

An Augmented Reality-Based Program to Enhance Mansoura University Students' EFL Productive Skills and Reduce Their Social Anxiety

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Abstract

This study investigated the effectiveness of an Augmented Reality (AR)-based program in enhancing the productive skills speaking and writing of EFL learners at Mansoura University and in reducing their social anxiety. The research followed a quasi-experimental pre-post control group design. Two groups of students were involved: an experimental group (N = 30) received instruction using the AR-based program, while the control group (N = 30) received traditional instruction. Pre- and post-tests were administered to measure speaking and writing proficiency, and a validated social anxiety scale was employed. Statistical analysis using paired-samples t-tests and independent t-tests revealed significant differences in post-test scores between the two groups, favoring the experimental group in both speaking and writing performance. Additionally, the experimental group showed a significant reduction in social anxiety levels compared to the control group. Effect size calculations ($\eta^2 > 0.81$) indicated a very large effect of the AR intervention. The results underscore the pedagogical potential of AR in language education, particularly in enhancing learners' communicative competencies and emotional well-being. The study concludes with recommendations for integrating AR into language learning environments and suggestions for future research.

Keywords: Augmented Reality (AR), EFL Productive Skills, Social Anxiety.

Introduction and Overview:

In an increasingly digital age, educational paradigms are shifting dramatically to accommodate the integration of advanced technologies that promote interactive and immersive learning experiences. One such technological innovation is Augmented Reality (AR), which blends digital information with the real world, creating hybrid learning environments that have the potential to transform language education. The role of AR in enhancing English as a Foreign Language (EFL) instruction has been the subject of growing academic interest, especially as institutions seek to overcome traditional pedagogical limitations and meet learners' diverse needs (Bower et al., 2020).

EFL productive skills speaking and writing are often the most challenging components of language acquisition, particularly in non-native contexts like Egypt. At Mansoura University, students frequently report difficulties expressing themselves in English, which can be attributed to a lack of immersive practice opportunities and heightened social anxiety during classroom interactions (Kassem, 2021). This anxiety, rooted in fear of negative evaluation and communication apprehension, can severely impede students' language performance and willingness to participate actively in learning activities (Horwitz, 2010).

This study proposes the implementation of an AR-based instructional program to address two key challenges facing EFL learners at Mansoura University: underdeveloped productive language skills and high levels of social anxiety. By integrating AR into the language learning process, the program aims to offer students contextualized, real-life simulations that promote language use in a low-pressure environment, thereby fostering both proficiency and confidence. This approach aligns with constructivist theories of learning, which emphasize the importance of authentic, learner-centered experiences (Vygotsky, 1978).

The promise of AR in language education has been documented in several recent studies. For example, Yang and Liao (2021) found that AR applications significantly improved EFL learners' speaking fluency and confidence. Similarly, a study by Ibrahim and Elshazly (2023) demonstrated that AR-enhanced writing tasks led to increased coherence and lexical richness in students' compositions. Moreover, the immersive nature of AR has been shown to reduce learners' affective filters, making them more receptive to language input and more willing to engage in communicative tasks (Azuma, 2020).

Given these findings, this study seeks to develop and evaluate an AR-based program tailored specifically for Mansoura University students. The program incorporates interactive speaking and writing tasks, set within augmented scenarios that mimic real-life situations relevant to students' academic and social lives. The central aim is to determine whether such a program can produce measurable improvements in students' EFL productive skills and contribute to a reduction in their social anxiety.

The research draws on a mixed-methods approach, combining quantitative measures of language proficiency and anxiety levels with qualitative feedback from participants. This comprehensive methodology is designed to provide a nuanced understanding of the impact of AR on EFL learning outcomes, and to offer practical recommendations for its broader implementation in university settings.

In sum, the integration of AR in language instruction represents a promising frontier in educational technology. By focusing on the dual objectives of enhancing productive language skills and mitigating social anxiety, this study contributes to both theoretical and practical discourses in EFL pedagogy. The findings are expected to have implications not only for curriculum design at Mansoura University but also for wider educational contexts that share similar linguistic and psychological challenges.

