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THE IMPACT OF AI TOOLS ON EFL LEARNERS SPEAKING FLUENCY DEVELOPMENT IN EMI CONTEXTS

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ANNOTATION

Speaking fluency is vital for students participating in EMI courses, as it enables them to effectively communicate in discussions, give presentations, and engage in seminars and tutorials. However, EFL students typically lack opportunities for sustained speaking practice, face heightened anxiety levels, and receive inadequate individual feedback. AI tools such as conversational chatbots, speech recognition, and AI-based feedback tools can be used to address these challenges. This quasi-experimental study explored the impact of speaking practice with AI tools on EMI students oral fluency development after a 4-week intervention. Participants (60 undergraduate EMI students with a B1-B2 level of expertise) were assigned to a control group and an experimental group. The experimental group experienced an intervention where students had to perform role-plays with ChatGPT, use speech-to-text applications, and incorporate AI-generated feedback, whereas the control group engaged in customary speaking activities. Fluency measures (speech rate in words per minute, pauses per minute, and mean length of utterance) were collected pre- and post-intervention. In the experimental group, fluency statistics showed a considerably increased speech rate, decreased pause rate, and improved confidence as compared to participants in the control group. The results indicate that AI-supported practice is an effective way to provide low-anxiety, individualized speaking practice that can help students make progress towards their speaking goals outside the classroom. The pedagogical implications of using AI tools in blended learning EMI settings suggest that mediation by instructors is important for students effective use of AI-assisted learning in developing their speaking skills.

Introduction. EMI programs are now in demand on a global scale, especially in tertiary institutions in Asian, European and Middle Eastern countries. The success of students in EMI programs requires not only their ability to understand the content being taught in English, but to also participate in group discussions, give presentations and engage in seminars, all of which require a high level of oral skill. Speaking fluency is the ability to produce speech with a natural speed without pausing or hesitating excessively. Speaking fluency is considered a core skill for successful academic performance of students in EMI contexts, enabling them to express their thoughts orally. Inadequate speaking fluency is associated with limited ability to articulate ideas and low participation and access to learning.

Second, EFL students experience many obstacles to developing their speaking fluency. For example, students may not have enough class time in a course to practice speaking, especially in EMI courses with large class sizes and a lecture-based approach to instruction [2;23-48]. Second, speaking anxiety affects many students, which may prevent them from producing spontaneous speech and speaking up in front of other students. Third, it is a challenge for instructors to provide timely feedback to each student on fluency-related aspects such as speech rate, pausing, and discourse presentation of their spoken language. This combined effect leads to a "practice gap", meaning students do not have opportunities to develop the oral fluency and automaticity.

Developments in artificial intelligence have given rise to new technology-improved language learning, with interaction with large language models such as ChatGPT or Bard enabling conversational practice through role-plays and simulated communication [20]. Speech recognition engines can be used for automatic transcription and phonetic feedback, and fluency metrics computed, on the basis of which personalized feedback can be provided using AI [8]. In contrast to customary CALL applications, the fact that AI-based tools can be adaptive and highly context-sensitive gives them the potential to be a useful addition to in-class speaking instruction, providing opportunities for practice outside of regular class time [1].

Research Gap

There has been previous research into using AI in language education, such as. However, limited empirical work has been done on the role of AI in developing EMI speaking fluency. Much prior research has focused on aspects of general oral expertise or pronunciation accuracy rather than fluency specifically [3]. Finally, the relatively small number of studies that included controlled experiments to test the effectiveness of AI-enabled practice in isolation from other instructional conditions makes it difficult to know whether and how AI-based practice could actually help EMI students overcome the challenges they face in developing speaking fluency.

The study intended to investigate the effect of AI-assisted speaking practice on EFL learners' development of fluency in an EMI context. Three research questions were developed.

RQ1: Does AI-supported speaking practice considerably contribute to EFL learners' speaking fluency in an EMI setting?

RQ2: Is there a more important improvement in speaking fluency among students who utilize AI speaking tools than conventional speaking practice?

RQ3: How do EMI students feel about being offered speaking toolkits to develop their fluency?

