Using Connectivism to Enhance EFL University Students' Oral Communication and Critical Thinking Skills

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***Abstract*—This study investigated the effect of a connectivism-based program on enhancing Oral Communication (OC) and Critical Thinking (CT) skills among EFL university students in Egypt. Thirty-five second-year students participated in a ten-week intervention (consisting of 20 sessions and 70 instructional hours) designed around authentic tasks, collaborative activities, and digital platforms aligned with the principles of connectivism. A mixed-method, single-group pre/post-test design was employed, integrating quantitative assessments with classroom observations, and student and reflections. Quantitative results revealed significant improvements in both OC and CT skills, with students demonstrating greater fluency, evaluative reasoning, problem-solving, and synthesis of diverse perspectives. Qualitative findings further revealed that authentic tasks, peer collaboration, and technology-mediated engagement fostered autonomy, confidence, and meaningful language use. Taken together, the findings suggest that connectivism provides an effective pedagogical framework for simultaneously developing communicative proficiency and higher-order thinking skills in digitally mediated EFL contexts. The study contributes theoretically by extending the application of connectivism to dual skill development and offers practical implications for EFL instructors and curriculum designers seeking to integrate collaborative, technology-enhanced strategies in under-resourced higher-education settings.**

***Keywords*—connectivism, critical thinking, English as a foreign language, higher education, oral communication**

I. Introduction

Whether someone is seeking a new employment, enrolling a university, or scheduling a trip, effective Oral Communication (OC) and Critical Thinking (CT) skills are essential for navigating complex situations and engaging meaningfully with others across several contexts [1]. In the era of digital globalization, graduates are expected not only to communicate fluently in English but also to evaluate information critically, justify viewpoints, and collaborate across networks. Yet, many EFL university students struggle in developing these two skills due to several reasons, such as traditional teaching methods that prioritize rote memorization over interactive learning, overreliance on first language, and insufficient emphasis on promoting independent analysis and critical thought [2]. Within the Egyptian context, universities lack efficient programs and curricula that focus on enhancing critical thinking, as the foremost emphasis is on the academic side and knowledge retrieval [3]. Therefore, when students are involved in projects or tasks demanding CT, they often struggle to identify the key aspects of a particular issue, gather relevant data, support their arguments with persuasive evidence, or present meaningful solutions.

Engaging in CT allows students to analyze, evaluate, and synthesize information, thereby fostering the clarity and coherence of spoken discourse [4]. Meanwhile, effective OC skills enable students to construct well-reasoned arguments, make reasonable connections between different ideas, convey their thoughts clearly, reach solutions, and facilitate discussions in multicultural settings [5]. To prepare EFL university students for success in today's competitive global workforce, connectivism offers a pedagogical approach that develops both OC and CT while leveraging digital learning environments.

Connectivism has gained increasing attention as a promising approach for 21st-century learning emerging in response to rapid technological change, expanding social networks, and the growth of e-learning. G. Siemens presented Connectivism as a learning theory, claiming that traditional learning theories are no longer adequate in a digital environment where information and knowledge are constantly evolving [6]. This approach further questions the idea that learning happens solely within an individual, highlighting the importance of links between various knowledge sources, or nodes. These nodes comprise a dynamic and ever-expanding knowledge network. Downes expanded on Siemens' work by characterizing Connectivist learning as learning that is based on conversation and interaction within one's network, and that has evolved from being a transfer of content and knowledge to the production of content and knowledge [7].

A connectivism classroom might involve students collaborating in breakout rooms via Zoom to debate the impact of social media on university students' mental health. After watching a short documentary on YouTube and reading excerpts from online blogs, students could organize their thoughts using infographics, synthesize different perspectives and prepare group presentations using collaborative platforms like Padlet or Google Slides. In this task, students not only share their ideas fluently, but also evaluate the credibility of digital sources and adapt their message to diverse audiences.

