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ANALYZING STUDENTS' ENGLISH-SPEAKING SKILLS USING SPEECHACE: INSIGHTS FROM AN AI-POWERED ASSESSMENT TOOL

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ABSTRACT

AI technology has increasingly integrated into language learning and assessment, offering efficient and engaging environment. This study evaluated the effectiveness of Speechace, an AI powered language assessment tool, in improving speaking skills among first semester students through a mixed-method approach. The findings revealed an average overall performance score of 5.69 out of 9, with female students consistently outperforming males' students in pronunciation, fluency, vocabulary, grammar and overall speaking competence. The question-specific analysis showed that students performed better on personal topics, exhibiting higher fluency and fewer pauses. Speechace provided valuable feedback, particularly in evaluating fluency-including the report of word per minute and bad pauses-as well as pronunciation accuracy via color-coded feedback. These findings highlight the potential use of AI tools in language education and offer insight for educators on integrating technology into English language instruction, more specifically in speaking skills.

Keywords: *Speechace, AI Assessment Tool, English Speaking Skills, Pronunciation, Fluency*

INTRODUCTION

In Indonesian higher education, especially for university students as non-native English-speaking speakers, English-speaking skills are crucial for academic success, and professional development. English-medium instruction (EMI) currently is increasingly adopted to enhance students' English proficiency, yet this still presents challenges such as student anxiety and reliance on the first language such as the Indonesian language which then prevents speaking skill development (Puspitasari & Dewi, 2023; Rifiyanti & Dewi, 2023).

Furthermore, for students at UIN Sayyid Ali Rahmatullah Tulungagung, Indonesia, mastering English speaking skills is also essential for their academic learning. However, Latifatul Isro'iyah et al., (2024) found that among 32 first-semester English education students struggled with grammar, vocabulary, expressing ideas understanding and responding to questions, pronunciation, intonation, and maintaining conversation. This difficulty is often compounded by the traditional instructional method that may not adequately address students' needs and provide effective practice opportunities. Therefore,

they suggested providing students with speaking activities and materials related to pronunciation and intonation practice which then could be integrated into technology and other mediums of instruction.

To enhance language learning, with the advancement in technology, Artificial Intelligence (AI) powered language assessment tools have emerged as innovative solutions. At UIN Sayyid Ali Rahmatullah Tulungagung, the integration of AI in English classes has shown positive results. For example, a study by Ningsih, (2023) found that using Classtime.com as an AI online grammar assessment of 246 students was effectively used for midterm tests. Similarly, (Iftanti et al., 2023) interviewed students who used AI tools like Grammarly and Bing Chat to aid their English writing.

Dealing with improving English speaking skills, one AI tool namely Speechace offers a comprehensive approach to assessing and improving speaking skills through automated feedback on pronunciation, fluency, vocabulary, and grammar. The implementation of Speechace as an AI-based tool represents a potential opportunity to enhance the speaking skills of English as a second language (ESL) students (Zainuddin & Mohamad, 2024).

However, due to the availability of AI-powered tools to assess language skills, some research focus on improving speaking skills within the context of Indonesian EFL students is still limited. More specifically, at UIN Sayyid Ali Rahmatullah Tulungagung, understanding this tool addresses common speaking issues among students also is important. Therefore, there are research questions as follows.

1. How do overall students perform in different aspects of speaking skills (pronunciation, fluency, vocabulary, grammar) assessed by Speechace?
2. How do students' fluency, pauses, and pronunciation vary across different questions?
3. How does Speechace's feedback help in identifying fluency and correcting pronunciation errors among students?

The significance of this study focuses on the potential contribution of valuable insight into the use of AI-powered tools in language education, specifically in English language speaking skills. By analyzing the use of Speechace to ESL students of UIN Sayyid Ali Rahmatullah Tulungagung, Indonesia, this research offers a deeper understanding of how Speechace as an AI assessment tool can enhance English speaking skills in a specific educational context. This understanding would provide valuable help for educators and policymakers dealing with technology integration into language instruction effectively. Lastly, as the use of AI in education more superficially in English language teaching will continue to grow, this study also contributes to another field on the role of technology in supporting language acquisition and the potential benefits of personalized and data-driven learning solutions.

AI in Language Education and Assessment

Lately, AI technology has increasingly integrated into language learning and assessments by offering an efficient and engaging learning environment (Cohen et al., 2024). Moreover, AI tools, such as speech recognition and natural language processing, have proved effective in helping students enhance their foreign language outcomes.