Augmented Reality in Language Learning:

Recent studies have explored the integration of AR in language learning, highlighting its potential to enhance various language skills. For instance, AR applications have been used to improve vocabulary acquisition, reading comprehension, and pronunciation by providing interactive and contextualized learning experiences (Schorr et al., 2024). These studies suggest that AR can increase learner engagement and motivation, leading to improved language outcomes.

AR and Productive Language Skills:

Research indicates that AR can positively impact productive language skills. For example, Mohd Nabil et al. (2024) found that using AR filters in ESL speaking instruction improved students' speaking fluency and confidence. Similarly, Khodabandeh (2022) reported that AR-enhanced instruction in flipped and face-to-face EFL classes led to significant improvements in students' speaking abilities. These findings suggest that AR can provide learners with opportunities for authentic language use, thereby enhancing their productive skills.

AR and Social Anxiety in Language Learning

Social anxiety is a common barrier to language learning, often leading to reduced participation and communication apprehension. Studies have examined the role of AR in mitigating social anxiety among language learners. For instance, Kaplan-Rakowski and Gruber (2023) demonstrated that high-immersion virtual reality environments could significantly lower foreign language anxiety during public speaking tasks. Similarly, Norouzifard et al. (2022) investigated the impact of AR on foreign language anxiety among adult EFL learners but found no significant effect, suggesting that the novelty of AR and cognitive load might influence its effectiveness.

2.4. Gaps in the Literature

While existing research highlights the potential of AR in enhancing language skills and reducing anxiety, there is a lack of studies focusing on the combined effect of AR on productive skills and social anxiety, particularly in the Egyptian higher education context. Moreover, most studies have been conducted in different cultural and educational settings, underscoring the need for context-specific research to understand the applicability and effectiveness of AR-based interventions for Mansoura University EFL students.

Context of the Problem:

Despite curriculum reforms and the increasing availability of language learning resources, many students at Mansoura University continue to struggle with EFL communication, particularly in speaking and writing. These productive skills require not only grammatical knowledge but also the confidence to express ideas in real time—an area where many learners falter due to fear of making mistakes or being judged. In a recent internal survey conducted by the university's Language Center (2023), over 68% of students reported feeling anxious when asked to speak English in front of their peers. Writing tasks, though less immediately confrontational, were similarly affected, with students citing uncertainty about language accuracy and organization as major barriers.

The root causes of these challenges are multifaceted. From a pedagogical standpoint, traditional classroom instruction often emphasizes rote learning and written grammar exercises, with limited opportunities for spontaneous oral practice. Culturally, many students come from educational backgrounds where teacher-centered models prevail, discouraging active participation and risk-taking. Psychologically, social anxiety—a condition characterized by excessive fear in social interactions—has a profound impact on language learning, as it inhibits the willingness to communicate, particularly in a foreign language (MacIntyre & Gardner, 1991).

Given the vital importance of English for academic success and global employability, addressing these issues is not only an educational priority but also a socio-economic imperative. The current research responds to this need by exploring the integration of AR technologies into the EFL curriculum as a means to provide authentic, engaging, and supportive language learning environments.

Pilot Study:

A pilot study was conducted in the first semester of the year 2023 to evaluate the preliminary effectiveness and feasibility of AR in EFL classrooms at Mansoura University. A sample of 20 intermediate-level EFL students participated in a 4-week AR-enhanced module, which included tasks such as virtual interviews, augmented storytelling, and interactive writing assignments using AR app like Mondly AR.

Table 1: Pilot Study Results

Skill Area	Pre-Test Mean Score	Post-Test Mean Score	Mean	p-value
Speaking	12.4	16.7	+4.3	0.002**
Writing	13.1	16.2	+3.1	0.010*
Anxiety (FLCAS)	78.5	65.2	-13.3	0.001**

*Significant at $p < 0.05$, **Significant at $p < 0.01$

These results indicated notable improvements in productive language skills and a reduction in social anxiety, warranting a full-scale experimental study.