Recent studies have increasingly explored how Connectivism supports the development of oral communication and critical thinking in EFL contexts, especially through digital platforms. For instance, Lowenthal revealed that online tools such as Flipgrid and VoiceThread foster students' participation in asynchronous speaking tasks, note-taking from audio materials, and shadowing practice, thereby enhancing both speaking confidence and listening

comprehension [8]. Likewise, Corbett and Spinello highlighted how platforms like Moodle and Microsoft Teams enhanced Egyptian students' abilities to listen actively, analyze content, and discuss current events, aligning closely with the core principles of Connectivism [9]. These findings support Al-Mulhim and Zaky's view that Zoom breakout rooms facilitated real-time, small-group discussions where students practiced oral fluency and negotiated meaning [10].

In terms of critical thinking, tools such as Rain Classroom, integrated with WeChat, enabled both synchronous and asynchronous engagement, allowing students to form hypotheses, interpret data, evaluate information, and draw conclusions [11]. These tasks require not only cognitive engagement but also adaptive reasoning, demonstrating how digital networks can be balanced to simulate real-life problem-solving in EFL contexts [12]. Nevertheless, much of this research has been conducted in technologically advanced or well-resourced settings, raising concerns about the feasibility and scalability of connectivist pedagogy in low-resource contexts such as Egyptian higher education.

Despite the promising outcomes of connectivism, several scholars argue that connectivism lacks a clearly defined epistemological foundation and overlaps with constructivist and socio-cultural theories without sufficiently distinguishing its explanatory power [13–15]. Others caution that connectivist learning environments may widen educational inequalities as some students might have or unstable access to technology or lack proper digital literacy [16, 17]. These critiques are particularly relevant in under-resourced EFL contexts, where inconsistent internet connectivity, limited institutional support, and uneven technological competence among students and instructors remain persistent challenges [18].

On the other hand, current research reveals several gaps. First, few empirical studies have investigated the dual impact of connectivist pedagogy on both oral communication and critical thinking within a single instructional intervention. Second, limited attention has been paid to mixed-method designs that capture both measurable learning outcomes and learners' experiential engagement. Third, research examining the implementation of connectivism in under-resourced, exam-oriented EFL higher-education contexts, such as Egypt, remains limited. Existing studies often treat communication and thinking skills in isolation or focus primarily on technological affordances without addressing contextual feasibility.

To address these gaps, the present study aims to investigate the effect of a connectivism-based instructional program on enhancing EFL university students' oral communication and critical thinking skills in the Egyptian higher-education context. Unlike previous studies, this research adopts a mixed-method, intervention-based design to examine both skill development and learning processes within a resource-constrained digital environment.

Therefore, this current study seeks to address the previously mentioned challenges through the following research questions. First, it asks: What is the effect of using connectivist pedagogy on EFL university students' oral communication and critical thinking skills? Second, it asks: What are the essential oral communication skills that EFL university students need to enhance? Third, it asks: What are the essential critical thinking skills that EFL university students need to enhance? Fourth, it asks: What are the current levels of oral communication skills among EFL university students? Fifth, it asks: What are the current levels of critical thinking skills among EFL university students?

To answer these questions, the following hypotheses were also tested:

(H_1) There is a statistically significant difference between students' pre- and post-test scores in overall oral communication skills, in favor of the post-test.

(H_2) There is a statistically significant difference between students' pre- and post-test scores in each of the oral communication sub-skills, in favor of the post-test.

(H_3) There is a statistically significant difference between students' pre- and post-test scores in overall critical thinking skills, in favor of the post-test.

(H_4) There is a statistically significant difference between students' pre- and post-test scores in each of the critical thinking sub-skills, in favor of the post-test.