In dealing with language assessment, AI-powered tools, such as intelligent tutoring systems and automated writing evaluation, provide real-time and immediate feedback which then boosts students' confidence to practice their speaking (Amin, 2023; Umar, 2024).

Additionally, Amin, (2023) added that AI also improves the efficiency and consistency of assessments by automating grading and feedback, which enhances test security.

However, the use of AI in language education become a concern, particularly in ethical considerations such as data privacy, algorithmic bias, and equity issues (Amin, 2023; Umar, 2024). Moreover, the readability and validity of AI-generated test items can also limit the effectiveness of AI tools (Kic-Drgas & Kılıçkaya, 2024). Therefore, the role of teachers in AI-based assessment must be redefined to balance the benefits and challenges of AI necessity of the collaborative effort with policymakers, researchers, and technology developers to ensure the effective integration of AI in language learning, especially in English classes (Umar, 2024).

Speechace

Speechace, accessed at https://www.speechace.com, is a sound recognition system designed to assess L2 pronunciation and fluency for English learners, aiming to function without instructor intervention (Alnafisah, 2022). Its design principles include perception and production practice, individualized immediate feedback, and a focus on accuracy. This Speechace website offers free and full access with costs.

Dealing with the attitude toward the use of Speechace as an AI tool for English language learning, there have been studies. Firstly, Zainuddin & Mohamad (2024) studied the use of Speechace for students and teachers, guided by the Technology Acceptance Model (TAM), and, found that both view Speechace positively with students rating it as useful (M=3.51) and easy to use (M=3.39). Furthermore, focusing on pronunciation, Mutiara et al. 2024) conducted a pronunciation test using Speechace and interviewed 30 students. The results showed that there were improvements in students' pronunciation as they were helped by the feedback report given after taking the speaking test.

To further a deep understanding dealing with the effectiveness of the use of Speechace, Moxon (2021) examined whether Speechace could improve pronunciation among 105 Thai undergraduate English learners. Similar to Mutiara et al's (2024) study, Moxon found that there is a significant improvement in pronunciation accuracy for students using Speechace platform compared to a control group. The study also found a limitation in terms of a predominantly female sample and restricted use. Thus, it is suggested to explore gender differences and various feedback methods.

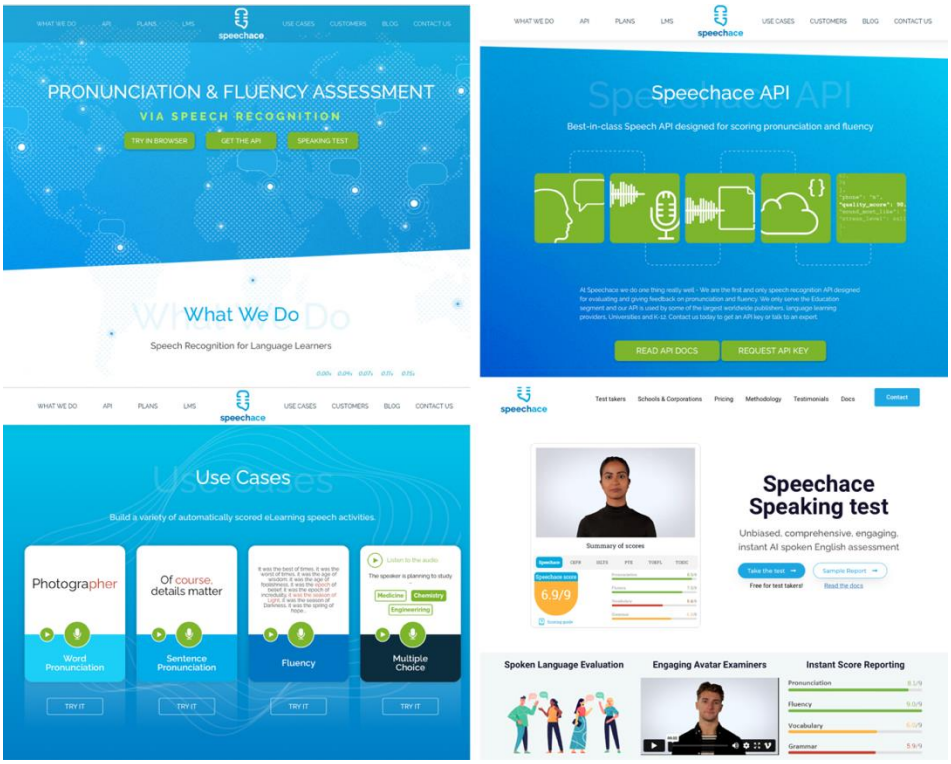
Despite existing research showing positive outcomes and improvement with Speechace, there remains a gap in exploring how different gender groups and varying feedback methods, specifically influence the effectiveness of the tool based on its speaking report in terms of pronunciation, fluency, vocabulary, grammar, and overall performance.

