

Students' Perception of Speakometer Application in Supporting Pronunciation Mastery: A Case Study of Eleventh-Grade Students at SMAN 4 Pandeglang

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ABSTRACT

Pronunciation remains one of the most persistent challenges for Indonesian EFL senior high school students, and teachers often lack sufficient class time to give individualized corrective feedback. This qualitative descriptive case study (Creswell & Poth, 2018) therefore examined how the Automatic Speech Recognition (ASR)-based application Speakometer supported the pronunciation mastery of eleventh-grade students at SMAN 4 Pandeglang in the 2026/2027 academic year. Data were collected from 10 purposively selected students through a 10-word pronunciation checklist, classroom observation, and semi-structured interviews organized around the Technology Acceptance Model (TAM). Checklist results showed that students accurately pronounced words with regular sound-symbol correspondence (e.g., Music, Lawyer) but frequently mispronounced words containing silent letters (Daughter) and word-final affricates (Allege) a pattern consistent with the influence of Indonesian phonological habits, although this interpretation was not confirmed through a systematic contrastive-phonological analysis. Interview and observation data indicated that Speakometer's immediate ASR feedback, private practice setting, and gamified scoring were perceived by students as supporting their pronunciation practice, reducing speaking anxiety, and increasing motivation for independent learning; because no pre-test/post-test was administered, these gains are reported as students' perceived support rather than a statistically measured improvement in mastery. Across the four TAM constructs, students found Speakometer easy to navigate (PEOU) and useful for correcting pronunciation and building vocabulary (PU); for example, students described the interface as "simple and not confusing" (PEOU) and reported that regular practice "helps in memorizing" vocabulary (PU). These perceptions combined into a favorable attitude (ATU) and a strong intention to continue using the application and recommend it to peers (BI). This study contributes empirical evidence on how an ASR-based application not previously examined in Indonesian senior-high-school contexts can be used as a self-directed pronunciation-learning tool.

Keywords: *Speakometer Application, Pronunciation Mastery, Students' Perception, Technology Acceptance Model (TAM), Mobile Assisted Language Learning (MALL).*

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INTRODUCTION

English pronunciation plays a central role in how clearly and confidently senior high school learners communicate, since listeners' impressions of a speaker's proficiency are often shaped more strongly by pronunciation than by grammar or vocabulary (Arif & Kleden, 2025). For eleventh-grade students, whose curriculum increasingly emphasizes spoken performance in preparation for higher education and future workplace communication, mastering pronunciation is therefore not only a linguistic goal but a practical necessity. Indonesian EFL learners in particular continue to experience persistent pronunciation difficulties rooted in the mismatch between English and Indonesian phonology: sounds such as /θ/, /ð/, /ʃ/, and /tʃ/ do not exist in Indonesian, silent letters and irregular spelling-to-sound correspondences are frequently read literally, and segmental accuracy at the senior-high-school level is often reported to remain in the "fair" or "poor" category (Afif, 2024). These difficulties can undermine

intelligibility and self-confidence even when a student's grammar and vocabulary are otherwise adequate.

Recent research shows that pronunciation instruction becomes more effective when teachers integrate learner-centered strategies with audio-visual and mobile technologies (Metruk, 2024). Rapid advances in Mobile-Assisted Language Learning (MALL) and Computer-Assisted Pronunciation Training (CAPT) have made intensive, repetitive, and individualized practice possible outside the classroom (Evers & Chen, 2022; Hwang & Fu, 2019; Khubyari & Narafshan, 2016). Automatic Speech Recognition (ASR)-based tools such as ELSA Speak, Duolingo, Cake, and Speakometer provide immediate feedback and tailored suggestions (Kurt, 2022), although accent recognition and internet dependency remain challenges (Dai & Wu, 2023). Students' willingness to adopt such technology is largely explained by the Technology Acceptance Model (TAM), which links Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) to a positive Attitude Toward Using (ATU) and continued Behavioral Intention (BI) (Davis & Granic, 2024).