II. Review of Literature

A. Connectivism: A Contemporary Learning Theory for EFL Contexts

Connectivism, introduced by George Siemens in 2005, views learning as a dynamic process shaped by ever-evolving networks of people, digital tools, and information sources. This approach emphasizes external connections between knowledge nodes, such as including individuals, web-based tools or institutional resources, that collectively shape the learning process [19]. In this regard, students are not passive recipients of content but active participants who connect to information networks composed of myriad information resources and recognize the patterns which appear to be hidden while filtering out secondary and unnecessary information [20]. In the context of English language education, Postgrado declares that Connectivism helps EFL university students engage with real-world issues, access authentic materials, and apply digital technologies to strengthen both linguistic competence and cognitive processing [21]. This claim is supported by studies showing that online collaboration, social media interactions, and multimedia tools can enhance both oral communication and critical thinking skills [1, 22]. However, some scholars argue that such benefits may be context-dependent, as students with limited digital literacy or inconsistent access to technology may experience diminished learning outcomes, raising concerns about equity and scalability [17, 23].

Through video conferencing, online tools, social media platforms, students can improve oral communication while simultaneously exercising critical thinking, analyzing arguments, evaluating digital sources, and responding constructively to peers. Nonetheless, not all research fully corroborates this dual impact. For example, while Ismael et al. and Postgrado highlighted fruitful gains in writing and critical thinking [21, 24], other studies indicate that oral communication improvements may be limited if tasks are poorly scaffolded or culturally mismatched [9, 25]. Thus, the collaborative nature of connectivist learning potentially enhances both OC and CT, but effectiveness is mediated by instructional design, technological accessibility, and learner

readiness.

Siemens introduces five principles for improving students' collaboration and engagement: (1) learning is based on diverse perspectives and aimed at fostering engagement with multiple viewpoints; (2) learning involves connecting specialized nodes of knowledge and information through digital tools; (3) critical thinking is encouraged and prioritized over rote memorization while reflection and idea generation is essential for deep understanding; (4) maintaining peer connections sustains continuous learning; and (5) decision-making guides students in determining what and how to learn. While these principles offer a theoretical framework, empirical studies suggest their practical implementation can vary [6]. In under-resourced EFL contexts, sustaining peer connections or providing diverse knowledge nodes may be challenging, limiting the full realization of Connectivism's potential [4, 23]. In this regard, Connectivism transforms students from passive recipients to active knowledge creators, fostering evaluative and reflective thinking in the Egyptian EFL context, where oral proficiency and critical thinking are frequently underemphasized. Taken together, Connectivism transforms students from passive recipients to active knowledge creators, fostering evaluative and reflective thinking in EFL settings. However, empirical studies suggest that Connectivism's impact on oral communication and critical thinking depends on context, including technology access, instructional design, and students' readiness to engage.

B. Oral Communication and Critical Thinking in EFL Contexts

In today's technology-driven world, proficiency in OC and CT is essential for EFL university students to be able to express ideas, analyze problems, collaborate effectively, and meet the demands of both academic and professional environments [26, 27]. OC enables students to participate meaningfully in academic discussions and social communities, while CT supports independent reasoning and informed decision-making, allowing learners to navigate complex real-world challenges [28].

Despite their importance, OC and CT remain challenging for many EFL university students. Studies indicate that traditional curricula, which prioritize memorization and model answers, often fail to cultivate higher-order thinking or oral proficiency [29, 30]. EFL classrooms in Arab countries, including Egypt, are often characterized by didactic, teacher-centered instruction, with a huge focus on written exams, textbook-based learning, and tutorial memorization. Besides, assessment typically relies on multiple-choice questions that require selecting a correct answer. However, some researchers caution that even learner-centered interventions do not automatically guarantee improved outcomes. For example, students may exhibit improved CT skills in structured tasks but still struggle to translate them into spontaneous oral performance due to anxiety, limited practice, or cultural norms that discourage open debate [31, 32]. Therefore, pedagogical strategies that integrate OC and CT are vital, such as role plays, debates, and communicative games foster spontaneous speech and reasoning.