METHOD

This study employed a mixed-method approach to evaluate English speaking performance using Speechace, accessible at https://www.speechace.com, focusing on a 'Travel' theme. Initially, the students took a speaking test with Speechace, and their reports including general overviews and scores were analyzed. Then descriptive statistics were used to calculate mean scores for pronunciation, fluency, vocabulary, grammar, and overall performance both overall and by gender. Furthermore, comparative analyses were also then conducted to compare the performance of male and female students across different question

types. Lastly, the data collected from the Speechace report were entered into a spreadsheet to examine performance variations.

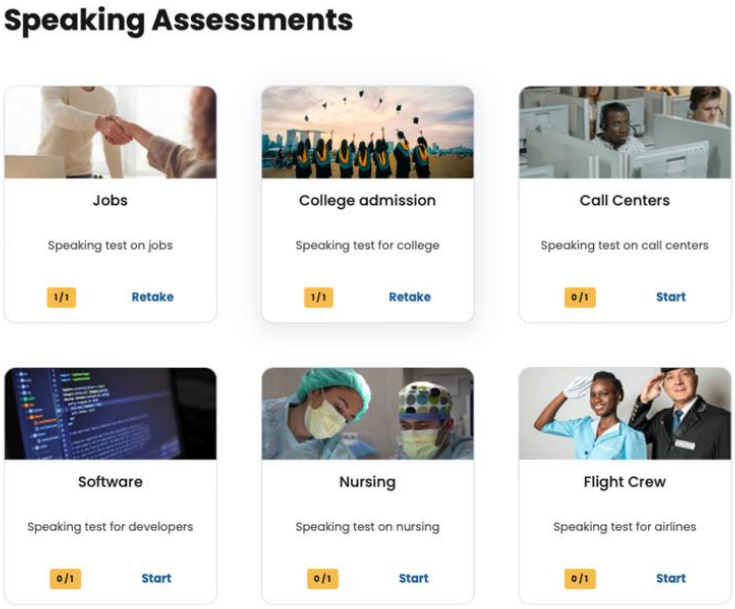
This study involved 20 first-semester university students enrolled in an English course at UIN Sayyid Ali Rahmatullah Tulungagung, Indonesia. The sample included 12 female students and 8 male students. Participants, selected based on their enrolment in the course and their willingness, used the Speechace application to assess and improve their English-speaking skills.



Picture 1. Home Page of Speechace's Website

Students or test takers were offered varied speaking assessment topics, as can be seen in Picture 2, such as Jobs, College Admission, Call Centres, Software, etc. For this study, the researcher chose 'Travel' as the speaking topic. To elicit spoken responses from the students, three specific assessment prompts provided by Speechache were used: (1) "If you had the chance to travel anywhere, where would you go and why?" (2) "What are the advantages of traveling alone versus traveling in a group?" and (3) "Do you think that traveling is bad for the environment? Why or why not?" These questions were chosen to encourage students to speak at length and use varied vocabulary and grammatical structures.

Afterward, students recorded their responses with the Speechace website which then generated reports on pronunciation, fluency, grammar, and overall scores. Fluency was assessed by word per minute and the number of long pauses, while pronunciation accuracy was indicated with color-coded feedback (green for correct, red for incorrect). Finally, the collected data was analyzed to evaluate performance differences.