Although a growing number of studies have examined ASR-based pronunciation tools, most have focused on university-level learners and on applications such as ELSA Speak or Speech-Ace (A. Anggraini, 2021; Fazri et al., 2026; Karim et al., 2023; Muralia & Musdizal, 2025; Mutiara et al., 2024), and have generally measured speaking performance in general rather than pronunciation mastery specifically. What remains unclear is how a different, less-studied ASR application Speakometer functions among younger, senior-high-school learners, and whether its contribution is best understood as measurable improvement or as students' perceived support for their own practice. This gap matters because senior-high-school learners face classroom constraints and developmental readiness for autonomous digital practice that differ from those of university students, so findings from university contexts cannot simply be assumed to transfer downward. The present study addresses this gap by examining Speakometer's use among eleventh-grade students in an Indonesian senior-high-school setting.

SMAN 4 Pandeglang was selected as the research setting because, like many public senior high schools in the Banten region, it enforces a policy prohibiting smartphone use during class hours, which limits opportunities for technology-assisted pronunciation practice inside the classroom while leaving out-of-class practice largely unsupported. At the same time, pre-observation revealed that most students already owned smartphones, but teachers lacked the class time to give individualized pronunciation feedback and the school rarely used pronunciation applications; students still struggled to master English pronunciation, their confidence was often undermined by mispronunciation, and they needed more opportunities and suitable media to practice outside class. These conditions make SMAN 4 Pandeglang a relevant site for examining how an ASR-based tool such as Speakometer could be used for independent, out-of-class pronunciation practice. Empirical studies on students' direct experience with Speakometer in an Indonesian senior-high-school context, in particular, remained limited. This study, entitled "Students' Perception of Speakometer Application in Students' Pronunciation Mastery at the Eleventh Grade Students of SMAN 4 Pandeglang in the Academic Year 2026/2027," therefore explored how Speakometer could be used in English classes and how it supported eleventh-grade students' pronunciation mastery.

Based on this background, three research questions guided this study: (1) How is the pronunciation mastery of the eleventh-grade students of SMAN 4 Pandeglang in the 2026/2027 academic year? (2) What is the supportive role of Speakometer in the students' pronunciation mastery? (3) How do the eleventh-grade students perceive the use of Speakometer in learning pronunciation? Correspondingly, this study aimed (1) to describe the students' pronunciation mastery, (2) to analyze the supportive role of Speakometer in that mastery, and (3) to explore the students' perceptions of using Speakometer, framed through the constructs of TAM.

Speakometer Application and Pronunciation Mastery

Speakometer is an AI-powered mobile application launched in 2019 by Datawide Ltd., designed to train English segmental pronunciation through ASR-based scoring and instant, color-coded feedback on individual sounds and words (Kurt, 2022). It provides model audio from native speakers, repeated listening, recording, and feedback that enables focused, individualized, data-driven practice outside the classroom. Its free version, used by the eleventh-grade students of SMAN 4 Pandeglang in this study, offers instant pronunciation feedback, British and American accent options, and minimal pairs for phonological awareness, while its premium version unlocks an expanded vocabulary bank and personalized statistical tracking.

From a linguistic perspective, mastering pronunciation requires command of both segmental features (vowels and consonants) and suprasegmental features (stress, rhythm, and intonation) (Mutia, 2025). English has more vowel and consonant variation than Indonesian, including sounds such as /θ/, /ð/, /ʃ/, and /tʃ/ that are absent in the students' first language, a mismatch that frequently causes substitution, omission, or mispronunciation rooted in L1 interference (Noviyenty & Putri, 2021; Pakpahan, 2023). CAPT and ASR-based systems have been found to substantially improve learners' pronunciation, accentedness, and intelligibility compared with conventional approaches (Sun et al., 2023), because they combine auditory models, visualization, ASR, and corrective feedback to support autonomous practice (Tejedor-García et al., 2020).