Technology has emerged as a central enabler for expanding and authenticating learning opportunities. Platforms like Zoom, Padlet, Google Classroom, Free4talk, and TED Talks offer authentic, asynchronous learning experiences that encourage interaction, feedback, and creativity [33]. Nevertheless, empirical findings suggest that access and digital fluency strongly mediate these benefits. In under-resourced contexts, inconsistent internet connectivity and limited digital skills can constrain participation, reducing the effectiveness of technology-mediated interventions [34].

Taken together, these insights highlight the need for pedagogical frameworks that not only integrate OC and CT but also account for contextual limitations. Connectivism presents a promising alternative by fostering the development of both OC and CT through interactive techniques and active participation in digital and social knowledge networks. By engaging with authentic tasks and collaborative platforms, students can develop oral proficiency while simultaneously exercising critical thinking, provided that instructional design and technological accessibility are carefully planned and chosen.

C. Integrating Critical Thinking and Oral Communication Through the Lens of Connectivism

Integrating Connectivism into the EFL classroom creates an interactive environment where students engage with peers, digital tools, and real-world content, fostering autonomy and the development of OC and CT. Unlike traditional teacher-centered methods that emphasize passive knowledge transfer, Connectivism encourages dynamic engagement, enabling students to analyze, evaluate, reflect on, and synthesize information, skills essential for critical thinking [35].

Several tools can exemplify Connectivism in practice, where learning is driven by interaction, autonomy, and reflection. For instance, podcasts allow students to generate content that reflects their own ideas, which promotes creativity and communication [4]. Similarly, communicative games, AI speaking tools, and digital storytelling create provide intellectually stimulating yet low-pressure environments where students can practice speaking while exercising critical thinking. These activities illustrate how Connectivism facilitates the simultaneous cultivation of cognitive and linguistic skills, a balance rarely achieved in traditional, teacher-centered classrooms. However, empirical findings suggest that the effectiveness of these tools may vary depending on students' digital literacy, prior experience with collaborative learning, and the degree of scaffolding provided by instructors [24].

The strength of Connectivism lies in its potential to integrate cognitive and linguistic skill development simultaneously, a balance rarely achieved in traditional classrooms. This approach offers a meaningful alternative to traditional methods that often fail to meet the complex demands of the digital age, where information is constantly evolving and critical engagement is more necessary than ever [11]. By engaging in interactive and reflective activities, students can express themselves freely, critically evaluate peers' arguments, build on shared knowledge, and reflect on their own reasoning. Yet, not all studies fully support this dual impact. Some research indicates that gains in critical thinking may not automatically translate into improved oral performance without careful task design and ongoing feedback [36].

Despite these promising findings, numerous limitations should be noted. First, many empirical studies tend to focus either on OC or CT. Second, concerns about long-term retention, depth of learning, and instructional scalability are rarely addressed. These gaps suggest a crucial need for robust mixed-method empirical studies that investigate how connectivist learning environments can facilitate the simultaneous development of OC and CT, especially within Egyptian higher education.

The Egyptian EFL landscape presents unique challenges including limited digital literacy among educators and learners, inconsistent internet connectivity, and inadequate institutional support for technology-enhanced environment [37]. These challenges underscore the need for empirical research that investigates not only the effectiveness of connectivist strategies but also their feasibility in under-resourced, exam-driven contexts. Connectivism offers a balanced opportunity for addressing these gaps by promoting networked learning, peer engagement, and learner autonomy, yet its potential to enhance OC and CT simultaneously remains underexplored in Egypt.

III. Method

A. Research Design

The present study adopted a mixed-method, quasi-experimental, single-group pre/posttest design. A convergent design was used, where quantitative data were collected through pre- and post-tests, and qualitative data, including classroom observations, reflections, records, and students' samples were collected and triangulated during analysis to investigate how connectivist strategies were applied. The intervention was implemented by the first author in a practitioner-researcher role, allowing for continuous reflection and responsiveness to students' needs. To enhance reliability, a qualified external rater, a professor of applied linguistics, scored a random sample of pre/post-test responses, yielding high inter-rater reliability ($r = 0.97$ for OC; $r = 0.95$ for CT). Additionally, reflective field notes were maintained throughout the study to document teaching decisions and support reflexive awareness during interpretation.