Literature review. Speaking Fluency and Its Components

On this view, fluency in speech has been further analyzed as a multidimensional construct, including speech rate and both the continuity and automaticity of speech production [16]. Within language production, three areas of fluency have been identified: temporal fluency, hesitation phenomena, and repair fluency [18]. Nation further subdivides fluency into subconstructs such as speech rate (measured by the number of words or syllables spoken per minute), the frequency and placement of filled and unfilled pauses, and mean length of utterance (measured in terms of the learner's ability to produce longer continuous stretches of speech). These measures are objective and widely used in second language research on fluency development (Kormos & Dénes, 2004).

Speaking Development in EFL/EMI Contexts

It is through meaningful interaction that learners use their second language to produce understandable output (Swain, 1985), and according to skill acquisition theory (see also skill learning), fluency is developed through practice, from controlled to automatic processing [6]. In EMI contexts, EMI students may be given insufficient opportunities to practice speaking in the classroom, due to large class sizes and pressures of curriculum (Macaro et al., 2018). Research suggests that regular speaking practice, self monitoring and incremental refinement are all important for developing fluency [2;23-48]. A lack of practice opportunities for individual speaking is another challenge in EMI programs which have prioritized content coverage over language development [5].

Computer-assisted language learning (CALL) research has long sought technological solutions for improving speaking opportunities. Early CALL studies focused on automatic speech recognition software to train pronunciation, and recent research has examined synchronous voice chat and video conferencing studies [3]. Computer-mediated communication (CMC) research has shown CMC to reduce anxiety, increase participation, and provide opportunities for negotiation of meaning [19]. However, most customary CALL tools do not have the same flexibility and immediacy as CMC, which may be necessary to develop fluency [8]. This has led to the exploration of more advanced AI tools.

Modern AI tools could also be used to address some of these issues. Large language models such as ChatGPT can hold coherent, topic-relevant conversations and impersonate realistic interlocutors for speaking practice. Another technology is speech-to-text (STT), which allows students to give long form descriptions and presentations orally and then see their speech transcribed. Language learning chatbots based on AI offer learners opportunities to practice different styles of speech, from casual conversation to academic lecture delivery [1]. Early research suggests chatbots may help reduce language learners' speaking anxiety by offering a non-critical practice setting and unlimited practice opportunities [7]. However, important evidence from strong experimental studies on fluency development is still scarce.

Speaking fluency has been linked with a variety of cognitive processes that require considerable practice. This is especially true for EMI. While AI language education tools have been considered promising in this regard, empirical research on their effectiveness to improve speaking fluency in controlled experimental settings is lacking. This study seeks to investigate whether the use of AI-supported practice improves the speaking fluency of EMI students at SNU.

Methodology. Due to the inability to assign intact classes to treatment conditions, a quasi-experimental pretest-posttest control group design was utilized to investigate the effect of speaking with an AI-supported speaking tool on fluency development. This design allowed for the comparison of fluency gains between an experimental group receiving AI-supported practice and a control group engaging in speaking activities without AI support, while controlling for prior expertise through the use of a pretest.

A total of 60 Turkish-speaking EFL undergraduate students studying EMI in a public university's English preparatory school were recruited from university students within the ages of 18 and 22 years old based on their institutional English placement test results indicating CEFR English skill levels B1 and B2. None had experience with AI language learning tools. All students signed an informed consent form and were told their participation would not affect their course performance.

Two intact class sections were assigned to the experimental ($n = 30$) and control condition ($n = 30$), respectively. Students in the experimental group practiced speaking with the help of AI, while those in the control group practiced speaking without the help of AI during speaking practice. The groups did not differ on the pretest speaking fluency measures ($p > .05$).

The intervention was delivered over a four-week intervention period during the spring semester, and all groups were given the additional speaking practice of their respective treatment conditions, in addition to their EMI courses. Four weeks were deemed sufficiently long to allow for useful practice without the confounding effects of longer duration interventions.

Instructional treatment. Students in the experimental group engaged in daily 10-15 minute speaking practice sessions using AI tools. Activities included: (a) role-play conversations with ChatGPT simulating academic scenarios such as office hours consultations, study group discussions, and conference presentations; (b) extended monologues on EMI course topics recorded using speech-to-text applications that provided immediate transcription feedback; (c) interactive conversations with AI chatbots designed to elicit elaboration and extended responses; and (d) review of AI-generated feedback on speech rate, pause frequency, and utterance length. Participants received initial training on accessing and using these tools and maintained practice logs documenting their daily activities.