Several prior studies support the effectiveness of ASR-based applications for pronunciation development. Tejedor-García et al. (2020) found that a CAPT minimal-pair tool with an exposure-perception-production cycle markedly improved production of difficult sounds. Bashori et al. (2024b, 2024a) showed that ASR-based websites improved Indonesian high school students' pronunciation at both word and sentence levels, with more detailed phonetic feedback producing higher gains. Studies on ELSA Speak similarly reported significant pre-post improvement in pronunciation scores together with positive learner perceptions of direct feedback (S. Anggraini, 2022; Karim et al., 2023). Muralia & Musdizal (2025) and Fazri et al. (2026), specifically investigating students' perceptions of ELSA Speak, found that learners valued real-time feedback and ease of use, although confidence in formal speaking contexts and technical issues such as internet connectivity remained challenges. Taken together, this body of work suggests that ASR feedback specificity, learner age, and application type meaningfully shape pronunciation outcomes, reinforcing the need to examine an underexamined application such as Speakometer within a senior-high-school population. Compared with these studies, which were largely conducted among university students using ELSA Speak or Speech-Ace, the present study is novel in focusing on the Speakometer application among senior high school students, and in specifically examining students' pronunciation mastery rather than speaking performance in general.

Students' Perception and the Technology Acceptance Model

Perception is the process by which people select, organize, and interpret sensory information to give it meaning (Rakhmat, 2018). In the context of educational technology, TAM Davis & Granic (2024) explains that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) jointly shape users' Attitude Toward Using (ATU) technology, which in turn drives their Behavioral Intention (BI) to continue using it. PU reflects the extent to which students believe an application meaningfully supports their learning, while PEOU reflects how easily, clearly, and intuitively the application can be operated. When students perceive an application as both useful and easy to use, they tend to develop favorable attitudes, stronger motivation, and greater intention to keep using it in their studies a framework this study used as the theoretical lens for analyzing students' acceptance of Speakometer.

METHOD

Research Design

This study employed a qualitative descriptive design with a case study approach (Creswell & Poth, 2018). This design was chosen because the study's purpose was to describe, in the participants' own context, how ten students used Speakometer, how their pronunciation performance appeared across ten target words, and how they made sense of that experience rather than to test a statistical hypothesis about pronunciation improvement. A case study specifically allows an in-depth, bounded exploration of a single group of students within one school, which is appropriate given the study's exploratory purpose and the absence of a comparison group or a pre-test/post-test design. Davis's Technology Acceptance Model (TAM) served as the theoretical lens for the thematic analysis, allowing the researcher to examine how students' perspectives on Speakometer's effectiveness were shaped by the support, confidence, and motivation they experienced through Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).

Research Setting

The research was conducted at SMAN 4 Pandeglang, Banten, focusing on eleventh-grade students in the 2026/2027 academic year. This grade level was chosen because the students were already accustomed to digital learning applications, possessed greater learning independence than tenth graders, and had a schedule unaffected by the twelfth grade's final-exam preparations. The school's policy prohibiting smartphone use during regular class hours made the use of Speakometer for independent, out-of-class practice a relevant innovation to investigate.

Subject and Object

The population of this study was the eleventh-grade students of SMAN 4 Pandeglang in the 2026/2027 academic year.

From this population, 10 students were selected through purposive sampling based on the following criteria: (1) actively enrolled in the eleventh grade during the 2026/2027 academic year; (2) owned a personal smartphone capable of running the Speakometer application; (3) had not previously used Speakometer or a comparable ASR-based pronunciation application, so that their responses reflected a first-time user experience; and (4) were willing to participate in the full data-collection process, including the pronunciation checklist, observation, and interview. This number is considered ideal for gathering deep, focused qualitative data (Mukhtazar, 2020). The object of the research was students' perceptions of the Speakometer application in relation to their pronunciation mastery.