Picture 2. Speaking Assessment Topics

RESULT AND DISCUSSION

Finding

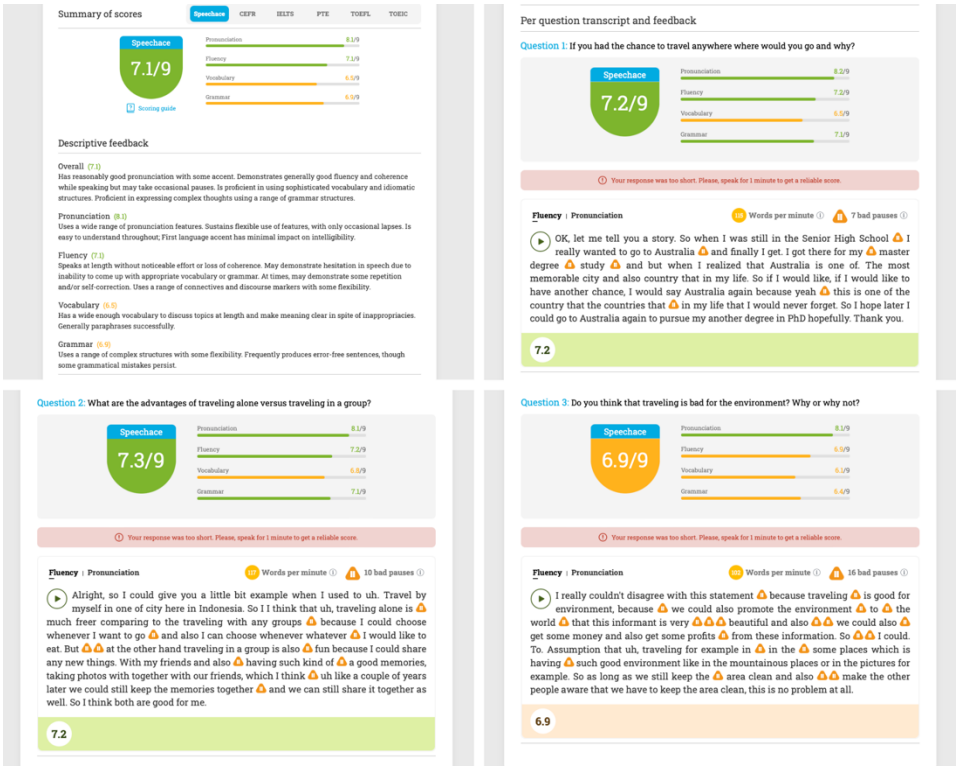
Overall Performance Summary

The overall performance of the 20 students was evaluated based on five key aspects of speaking skills: pronunciation, fluency, vocabulary, grammar, and overall performance. Below is a summary of each student's performance, along with an example of a student's speaking report provided by Speechace.

Table 1. Summary scores for pronunciation, fluency, vocabulary, grammar, and overall performance.

Student No.	Student Initial	Gender	Pronunciation	Fluency	Vocabulary	Grammar	Overall
1	AH	M	6.7	6.0	4.8	4.7	4.0
2	MFAB	M	7.2	5.7	5.3	5.1	4.6
3	PTR	F	7.9	6.4	6.1	5.9	6.6
4	FDS	M	8.1	7.8	5.8	5.4	6.8
5	DADS	M	7.9	6.3	4.0	5.1	4.0
6	MAR	F	7.4	6.3	5.6	5.5	6.2
7	OPS	M	7.7	6.2	5.7	5.4	5.5
8	SDZS	F	8.3	7.0	4.9	5.1	5.4
9	AMNZ	F	7.9	6.6	6.2	5.9	6.7
10	EFA	F	8.2	7.1	6.8	6.6	7.2
11	DBP	M	8.2	7.7	4.8	5.0	5.1
12	FNI	M	7.1	5.3	5.1	5.5	5.1

13	RDP	F	7.7	6.5	6.4	5.6	6.6
14	AP	F	7.8	6.6	5.9	5.8	6.5
15	AZ	F	7.6	6.3	5.3	5.5	5.6
16	AP	F	7.6	6.4	6.3	5.9	6.6
17	DK	F	7.7	7.4	6.5	5.8	6.8
18	BZM	F	6.9	5.7	5.7	5.4	4.7
19	DE	F	7.4	5.5	5.3	5.3	5.9
20	MAA	M	6.9	5.3	5.1	4.9	4.0
Average (N=20)			7.61	6.40	5.58	5.47	5.69



Picture 3. Example of Speechace Report

It can be seen from Table 1, that the average pronunciation score for all students was 7.61. Female students generally performed better than male students, with female students achieving higher individual scores (such as EFA with 8.2 and SDZS with 8.3) compared to male students (e.g., MAA with 6.9 and MFAB with 7.2). The highest pronunciation scores were 8.3 by SDZS (F) and 8.2 by both DBP (M) and EFA (F), indicating strong pronunciation skills.

Furthermore, the average fluency score was 6.40. Similar to pronunciation, female students scored higher in fluency, with notable performances from EFA (7.1) and DK (7.4). In contrast, male students like FNI and MAA had lower fluency scores of 5.3. FDS (M) achieved the highest fluency score of 7.8, showcasing his proficiency in this area. Then the average vocabulary score was 5.58. Female students again showed stronger performance,

with EFA scoring 6.8 and RDP scoring 6.4. Male students had more varied scores, with DBP at 4.8 and FDS at 5.8. EFA's score of 6.8 highlights her exceptional vocabulary usage.