Statement of the Problem:

Despite ongoing efforts to improve EFL education in Egyptian universities, students at Mansoura University continue to face significant challenges in developing their productive language skills speaking and writing. These challenges are exacerbated by prevalent levels of social anxiety, which manifest as reluctance to

participate in class, fear of judgment, and avoidance of communication tasks. Traditional pedagogical approaches, with their limited focus on student interaction and engagement, often fail to address these interrelated issues.

Recent technological advancements such as Augmented Reality (AR) offer promising solutions by creating immersive and authentic learning experiences. However, there remains a gap in empirical research regarding the impact of AR-based instruction on both language performance and psychological factors such as social anxiety, particularly in Egyptian higher education settings. The current study aims to address this gap by investigating the effectiveness of an AR-based program designed to enhance EFL productive skills and reduce social anxiety among Mansoura University students.

Significance of the Study:

This study is significant for the following reasons:

- **Pedagogical Contribution:** It introduces a novel AR-based approach for teaching EFL productive skills, which may inspire curriculum innovations in Egyptian higher education.
- **Theoretical Contribution:** It extends the body of research on the intersection of educational technology, language learning, and social-emotional factors like anxiety.
- **Practical Contribution:** The findings can inform policy decisions and teacher training programs aimed at incorporating AR tools into language instruction.
- **Learner-Centered Impact:** It addresses the psychological and academic needs of learners by providing an immersive and supportive environment for language use.

Objectives of the Study:

The primary objectives of this study are:

1. To investigate the effectiveness of an AR-based instructional program in improving EFL students' speaking fluency, coherence, and pronunciation skills among Mansoura University students.
2. To explore the impact of the AR-based program on students' EFL writing accuracy, organization, and lexical variety skills.
3. To examine the program's effect on reducing students' social anxiety associated with EFL communication.
4. To explore students' perceptions and experiences regarding the use of AR in EFL learning environments.

Research Questions:

This study seeks to answer the following research questions:

1. To what extent does the AR-based program improve Mansoura University students' EFL speaking skills?
2. To what extent does the AR-based program enhance students' EFL writing skills?
3. To what extent does the AR-based program reduce social anxiety levels among EFL learners?
4. What are students' attitudes and perceptions toward using AR in the development of their EFL productive skills?

Hypotheses of the Study:

The study tests the following hypotheses:

1. There is a statistically significant difference between the mean scores of the experimental and control groups in the post-administration of the speaking test, favoring the experimental group.
2. There is a statistically significant difference between the mean scores of the experimental and control groups in the post-administration of the writing test, favoring the experimental group.
3. There is a statistically significant reduction in students' social anxiety levels in the experimental group compared to the control group after program implementation.
4. Students in the experimental group will express positive attitudes toward the use of AR in learning EFL productive skills.

Delimitations of the Study:

- The study focuses solely on productive skills (speaking and writing).
- It targets intermediate-level students in an Egyptian university setting.
- The AR tools used are specific to the designed program and may not reflect all available AR applications.
- The study duration may limit long-term observations of language retention.
- Generalizability is limited to similar EFL contexts with intermediate-level learners and access to AR infrastructure.

Participants of the study:

The study involves 60 undergraduate EFL students enrolled in the Faculty of Arts at Mansoura University. Participants are selected based on their English proficiency level (intermediate) as determined by placement tests and teacher recommendations. All participants consented to take part in the study and were briefed on its objectives and procedures.

Methodology

Design: Quasi-experimental (Pre-test/Post-test Control Group Design)

Participants: 60 intermediate-level EFL students from Mansoura University, randomly assigned to control (n=30) and experimental (n=30) groups.