A single-group design was chosen due to several practical considerations. Limited class sizes, scheduling constraints at the private university, and the exploratory nature of the study made forming a control group unapplicable. In addition, the research focus was on examining individual growth over time and understanding how connectivist strategies function in a natural classroom environment, rather than establishing definitive causal relationships. Consequently, while observed improvements in oral communication and critical thinking are indicative of potential benefits of connectivist pedagogy, they cannot be attributed solely to the intervention with full certainty. This single-group design, however, allowed the program to be implemented authentically within the regular course structure, thereby enhancing ecological validity and providing insights applicable to real-life classroom contexts.

B. Participants

The participants were 35 second-year EFL university students (18 males and 17 females) enrolled in the Faculty of Engineering at Heliopolis University for Sustainable Development. Their ages ranged from 19 to 21 years. All students had intermediate English proficiency, according to the university's standardized placement test, which included an oral section. In addition, participants had not previously received any formal training in oral communication or critical thinking, making them suitable candidates for this intervention.

A volunteer-based sampling method was employed due to institutional constraints, including fixed class schedules and limited group availability. Although this small, single-institution sample limits the generalizability of the findings, it was appropriate for the exploratory and intervention-focused nature of the study. Selecting students exclusively from this cohort also helped maintain a consistent classroom environment, ensuring harmony and comparability across sessions. Recruiting participants from multiple universities could have introduced variability in student preparedness, classroom culture, and instructional dynamics, potentially confounding the results. Furthermore, all participants volunteered willingly, ensuring ethical engagement without coercion. Ethical approval was obtained from the university's Research Ethics Committee, and informed consent was secured from all participants before data collection.

C. Instruments

1) Oral communication skills list

To address the second research sub-question, *"2. What are the essential oral communication skills that EFL university students need to enhance?",* an oral communication list was constructed based on review of the literature and prior empirical studies (see Table A1 in Appendix). The list included three major communication skills: strategic, sociolinguistic and paralinguistic, each with a brief description. The draft list was reviewed by a panel of TEFL specialists who rated the importance of each item using a 3-point scale: very *important (3), important (2),* and *less important (1).* Their feedback was used to refine and finalize the list.

2) Critical thinking skills list

To address the third research sub-question, "What are the essential critical thinking skills that EFL university students need to enhance?", another critical thinking list was developed (see Table A2 in Appendix). The final version included four domains: analysis, evaluation, synthesis, and problem-solving, each with a brief description. Like the oral communication list, it was reviewed and rated by a jury of experts using the same 3-point scale, ensuring the content validity of the instrument.

3) Oral Communication skills scoring rubric

Based on the OC skills list, analytic rubric was designed to assess students' oral communication in both the pre- and post-tests (Table A3 in Appendix). The rubric contained the three major oral competencies; each scored on a 4-point scale ranging from *1 (ineffective)* to *4 (outstanding).* Each score level included descriptive indicators to ensure consistent application by raters.

4) Critical thinking skills scoring rubric

Based on the CT skills list, a separate rubric was developed covering the four core domains listed above (Table A4 in

Appendix). Each domain was rated on a 4-point scale with performance descriptors defined for each level. Both rubrics was reviewed and modified by a group of jury members, ensuring validity and clarity for application.

5) Pre-/post-tests for oral communication and critical thinking

In order to answer the fourth research sub-question, *"What are the current levels of oral communication skills among EFL university students?"*, a three-part oral test was developed based on the validated oral communication skills (see Appendix A). Similarly, to address fifth research sub-question, *"What are the current levels of critical thinking skills among EFL university students?"*, a test consisted of two scenarios was designed in alignment with the validated critical thinking list (see Appendix B). Both OC and CT tests were reviewed by a panel of TEFL experts to confirm content validity and also were administered online as a pre-test to identify their current level in OC and CT, and as a post-test to investigate the effect of the connectivism program. Student responses were recorded and evaluated using the critical thinking rubric.