In the last skill, the average grammar score was 5.47. Grammar scores were relatively consistent between genders, but female students like EFA (6.6) and PTR (5.9) performed better overall. Male students such as AH (4.7) and MAA (4.9) had lower scores, indicating a need for more focus on grammatical accuracy. Lastly, the overall performance average was 5.69. Female students tended to have higher overall scores, with EFA leading at 7.2 and AMNZ at 6.7. Male students like FDS scored 6.8, but others such as MAA and AH were lower, both at 4.0. The highest overall performance score was by EFA (F) with 7.2, showing a strong all-around capability in speaking English.

Gender Comparison

Table 2. Analysis of differences in performance between male and female students.

Gender		Pronunciation	Fluency	Vocabulary	Grammar	Overall
Male	Mean	7.5	6.3	5.1	5.1	4.9
	N	8	8	8	8	8
	St. Deviation	.573	.976	.570	.277	.969
Female	Mean	7.7	6.5	5.9	5.7	6.2
	N	12	12	12	12	12
	St. Deviation	.374	.537	.569	.387	.708

The analysis revealed that female students generally outperform male students in all aspects of speaking skills measured by Speechace AI. The higher scores in pronunciation, fluency, vocabulary, and overall performance among female students suggest they might be more adept at English speaking skills or perhaps more engaged in language learning activities. Male students, while showing potential in areas like fluency (e.g., FDS with 7.8), need improvement in vocabulary and grammar to enhance their overall speaking competence.

These findings suggest that targeted interventions could be beneficial, especially for male students, to improve their weaker areas. Additionally, the data demonstrates the effectiveness of using Speechace.com as an AI tool to provide detailed feedback and highlight specific areas needing improvement. This can guide educators in developing focused teaching strategies to address individual student needs.

Question-Specific Analysis

Table 3. Detailed analysis of performance on each question, highlighting common errors and correct responses.

Student	Question 1			Question 2			Question 3		
	Fluency		Pronun-ciation	Fluency		Pronun-ciation	Fluency		Pronun-ciation
	Word per minute	Bad pauses	Accuracy (%)	Word per minute	Bad pauses	Accuracy (%)	Word per minute	Bad pauses	Accuracy (%)
1	59	0	74	35	2	67	71	0	82
2	62	1	82	55	1	76	66	3	82

3	82	4	86	87	3	86	92	6	90
4	102	1	87	90	0	93	80	0	90
5	20	2	85	10	0	93	20	4	86
6	50	2	83	82	1	84	88	4	83
7	40	2	84	70	7	84	64	3	90
8	28	0	88	26	0	93	18	0	96
9	120	1	88	138	3	90	77	5	65
10	120	2	93	121	2	92	96	3	89
11	16	1	85	18	1	92	29	0	97
12	47	7	82	37	10	77	29	17	77
13	102	1	8.5	94	4	85	98	0	86
14	115	1	86	105	1	88	81	1	85
15	105	1	86	76	1	85	90	2	83
16	79	6	84	103	3	86	94	2	84
17	146	1	89	116	0	84	96	0	84
18	63	4	74	54	0	74	73	1	81
19	52	7	82	48	9	80	69	6	86
20	46	5	81	80	1	79	55	2	71
Average (N=20)	72.7	2.45	80.38	72.25	2.45	84.40	69.30	2.95	84.35

Question 1: If you had the chance to travel anywhere, where would you go and why?

In Question 1, which asked students about their travel preferences, the average fluency was 72.77 words per minute (WPM), with an average of 2.45 bad pauses per response, and a pronunciation accuracy of 80.38%. For example, Student 17 demonstrated good performance with 146 WMP and only 1 bad pause, while Student 10 also performed well with 120 WMP and 2 bad pauses. Meanwhile, Student 11 struggled with fluency of 16 WPM but maintained a pronunciation accuracy of 85, similar to Student 5 who had 20 WPM and 2 bad pauses. The se findings suggest that students were more comfortable discussing personal travel preferences, leading to higher fluency and fewer pauses.

Question 2: What are the advantages of traveling alone versus traveling in a group?

For Question 2, which required students to compare traveling alone versus group, the average fluency slightly decreased to 72.25 WPM, with the same average of 2.45 bad pauses. However, pronunciation accuracy improved to 84.40%. For example, Student 9 showed the highest fluency at 138 WPM, despite 3 pauses, while Student 17 maintained a good performance with 116 WPM and no bad pauses. On the other hand, Student 5 had the lowest fluency at 10 WPM but achieved a high pronunciation accuracy of 93%, similar to Student 11 with 18 WPM and 92% accuracy. This suggests that while fluency decreased, students focused more on clear articulation when making comparisons.