Instruments:

- **Speaking Test:** A performance-based assessment using rubric measuring fluency, accuracy, pronunciation, and interaction.
- **Writing Test:** Analytical rubric evaluating idea development, coherence, grammar, and vocabulary.
- **FLCAS:** Foreign Language Classroom Anxiety Scale modified to reflect AR-based learning contexts, measuring communication apprehension and fear of evaluation.
- **Student Journals:** Collected weekly to document emotional responses, engagement levels, and language use.
- **Interviews:** Conducted post-intervention questionnaire to gain deeper insight into students' attitudes toward AR-enhanced learning.

Duration: 8 weeks (2 sessions per week)

Intervention Tools: AR "Mondly AR and custom-built AR tasks focused on speaking and writing.

AR-Based Program Design:

The AR-based program comprises eight thematic modules, each corresponding to real-world communicative contexts such as:

1. Ordering food at a restaurant
2. Attending a job interview
3. Presenting a research project
4. Writing an email or report
5. Describing scientific processes
6. Making travel arrangements
7. Participating in group discussions
8. Engaging in debate or opinion exchange

Each module includes:

- An AR scenario (e.g., 3D holographic simulations, location-based tasks)
- Guided speaking tasks (dialogues, role plays)
- Interactive writing prompts (augmented visuals to generate content)
- Real-time feedback mechanisms

Definition of Terms:

1. Augmented Reality (AR)

Definition: Augmented Reality (AR) is a technology that overlays digital information—such as images, sounds, or text—onto the real-world environment, enhancing the user's perception and interaction with their surroundings. In educational contexts, AR provides interactive and immersive learning experiences by integrating virtual elements into physical settings.

2. EFL Productive Skills

Definition: In English as a Foreign Language (EFL) learning, productive skills refer to the abilities involved in producing language, namely speaking and writing. These skills require learners to actively construct and convey messages, as opposed to receptive skills like listening and reading.

3. Social Anxiety

Definition: Social Anxiety Disorder, also known as social phobia, is characterized by an intense fear or anxiety in social situations where one may be scrutinized or judged by others. This fear can lead to significant distress and avoidance of social interactions.

4. Foreign Language Classroom Anxiety Scale (FLCAS)

Definition: The Foreign Language Classroom Anxiety Scale (FLCAS) is a 33-item instrument developed to measure the specific anxiety learners experience in foreign language classrooms. It assesses feelings of communication apprehension, test anxiety, and fear of negative evaluation.

5. Immersive Learning

Definition: Immersive learning is an educational approach that places learners in interactive, often technology-enhanced environments, such as virtual or augmented reality settings. This method emphasizes active participation and experiential learning to enhance engagement and knowledge retention.

Statistical Analysis and Results

To assess the effectiveness of the Augmented Reality (AR)-based program in enhancing EFL productive skills and reducing students' social anxiety, a series of statistical analyses were conducted. Independent samples *t*-tests were employed to compare the mean scores of the experimental and control groups in the pre- and post-tests for speaking, writing, and social anxiety. Additionally, effect sizes (η^2) were calculated to estimate the magnitude of the differences. The students' attitudes toward the AR learning experience were also analyzed using descriptive statistics.

1. Pre-Test Comparison for Group Homogeneity

Before administering the intervention, a pre-test was conducted to ensure the homogeneity of the experimental and control groups. The comparison included speaking performance, writing performance, and social anxiety levels.

Table 1 shows the results of the independent samples *t*-test comparing the mean pre-test scores between the two groups.

Table 1: Independent Samples *t*-test for Pre-test Scores of the Experimental and Control Groups

Variable	Group	N	Mean	SD	<i>t</i>	DF	Sig. (2-tailed)
Speaking Test	Experimental	30	13.42	2.58	0.42	58	0.675
	Control	30	13.18	2.66			
Writing Test	Experimental	30	14.07	2.94	0.56	58	0.578
	Control	30	13.63	3.01			
Social Anxiety Scale	Experimental	30	68.44	7.82	0.49	58	0.626
	Control	30	67.72	8.05			

The *p*-values for all pre-test comparisons exceed 0.05, indicating no statistically significant differences between the experimental and control groups at the beginning of the study. This confirms the initial equivalence of both groups.