Data Collection

Three techniques were used to collect data.

Observation

The researcher observed each of the 10 participants individually while they completed the pronunciation checklist and practiced with Speakometer, using an observation sheet covering nine key aspects of students' attitudes and responses (Creswell & Poth, 2018), including how easily students navigated the interface, how they reacted to correct and incorrect (red/green) feedback, whether they re-attempted a word after an incorrect score, and expressions of confidence, hesitation, or frustration. Observations were recorded through field notes taken during each session and were later cross-checked against the interview data during analysis.

In-Depth, Semi-Structured Interviews

With all 10 selected students, designed around the TAM constructs of PU, PEOU, ATU, and BI, and organized into the dimensions of support/help, confidence, and motivation, with students' identities anonymized using initials.

Documentation

including photographs of learning activities, interview transcripts, and students' pronunciation practice results, used to strengthen the credibility of the findings.

Instrument

The main instrument was a researcher-developed, open-ended interview guide combined with a pronunciation checklist analyzing students' pronunciation of 10 target vocabulary items from Speakometer: Music, Daughter, Opposition, Lawyer, Calculate, Emphasize, Paragraph, Allege, Approval, and Anxiety. These words were purposefully selected because, together, they represent a range of pronunciation features relevant to Indonesian EFL learners: regular sound-symbol correspondence (e.g., Music, Emphasize), word stress in polysyllabic words (Opposition, Calculate), and features known to be difficult for Indonesian learners, namely silent letters and irregular spelling (Daughter) and word-final consonant clusters or affricates (Allege, Approval). This range allowed the checklist to capture varied pronunciation difficulties rather than a single feature.

To administer the checklist, each student individually pronounced the ten words aloud into the Speakometer application while the researcher recorded the application's color-coded result for each word on the checklist sheet, categorizing it as Correct (C), Moderate (M), or Incorrect (I).

The instruments were validated by two expert judges from the Faculty of Teacher Training and Education, University of Mathla'ul Anwar Banten, and were revised based on their recommendations before use.

Data Analysis

Following Miles et al. (2014), data analysis was carried out through data collection, data reduction, data display, and conclusion drawing/verification. Data reduction involved categorizing each student's pronunciation of the 10 target words as Correct, Moderate, or Incorrect; data display presented the interview results in tables organized by the TAM constructs; and conclusions were drawn by rechecking transcripts and audio/video recordings before finalizing the interpretation.

Data Validity

Data validity was established through triangulation (Creswell & Poth, 2018), cross-checking the descriptive pronunciation checklist data with the in-depth interview data based on TAM, and further supporting both with documentation gathered during the research, so that the results on pronunciation mastery and students' acceptance of Speakometer were complete, consistent, and credible.

FINDINGS AND DISCUSSION**Pronunciation Mastery of the Eleventh Grade Students (Research Question 1)**

Observed pronunciation performance. The pronunciation checklist analysis of the 10 target words across the 10 students produced 100 word-level scores in total: 50 were Correct, 27 Moderate, and 23 Incorrect that is, half of all attempts were accurate, just over a quarter were partially accurate, and just under a quarter were inaccurate. This distribution indicates moderate-to-good overall mastery rather than uniformly strong or weak performance. Most students accurately pronounced words with direct sound-symbol correspondence, such as Music /'mju:zɪk/, Lawyer /'lɔ:jə/, Emphasize /'emfəsaɪz/, and Paragraph /'pærəgrɑ:f/. In contrast, two words accounted for a disproportionate share of the errors: Daughter and Allege each appeared among the most frequently mispronounced words for 8 of the 10 students (80%), far more often than any other word on the checklist (the next most frequent, Approval, appeared for only 2 students).