Question 3: Do you think that traveling is bad for the environment? Why or why not?

Then Question 3, which asked whether traveling is bad for the environment, the average fluency decreased to 69,20 WPM, with an average of 2.95 bad pauses. In this case, pronunciation accuracy remained high at 84.35%. For more detail, Student 10 showed high

fluency with 96WPM and 3 bad pauses, while Student 3 showed similar performance with 92WPM and 6 bad pauses. Student 5 and Student 11 maintained low fluency but high pronunciation accuracy at 86% and 977% respectively. This finding indicates that while students experience more hesitations when formulating options, they remain attentive to pronunciation accuracy. Lastly, from those 3 analyses, these findings highlight the need for additional practice in fluently expressing complex ideas while maintaining high pronunciation accuracy.

Question Comparison

Table 4. Detailed analysis of students' fluency and pronunciation based on the questions

Question	Average Fluency (WPM)	Average Bad Pauses	Average Pronunciation Accuracy (%)
Question 1 (Personal Choice)	72.7	2.45	80.38
Question 2 (Comparative)	72.25	2.45	84.40
Question 3 (Opinion)	69.30	2.95	84.35

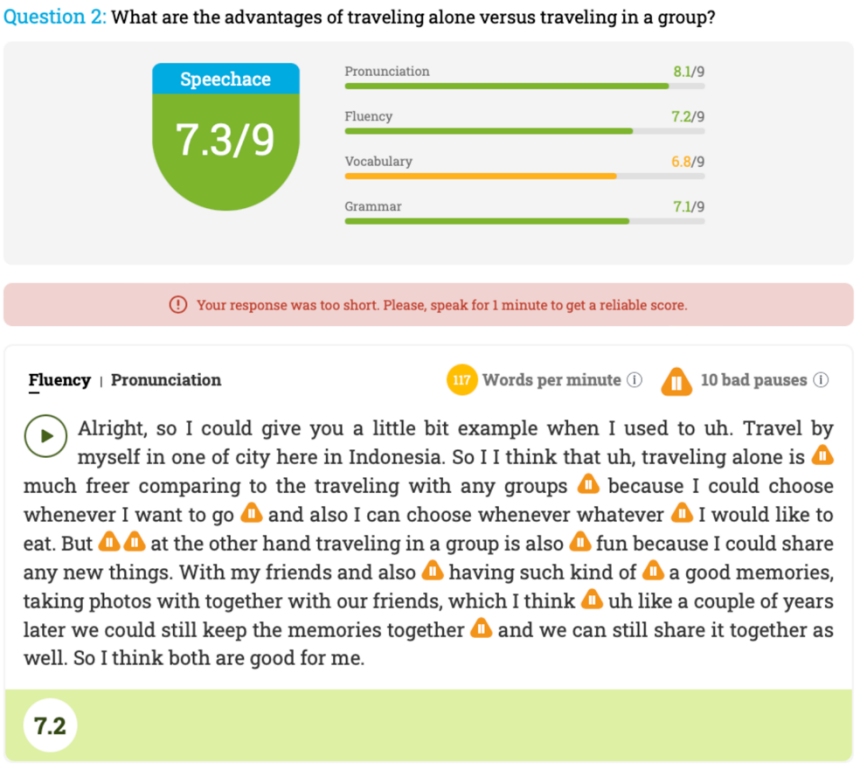
Based on Table 4, the data reveals that students at UIN Sayyid Ali Rahmatullah demonstrate reasonable proficiency in English speaking skills, with better performance in pronunciation accuracy than fluency. Female students generally outperform male students in all aspects of speaking skills. When tasked with different types of questions, students showed varying strengths and weaknesses, highlighting areas for targeted improvement, such as increasing fluency and reducing bad pauses in more complex speaking tasks. The use of AI tools like Speechace.com provides valuable insights into these specific aspects, allowing for more focused and effective language instruction.

Fluency and Pronunciation Analysis

To analyze how Speechace's feedback helps in identifying fluency and correcting pronunciation errors among students, the descriptive analysis will be divided into two sections; Fluency and Pronunciation, as follows.

In the Picture 4 report example, the fluency feedback given by Speechace report is ***"Your response was too short. Please, speak for 1 minute to get a reliable score."*** In the assessment, fluency is scored on a scale, and one student's response was noted with a fluency score of 7.2. The feedback indicated that the response was too short, requiring the student to speak for a full minute to receive a more reliable score. This feedback emphasizes the importance of providing a comprehensive response to meet the criteria for fluency assessment.