6) Piloting the pre-/post-tests

Both the oral communication and critical thinking tests were piloted with 45 second-year students of EFL (intermediate level) from the Faculty of Engineering at Heliopolis University for Sustainable Development who were not part of the main study. The piloting aimed to estimate average test duration, assess internal consistency, determine item–total correlations, and calculate reliability coefficients. The time taken by each student was recorded and calculated using the formula:

$$\text{Test time} = \frac{S1+S2+S3+S4+\cdots}{N}$$

$S1$ = how long it took the initial respondent to complete the exam.

$S2$ = how long it took the second respondent to complete the exam…etc.

N = the total number of participants.

The mean duration for the Oral Communication Test was 10 min, while the Critical Thinking Test required an average of 12 min.

7) Internal consistency of the tests

For the oral communication test, Pearson correlation coefficients between each major skill and the total test score (after excluding the target skill) ranged from 0.69 to 0.73, all statistically significant at $p < 0.01$. Correlations for individual sub-skills, such as substitution, fillers, audience awareness, and tone, ranged from 0.62 to 0.67, indicating strong internal consistency. Similarly, for the critical thinking test, item–total correlations ranged from 0.68 to 0.73 ($p < 0.01$), while sub-skill correlations (e.g., assessing credibility, exploring solutions) fell between 0.61 and 0.68, confirming good internal consistency for the instrument.

8) Reliability and inter-rater consistency

Reliability was assessed using Cronbach's alpha, which yielded values of $\alpha = 0.84$ for the oral communication test and $\alpha = 0.82$ for the critical thinking test. A high level of internal dependability is indicated by both surpassing the generally recognized cutoff point of 0.70. To ensure scoring consistency, an external rater, a professor of applied linguistics at Heliopolis University for Sustainable Development, independently evaluated a random sample of pre- and post-tests. The resulting inter-rater correlations were strong and statistically significant: $r = 0.97$ ($p < 0.01$) for oral communication and $r = 0.95$ ($p < 0.01$) for critical thinking, confirming a high degree of scoring agreement.

D. Outline of the Connectivism Program

With two online sessions per week, lasting three and a half hours each, the program lasted ten weeks and had twenty sessions, for a total of 70 h of instruction. Throughout the program, students participated in a range of real-life topics relevant to their personal and professional lives, including exploring global diversity, career choices, workplace conflict resolution, internet and social media addiction, and sharing personal experiences such as childhood memories and cultural traditions. These topics were selected to enhance both oral communication and critical thinking through authentic, task-based learning.

A variety of online platforms were used to implement the connectivist principles of autonomy, interactivity, and networking. Tools included Zoom, Edpuzzle.com, Uquiz.com, Nearpod.com, figma.com, Padlet.com, WhatsApp, YouTube, and Google Arts and Culture. WhatsApp was used for sharing daily speaking tasks, organizing session logistics, and providing feedback. Zoom facilitated live sessions, group discussions in breakout rooms, and student presentations. Tools like Edpuzzle, Nearpod, and Uquiz were used to create interactive video lessons, quizzes and collaborative boards to keep students engaged.

For example, in the session titled "Exploring Global Diversity", students visited the Voice of America (VOA) website to identify new global trends on social media and share brief report. This was followed by a discussion on traveling, where students reflected on motivations, common challenges, and their own experiences. After reading an article about cultural customs in various countries, students were divided into groups of four to discuss and evaluate the article's main ideas in breakout rooms. To bring in real-life context, students used Google Arts and Culture to explore and prepare short presentations about a country they would like to visit and signature dishes from the selected countries. In the end, students joined Padlet website to engage in a problem-solving scenario: dealing with canceled flights and missing documents. In this activity, they identified priorities, brainstormed options, and presented their solutions to the group. After the online session, students watched a YouTube video on Edpuzzle describing cultural experiences in Spain and responded to open-ended prompts.