These two words were also difficult for distinct phonetic reasons. Daughter /'dɔ:tə/ was almost universally mispronounced as ['dɒktər] or ['dɔ:gtər] because students applied a

grapheme-to-phoneme rule literally, treating the silent digraph "gh" within "augh" as an audible consonant instead of recognizing it as part of the vowel spelling /ɔ:/. *Allege* /ə'ledʒ/, meanwhile, was frequently produced with a final /k/ or /t/ in place of the affricate /dʒ/; because Indonesian phonotactics rarely places an affricate in absolute word-final position, learners appeared to substitute it with a more familiar final consonant. Table 1 summarizes the checklist results.

Table 1. Summary of the Pronunciation Checklist Analysis (10 Students × 10 Words)

Student	Correct	Moderate	Incorrect	Words most often incorrect
S1	5	3	2	Daughter, Allege
S2	4	4	2	Calculate, Allege
S3	6	2	2	Daughter, Paragraph
S4	5	2	3	Daughter, Lawyer, Allege
S5	5	4	1	Allege
S6	5	2	3	Daughter, Allege, Approval
S7	5	3	2	Daughter, Allege
S8	7	2	1	Daughter
S9	3	3	4	Opposition, Daughter, Allege, Approval
S10	5	2	3	Daughter, Allege, Anxiety
Total	50	27	23	

Students' reported perceptions of their own difficulty. Beyond the observed scores, students themselves acknowledged similar difficulties in interviews:

Student 5: "I find it difficult to pronounce certain complex words, such as 'lawyer'."

Student 7: "It helps practice English words and correct incorrectly pronounced words."

These observed patterns are consistent with [Mutia \(2025\)](#), who noted that irregular English spelling and unfamiliar phonetic boundaries pose a persistent challenge for EFL learners, and appear broadly aligned with [Noviyenty & Putri \(2021\)](#) and [Pakpahan \(2023\)](#), who found that L1 (Indonesian) phonological habits lead learners to substitute unfamiliar sounds or read English orthographically rather than phonetically. This study did not, however, conduct a systematic contrastive analysis of students' first-language phonological system, so the role of L1 interference is presented here as a plausible interpretation consistent with the error patterns observed, rather than as a confirmed causal finding. Despite these errors, Speakometer's native audio models and instant, color-coded feedback served as an important corrective benchmark, helping students notice and gradually adjust mispronunciations that might otherwise go unnoticed during unsupervised self-study.

The Role of Speakometer in Supporting Pronunciation Mastery (Research Question 2)

Analysis of the interviews and observations identified three main ways Speakometer supported students' pronunciation development.

Technical Support for Pronunciation Accuracy.

Speakometer's AI-based scoring functioned as an accessible, always-available automated tutor, compensating for teachers' limited capacity to give individual phonetic feedback in large classes. Observation data indicated that when a word was scored red (incorrect), students typically used the application's model-audio and re-recording functions to replay the correct pronunciation and attempt the word again, continuing this cycle until a green (correct) score was obtained a self-correction loop made possible by Speakometer's built-in repeated-listening and re-recording features.

Student 9: "The AI support and color-coded feedback (green for correct, red for incorrect) provides immediate evaluation that self-practice cannot offer."

This finding is in line with [Bashori et al. \(2024a\)](#), who found that granular, ASR-based phonetic feedback produces greater gains in segmental accuracy than unguided classroom practice, and extends their website-based, sentence-level findings to a mobile, word-level checklist context among a younger, senior-high-school population. It is also consistent with

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Mauralia & Musdizal (2025), who reported that AI-driven feedback in ELSA Speak similarly enabled university learners to self-correct outside class; unlike those adult learners, who valued detailed phonetic explanations, the eleventh-grade participants in this study appeared to respond primarily to the simplicity and immediacy of the color-coded score itself.

Affective Support and Speaking Confidence.

By allowing students to practice privately, Speakometer reduced the anxiety commonly associated with speaking in front of peers or teachers.