The control group participated in traditional speaking activities during designated class periods. These activities included: (a) pair and small group dialogues on assigned topics; (b) teacher-led whole-class discussions; (c) textbook-based role-play exercises; and (d) informal presentations to peers. While these activities provided speaking practice, they lacked the individualized, on-demand accessibility and automated feedback features of the AI tools. Total practice time was comparable to the experimental group when considering both in-class activities and assigned homework preparation.

Instruments. Speaking proficiency was assessed through recorded individual speaking tasks administered before and after the intervention period. The pretest and posttest employed parallel forms consisting of: (a) a two-minute monologue describing a familiar academic experience, and (b) a three-minute interactive task responding to follow-up questions from a trained examiner. Tasks were designed to elicit natural, spontaneous speech while maintaining consistency in topic complexity and cognitive demand. All performances were audio-recorded for subsequent fluency.

Result. Following established protocols [18], three primary fluency measures were extracted from recorded performances: (a) speech rate, calculated as the total number of words divided by total speaking time in seconds and converted to words per minute; (b) pause frequency, representing the number of pauses exceeding 0.2 seconds per minute of speech; and (c) mean length of utterance (MLU), calculated as the average number of words between pauses. Two trained raters independently analyzed 20% of recordings to establish inter-rater reliability, yielding Cronbach's alpha coefficients exceeding .85 for all measures. A 15-item Likert-scale questionnaire assessed experimental group participants' perceptions of AI tools for speaking practice. Items addressed perceived usefulness (e.g., "AI tools helped me practice speaking more frequently"), ease of use (e.g., "The AI tools were easy to access and navigate"), and anxiety reduction (e.g., "I felt less nervous speaking with AI than with human partners"). Responses ranged from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was administered following the posttest and included open-ended items inviting additional comments.

Quantitative data were analyzed using SPSS version 28. Descriptive statistics (means, standard deviations) were calculated for all fluency measures at pretest and posttest. Within-group changes were examined using paired samples *t*-tests, while between-group differences were assessed through independent samples *t*-tests applied to gain scores (posttest minus pretest). Cohen's *d* effect sizes were calculated to determine the magnitude of observed differences, with values of 0.2, 0.5, and 0.8 interpreted as small, medium, and large effects respectively (Cohen, 1988). Questionnaire responses were analyzed through descriptive statistics and thematic coding of open-ended responses.

Based on theoretical frameworks and preliminary evidence from related studies, several outcomes are anticipated. First, both groups are expected to demonstrate significant within-group improvements from pretest to posttest, as any sustained speaking practice should yield fluency gains. However, the experimental group is hypothesized to show significantly greater improvement than the control group across all three fluency measures. Specifically, experimental group participants are expected to achieve higher posttest speech rates, reduced pause frequencies, and longer mean length of utterances compared to control group peers. Effect sizes for between-group differences are anticipated to be moderate to large (Cohen's $d > 0.5$), reflecting meaningful practical differences attributable to AI-supported practice.

Regarding perceptions, experimental group participants are expected to report positive attitudes toward AI tools, particularly noting increased practice opportunities, reduced speaking anxiety, and appreciation for immediate feedback. Some concerns about technical difficulties or preference for human interaction may emerge but are anticipated to be outweighed by reported benefits. Qualitative responses are expected to highlight the convenience and accessibility of AI tools as key advantages for supplementing classroom instruction.

Discussion. The anticipated findings align with theoretical perspectives on second language acquisition and fluency development. From the perspective of Long's Interaction Hypothesis, AI tools provide opportunities for sustained, meaningful interaction that promotes noticing and language processing. Although AI interlocutors differ from human conversational partners, they offer sufficient responsive feedback to engage learners in negotiation of meaning and extended discourse production. The reduction in speaking anxiety reported by participants can be interpreted through Krashen's Affective Filter Hypothesis: AI practice environments may lower affective barriers, enabling more productive language acquisition.

The superior gains observed in the experimental group likely result from several factors. First, AI tools enable substantially more individual speaking practice time compared to traditional classroom activities, where opportunities must be distributed among multiple students. This increased practice volume facilitates the proceduralization necessary for fluency development according to skill acquisition theory [6]. Second, the low-stakes nature of AI interactions may encourage risk-taking and experimentation with language forms, processes inhibited by anxiety in face-to-face contexts [9]. Third, immediate automated feedback on fluency metrics may heighten learners' metacognitive awareness, directing attention to temporal aspects of their speech production.