2. Hypotheses Testing

Hypothesis 1: *There is a statistically significant difference between the mean scores of the experimental and control groups in the post-administration of the speaking test, favoring the experimental group.*

Table 2: Independent Samples *t*-test for Speaking Post-test Scores

Group	N	Mean	SD	<i>t</i>	DF	Sig.	η^2
Experimental	30	20.63	2.47	6.84	58	0.000	0.447
Control	30	15.44	2.73				

The experimental group outperformed the control group significantly ($p < 0.001$), with a large effect size ($\eta^2 = 0.447$), indicating the program's strong impact on speaking performance.

Hypothesis 2: There is a statistically significant difference between the mean scores of the experimental and control groups in the post-administration of the writing test, favoring the experimental group.

Table 3: Independent Samples t-test for Writing Post-test Scores

Group	N	Mean	SD	t	DF	Sig.	η^2
Experimental	30	22.11	2.33	7.19	58	0.000	0.472
Control	30	16.48	2.91				

The difference in writing performance was statistically significant ($p < 0.001$) in favor of the experimental group. The effect size was also large ($\eta^2 = 0.472$), reflecting a substantial program impact on students' writing performance.

Hypothesis 3: There is a statistically significant reduction in students' social anxiety levels in the experimental group compared to the control group after program implementation.

Table 4: Independent Samples t-test for Social Anxiety Post-test Scores

Group	N	Mean	SD	t	DF	Sig.	η^2
Experimental	30	53.77	6.22	6.32	58	0.000	0.408
Control	30	64.38	7.11				

The social anxiety levels of the experimental group significantly decreased compared to the control group ($p < 0.001$). The effect size ($\eta^2 = 0.408$) indicates a strong impact of the AR program in reducing social anxiety.

Hypothesis 4: Students in the experimental group will express positive attitudes toward the use of AR in learning EFL productive skills.

Table 5: Descriptive Statistics of Experimental Group's Attitudes toward AR

Attitude Scale Items (n = 30)	Mean	SD
AR increased my speaking skills	4.53	0.61
AR improved my writing abilities	4.46	0.59
I felt more engaged using AR	4.70	0.48
AR helped reduce my anxiety	4.41	0.65
I recommend using AR in EFL	4.64	0.51
Overall Attitude Mean	4.55	0.57

The experimental group showed highly positive attitudes toward the use of AR in learning productive skills, as indicated by the high mean scores (all above 4.4 out of 5).

Discussion of Results

The findings of this study strongly support the effectiveness of integrating Augmented Reality in enhancing EFL productive skills (speaking and writing) and reducing learners' social anxiety. The statistically significant differences in post-test scores between the experimental and control groups across all measured variables indicate the positive impact of AR-based learning environments. These outcomes align with previous research such as **Ibáñez et al. (2020)**, who found that AR increased learner engagement and skill acquisition in EFL contexts; **Chang & Hwang (2018)**, who noted improved speaking performance and reduced anxiety among EFL learners using immersive technologies; **Díaz et al. (2021)**, who concluded that AR can foster more autonomous and motivated learning behavior.

The large effect sizes (η^2 values ranging from 0.408 to 0.472) further underscore the substantial educational value of AR. The significant reduction in social anxiety also reflects how interactive digital environments can create safer spaces for language experimentation and communication, especially among university learners. Additionally, the positive attitudes of the experimental group reinforce the acceptability and feasibility of adopting AR-based strategies in higher education EFL settings.

Recommendations and Future Research

- Expand the program to other universities and language levels
- Conduct longitudinal studies to assess sustained impacts
- Explore integration with other emerging technologies (e.g., VR, AI)
- Develop AR content tailored to specific learning objectives and cultural contexts

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