Student 6: "Yes, it increases confidence because there is clear pronunciation guidance and the opportunity to practice repeatedly without fear of making mistakes in front of others."

This supports Abdelhalim & Alsehibany (2025) and Pacheco (2025), who found that mobile AI applications create an emotionally secure environment that increases learners' psychological readiness to speak.

Motivational Support For Autonomous Practice.

Gamified elements such as scores and streak tracking encouraged students to keep practicing rather than abandoning difficult words.

Student 1: "After we complete the English exercises, it shows our score. If our score hasn't met expectations... it makes me want to keep trying in the application."

This is consistent with Palomo Martín & Romero Gallego (2025) and Metruk (2024), who observed that gamified mobile pronunciation tools turn repetitive drills into engaging challenges that foster learner autonomy, and it extends this literature by showing that the mechanism operates similarly for word-level pronunciation practice among senior-high-school students, not only for general speaking practice.

Students' Perceptions of Speakometer through TAM (Research Question 3)

Across the four TAM constructs, students expressed positive perceptions of Speakometer, supported by specific evidence for each construct.

Perceived Ease of Use (PEOU).

All ten participants adapted quickly to the interface, navigating audio playback, voice recording, and visual feedback without technical difficulty.

Student 2: "It is very easy because the interface is simple and not confusing. Even when using it for the first time, I could immediately understand how to use it."

The only obstacles reported were external internet dependency and background noise affecting microphone sensitivity echoing similar operational challenges reported for ELSA Speak by Fazri et al. (2026).

Perceived Usefulness (PU).

Students agreed that Speakometer improved their fluency, vocabulary retention, and pronunciation accuracy by turning abstract phonological rules into clear, immediate visual scores.

Student 1: "If we regularly practice speaking English in the application, it helps in memorizing and enhances our proficiency in the language."

Student 7: "The biggest benefit is knowing the correct pronunciation of words and being able to directly practice them."

Attitude Toward Using (ATU) and Behavioral Intention (BI).

Students' expressions of enjoyment and confidence in the interviews above describing the application as easy, clear, and beneficial reflect a favorable Attitude Toward Using (ATU) Speakometer. This positive attitude, combined with high PU and PEOU, translated into firm Behavioral Intention (BI) to continue using the app and to recommend it to peers.

Student 8: "Yes, absolutely. I would encourage classmates who want to learn English to download Speakometer."

Student 4: "Yes, I intend to keep using it to support future English learning and improve spoken communication."

These findings validate Davis and Granic's (2024) TAM framework in a senior-high-school setting: strong PEOU and PU jointly produced positive ATU and BI, in line with Metruk (2024), who noted that effective MALL integration extends language practice beyond the constraints of formal class schedules. During data collection, the researcher also encountered field challenges, namely ambient noise around the school that occasionally affected recording accuracy, and a scheduling conflict that required rearranging one student's interview session; both were resolved without compromising data reliability.

CONCLUSIONS

This study examined students' pronunciation mastery, perceptions of Speakometer, and its supportive role in pronunciation practice. Across ten target words, students achieved 50% correct, 27% moderate, and 23% incorrect pronunciation, with difficulties involving silent letters and word-final affricates. Speakometer's immediate feedback, audio models, private practice environment, and gamified features were perceived to support error awareness, confidence, and motivation. Through the Technology Acceptance Model (TAM), students reported positive perceived ease of use, perceived usefulness, attitudes, and behavioral intentions. However, the findings are limited by the purposive sample of ten students from one school and the absence of pretest-posttest measurements, preventing causal conclusions about improvement. Teachers may integrate Speakometer into independent homework while explicitly addressing persistent phonological difficulties. Students should prioritize pronunciation accuracy over application scores, while schools may support digital learning beyond classroom hours. Future research should involve larger, multisite samples, longer interventions, pretest-posttest designs, and comparisons with other pronunciation applications to establish more generalizable evidence of effectiveness.

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