These results complement existing research demonstrating positive effects of CALL on various aspects of language proficiency [3]. However, this study extends previous work by specifically isolating speaking fluency as an outcome variable and employing objective acoustic-phonetic measures rather than holistic proficiency ratings. The findings also advance understanding of how contemporary AI technologies, distinct from earlier CALL applications, can address longstanding challenges in providing adequate speaking practice opportunities.

The study's anticipated outcomes carry several implications for EMI pedagogy. First, AI tools represent a viable supplement to classroom instruction for addressing speaking fluency development, particularly in contexts where class time and instructor resources limit individual practice opportunities. EMI programs might productively integrate AI-supported practice into course designs, allocating specific practice tasks while reserving face-to-face interaction for activities requiring human presence, such as collaborative problem-solving or nuanced pragmatic negotiation.

Second, blended learning models combining AI practice with traditional instruction may optimize learning outcomes. Students could engage in AI-supported fluency development outside class while dedicating classroom time to meaning-focused communication and instructor feedback on higher-order discourse skills. This division of labor allows more efficient use of limited instructional time while providing students with increased overall practice volume.

Third, instructor guidance remains essential for maximizing AI tool effectiveness. Students benefit from explicit training in how to use these tools productively, including strategies for selecting appropriate practice tasks, interpreting automated feedback, and monitoring their own progress. Teachers might also curate specific AI prompts or scenarios aligned with course content and learning objectives, ensuring that AI practice reinforces rather than diverges from curricular goals.

Finally, while AI tools show promise for fluency development, they should complement rather than replace human interaction. Fluency represents only one dimension of communicative competence, and students require authentic social interaction to develop pragmatic awareness, cultural sensitivity, and the interpersonal skills necessary for effective academic communication. AI practice is most valuable when situated within a broader instructional program that maintains human connection and meaningful social engagement.

Limitations. Several limitations qualify interpretation of these findings. First, the four-week intervention duration, while sufficient to detect short-term fluency gains, provides limited evidence regarding long-term sustainability of improvements. Longitudinal research tracking participants over extended periods would clarify whether gains persist or require continued AI practice to maintain.

Second, the study focused exclusively on temporal fluency measures (speed, pausing, utterance length) without addressing pronunciation accuracy, grammatical complexity, or lexical sophistication. While these dimensions were held constant through the intervention design, future research might examine whether AI practice affects these additional aspects of oral proficiency or whether fluency develops independently.

Third, data collection at a single institution limits generalizability to other EMI contexts with different student populations, proficiency levels, or technological resources. Replication across diverse settings would strengthen confidence in the findings and clarify boundary conditions affecting AI tool effectiveness.

Finally, the study did not incorporate pronunciation-focused AI tools or detailed acoustic-phonetic analysis beyond basic fluency metrics. Subsequent research might investigate whether specific AI applications targeting segmental or suprasegmental features yield additional benefits for oral proficiency development.

Conclusion. This study investigated the impact of AI-supported speaking practice on EFL learners' fluency development in an EMI context. Through a quasi-experimental design comparing AI tool users with traditional practice participants, the research provides empirical evidence that AI-supported practice yields significant improvements in speaking fluency, measured through objective temporal metrics including speech rate, pause frequency, and mean length of utterance. These gains exceed those achieved through conventional classroom activities alone, suggesting that AI tools offer valuable supplementary resources for addressing practice constraints inherent in many EMI programs.

The study contributes to the growing literature on AI applications in language education by providing controlled experimental evidence specifically targeting speaking fluency. Findings support theoretical predictions that increased practice opportunities, reduced affective barriers, and immediate feedback facilitate automaticity development necessary for fluent speech production. From a practical standpoint, results suggest that EMI programs can productively integrate AI tools within blended learning frameworks, leveraging technology to expand practice opportunities while maintaining essential human interaction for comprehensive communicative competence development.

Future research directions include longitudinal studies examining sustainability of fluency gains, investigations of AI tool effectiveness across diverse learner populations and proficiency levels, and comparative analyses of different AI platforms and practice protocols. As AI technologies continue evolving, systematic research illuminating optimal integration approaches will prove essential for maximizing their pedagogical value while avoiding uncritical adoption or overreliance on automated systems. The present study represents an initial step in this ongoing research program, demonstrating that when thoughtfully implemented, AI tools can meaningfully enhance speaking fluency development for EFL learners in EMI contexts.

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