Despite the feedback suggesting a short response, the student answered the question with an impressive 117 WPM. This suggests that while the number of words per minute was high, the duration of the response was still insufficient for a complete assessment. Ideally, maintaining a steady rate while ensuring the response for full a minute would balance both quantity and duration effectively.

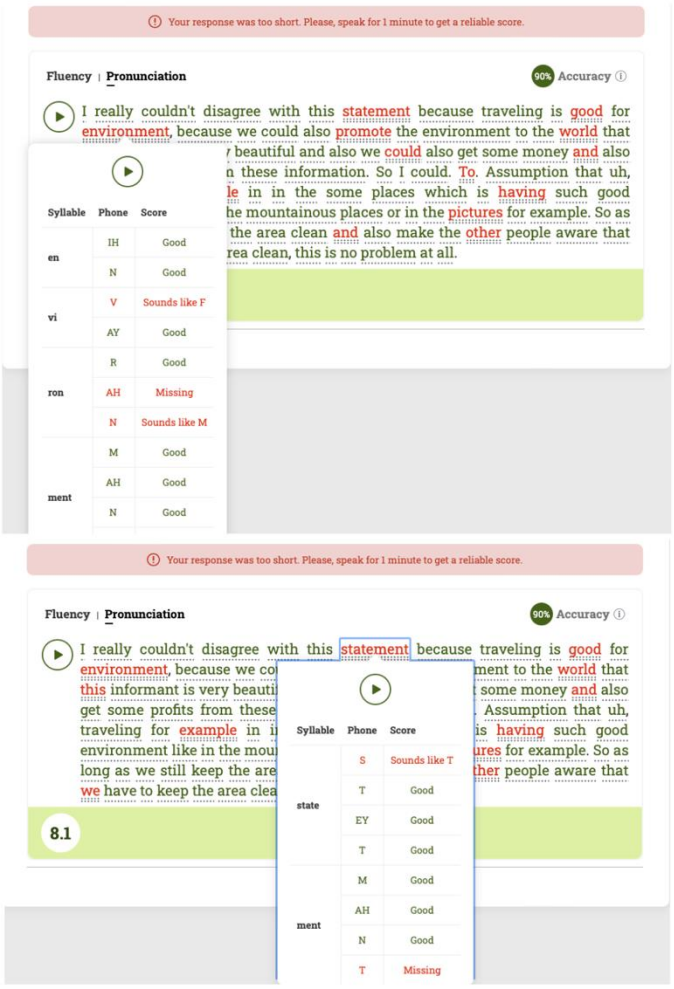


Picture 4. Fluency Feedback from the Speechace Report

Additionally, there is fluency feedback stating ***"Your speaking rate is low. You should aim to speak at 120 words per minute or above while maintaining clear and intelligible pronunciation."***Based on the target speaking rate recommended by Speechace.com is 120 words per minute or higher. In this example, the student was close to the target with 117 words per minute but was still advised to increase the speaking rate slightly. This indicates that while the student's rate was close to the optimal range, there's room for improvement to reach the recommended standard.

The report highlighted that the test taker made 10 bad pauses. Feedback suggested, ***"Do not take pauses whenever you see the pause triangle (with orange sign). Two or more (pause sign) means that you are taking longer pauses."*** This specific feedback points out that frequent and some pauses can disrupt the flow of speech, making it less fluent. Reducing the number of bad pauses is crucial for improving overall fluency and maintaining a smooth and continuous speech pattern.

From the example provided, it can be interpreted that the student has the potential to speak at an adequate rate but needs to work on the duration and flow of the speech. Ensuring that responses last at least one minute and reducing the number of bad pauses would enhance the student fluency score. Therefore, practicing longer can help in achieving better speaking performance. To improve fluency based on the feedback, the green play button can be used to replay the recording. By listening to the recorded response, the student can identify moments where pauses occurred and assess the overall fluency. This practice allows for self-evaluation and adjustment in future responses, aiming to minimize pauses and increase the words per minute while maintaining clear pronunciation.



Picture 5. Pronunciation Feedback from the Speechace Report

In the Picture 5 report example, the pronunciation feedback said ***"Great job! Your pronunciation is excellent and native-like."*** In the pronunciation assessment, the student achieved a high score of 8.1 with an accuracy of 90%. The feedback was very positive, showing the student's pronunciation as excellent and comparable to a native speaker. This indicates that the student has a strong command of English pronunciation.