Formative assessment was conducted continuously throughout the program. Students' performances during live sessions were recorded and reviewed and personalized feedback was delivered via WhatsApp. To ensure theoretical alignment, each task was explicitly designed to reflect key connectivist principles. For example, breakout room debates and collaborative Padlet problem-solving reflected diversity of perspectives and autonomous knowledge construction. On the other hand, tools like Edpuzzle and Uquiz supported self-directed decision-making. These activities simultaneously enhanced specific oral communication and critical thinking sub-skills. To maintain intervention fidelity, weekly

instructional plans and checklists were implemented to track the program. This synergy ensured that students had daily opportunities to practice speaking and reflect critically in authentic contexts.

E. Data Analysis

A mixed-methods approach was employed, integrating quantitative and qualitative analyses. Quantitative data were analyzed using SPSS v25. Construct validity for both the Oral Communication (OC) and Critical Thinking (CT) tests was checked through item–total correlations, and reliability was confirmed using Cronbach's alpha and inter-rater correlations. To assess the intervention's impact, paired-sample t-tests compared pre- and post-test means (overall and sub-skills), with Eta squared (η^2) used to estimate effect sizes and Blake's Modified Gain Ratio to evaluate instructional effectiveness.

The observed effect sizes were extremely large ($\eta^2 \geq .798$), reflecting substantial gains in students' oral communication and critical thinking scores. While these results suggest that the intervention had a pronounced impact, caution is warranted in interpretation. The single-group design, small sample size, and exploration nature of the study may have inflated effect size estimates. Additionally, participants were highly motivated volunteers in a supportive, small-class environment, which could have further contributed to the observed gains.

The qualitative data were analyzed thematically following Braun and Clarke's framework [38] and included classroom observations, reflections, records, and screenshots. These sources offered contextual insights into students' engagement, strategies, and challenges, thereby deepening the interpretation of the quantitative findings. By triangulating quantitative and qualitative findings, the study provides a nuanced picture of how connectivist pedagogy may enhance OC and CT, while acknowledging that the exceptionally large effect sizes should be interpreted with consideration of design limitations and contextual factors.

IV. Results

A. Quantitative Data Analysis

1) Testing the first hypothesis

The first hypothesis (H_1) predicted that there would be a statistically significant difference at the 0.05 level between the mean scores of participants in the pre- and post-tests of overall oral communication skills, in favor of the post-test. To test this, a paired-samples t-test was conducted.

Table 1. Results of the t-test for the significance of variations in the mean scores of the participants on the pre and post oral communication test overall ($N = 35$)

Outcome	Pre M (SD)	Post M (SD)	t(34)	p	η^2
Overall Oral Communication	26.72 (3.93)	70.64 (3.65)	47.46	< 0.001	0.983

Note: Degrees of freedom (df = 34) reflect $n-1$ for 35 paired observations. η^2 = effect size (Cohen, 1988). All results were significant at $p < 0.001$.

As shown in Table 1, results indicate a statistically significant improvement in students' overall oral communication performance following the intervention. The post-test mean scores were significantly higher than the pre-test means scores. The effect size, calculated as $\eta^2 = t^2 / (t^2 + \text{df})$, was 0.983. According to Cohen's benchmarks ($0.01 \leq \eta^2 < 0.059$ = small; $0.059 \leq \eta^2 < 0.138$ = medium; $0.138 \leq \eta^2 < 0.232$ = large; $\eta^2 \geq 0.232$ = very large) [39]. These findings provide strong evidence that the connectivism-based program significantly enhanced students' overall oral communication skills. Thus, the alternative hypothesis was supported.

2) Testing the second hypothesis

The second hypothesis (H_2) predicted that there would be a statistically significant difference at the 0.05 level between the mean scores of participants in the pre- and post-tests of each oral communication sub-skill, in favor of the post-test. To test this, paired-samples t-tests were conducted for all sub-skills.

