., 2020). According to teachers, speech-to-text tools support learners in inclusive classroom participation by offering alternative means of communication for slow learners who struggle with writing skills (Sand, 2024).

## Conclusion

The research suggests that AI speech-to-text tools offer valuable support to slow learners in the classroom by enhancing writing achievement, classroom engagement, academic motivation, and self-efficacy in writing. Technology facilitates inclusive classroom engagement and overcomes learning challenges associated with traditional writing approaches (Holmes et al., 2022). Use of speech-to-text tools in classroom instruction promotes accessibility and caters to the needs of diverse learners in inclusive classrooms (UNESCO, 2021; Sohail et al., 2026).

## Recommendations

Based on the findings, following recommendations were as follows:

School curriculum may include speech-to-text tools in inclusive education. Researchers may explore long-term impacts of speech-to-text tools on writing through qualitative longitudinal studies.

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