Despite the high score, the report highlighted areas where the student made mistakes. The Speechace.com system marks mispronounced words in red, while correctly pronounced words are marked in green. This color coding provides a clear visual representation of pronunciation accuracy. For instance, the test taker mispronounced the word "environment." By clicking on this word in the report, detailed feedback appears, breaking down the mispronunciation into specific syllables and phonemes. In this case, the student made mistakes as follows.

- The "V" sound was pronounced like "F".
- The "AH" sound was missing.
- The "N" sound was pronounced like "M".

The feedback also indicates if the remaining syllables were pronounced correctly by marking them as "Good." This analysis helps the student understand exactly which parts of the word need improvement.

To further improve pronunciation, the green play button allows the student to replay the recording. Listening to both the correct and incorrect pronunciations helps the student recognize their mistakes and understand the correct pronunciation. This practice is crucial for reinforcing correct pronunciation and minimizing future errors. Thus, the pronunciation report is highly effective in helping students understand their pronunciation mistakes and corrections through color-coded feedback. Seeing the colors allows students to quickly identify which words and sounds need improvement, making the learning process more intuitive and efficient.

Discussion

The data from this study show an overall performance average of 5.69 out of 9 points as general competence in English speaking skills, with female students consistently achieving higher scores compared to males. These findings are consistent with previous studies that females generally outperform males in language-related tasks. For example, Aprianto et al., (2024) indicated that female students often perform better in language proficiency due to higher engagement and stronger correlations between motivation, self-efficacy, and language proficiency compared to male students. This is further supported by (Mahgoub Kamel Mohammad & Nik Aloesnita Alwi, (2023) who observed writing performance among 180 students (80 males and 80 females), with the result showed females often performed better in term accuracy, fluency, and complexity.

However, it is important to note that male students can also show strong language skills. These findings suggest that females may generally perform better, but individual differences and educational strategies play crucial roles in shaping language proficiency outcomes for both genders (Aprianto et al., 2024). Thus, implementing gender equality teaching strategies and considering the individual need for balanced improvement across all students.

Focus on the second data finding, the question-specific analysis showed that students do better on personal topics, with higher fluency and fewer pauses, which supports Latifatul Isro'iyah et al. (2024)'s finding on the positive impact of familiarity on fluency. They suggested choosing familiar topics that are associated with students' daily lives with various speaking methods, more specifically which focus more on pronunciation and intonation.

Furthermore, the analysis of student's English speaking performances based on Speechace.com feedback revealed significant insights into their fluency and pronunciation skills across various speaking skills. Overall, students demonstrated varying levels of proficiency, with generally higher pronunciation accuracy compared to fluency which is in line with the study conducted by Moxon (2021). These could be affected by several factors such as the influence of the mother tongue and a lack of understanding of foreign language pronunciation, and students struggle with both consonant and vowel sounds (Arjulayana & Márquez Martínez, 2022). Moreover, some psychological factors such as nervousness, lack of confidence, and fear of making mistakes also affect fluency and accuracy (Cendra & Sulindra, 2022).

The use of AI tools like Speechace is in line with the findings by Amin (2023) & Umar (2024) which highlighted the effectiveness of AI in providing detailed, actionable

feedback for language learners. In this case, educators are suggested to focus on enhancing fluency by incorporating exercises and practice sessions which then the detailed reports like specific pronunciation errors and bad pauses can improve students' speaking performances

Lastly, this study is not without limitations. Firstly, the sample size which only included 20 students may not fully represent the diverse range of ESL learners, more specifically at UIN Sayyid Ali Rahmatullah Tulungagung, Indonesia. Moreover, the study did not account for factors such as the frequency usage of the Speechace, individual learning strategies, and language proficiency which influence the results. The findings may limit the Speechace itself, including the algorithmic biases and accuracy of automated feedback. While AI tools such Speechace offer detailed and immediate feedback that may not capture the full context of language use or address language issues effectively (Alnafisah, 2022).

CONCLUSION

In conclusion, this study explored the effectiveness of Speechace, and AI language tools in improving English speaking skills among first-semester university students. The findings showed that female students generally outperformed male students on pronunciation, fluency, vocabulary, grammar, and overall performance, with better results on personal topics. While Speechace provided valuable feedback, especially in pronunciation and identifying bad pauses, limitations such as small sample size and potential algorithmic biases were noted. Recommendations include utilizing AI tools in pronunciation, using familiar topics, encouraging, self-evaluation, addressing biases in AI feedback, and studying future topics to larger, diverse samples, and varied learning strategies.

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