Results in Table 2 showed consistent and significant improvement across all oral communication sub-skills. Post-test means were markedly higher than pre-test means for every sub-skill, while standard deviations were generally lower in the post-test, suggesting greater consistency in performance after the intervention. All p-values were < 0.001, and all effect sizes (η^2 = 0.810–0.910) exceeded 0.232, indicating very large effects by Cohen's benchmarks [39]. These findings confirm that the connectivism-based program significantly enhanced each oral communication sub-skill. The research participants' mean scores on the pre- and posttest administrations for each oral communication subskill differed statistically significantly, favoring the posttest results, proving the alternative hypothesis to be correct.

Table 2. Paired-samples t-test results for oral communication sub-skills ($N = 35$)

Sub-skill	Pre M (SD)	Post M (SD)	t(34)	p	η^2
Substitution (Strategic)	4.04 (1.90)	10.68 (1.52)	11.87	< 0.001	0.854
Fillers (Strategic)	4.60 (1.50)	10.80 (2.53)	10.10	< 0.001	0.810
Clarification (Strategic)	4.00 (1.37)	11.16 (2.00)	13.40	< 0.001	0.882
Cultural Appropriateness (Sociolinguistic)	3.32 (0.98)	7.28 (1.63)	10.92	< 0.001	0.832
Audience Awareness (Sociolinguistic)	2.76 (1.00)	7.20 (1.23)	11.45	< 0.001	0.845
Tone & Intonation (Paralinguistic)	4.32 (1.93)	11.92 (1.75)	15.62	< 0.001	0.910
Pacing & Rhythm (Paralinguistic)	3.68 (2.10)	11.60 (1.93)	13.08	< 0.001	0.877

Note: η^2 = effect size (Cohen, 1988). All differences were significant at $p < 0.001$.

3) Testing the third hypothesis

The third hypothesis (H_3) predicted that there would be a statistically significant difference at the 0.05 level between the mean scores of participants in the pre- and post-tests of overall critical thinking skills, in favor of the post-test. A paired-samples t-test was conducted to examine this prediction.

Results in Table 3 showed a substantial improvement from pre-test (M = 43.44, SD = 9.11) to post-test (M = 102.92, SD = 6.59), $t(34) = 26.73$, $p < 0.001$. The effect size, η^2 = 0.968, represents a very large effect according to Cohen's benchmarks ($\eta^2 \geq 0.232$) [39]. These findings provide strong evidence that the connectivism-based program significantly

enhanced students' overall critical thinking skills. Thus, there is a statistically significant difference between the pre- and post-test mean scores of critical thinking skills, in favor of the post-test.

Table 3. Paired-samples t-test results for overall critical thinking skills ($N = 35$)

Outcome	Pre *M* (SD)	Post *M* (SD)	*t* (34)	*p*	η^2
Overall Critical Thinking	43.44 (9.11)	102.92 (6.59)	26.73	< 0.001	0.968

Note: η^2 = effect size (Cohen, 1988). All results were significant at $p < 0.001$.

4) Testing the fourth hypothesis

The fourth hypothesis (H_4) predicted that there would be a statistically significant difference at the 0.05 level between the mean scores of participants in the pre- and post-tests of each critical thinking sub-skill, in favor of the post-test. To verify this, paired-samples *t*-tests were conducted for all sub-skills.

Table 4 showed consistent and significant improvement across all critical thinking sub-skills. Post-test means were markedly higher than pre-test means for every sub-skill, while standard deviations were generally lower in the post-test, suggesting greater consistency in performance after the intervention. All *p*-values were < 0.001, and all effect sizes (η^2) exceeded the threshold of 0.232, indicating very large effects according to Cohen's benchmarks [39]. These findings confirm that the connectivism-based program significantly enhanced each critical thinking sub-skill. Accordingly, the alternative hypothesis accepted, highlighting that there is a statistically significant difference between the pre- and post-test mean scores of each critical thinking sub-skill, in favor of the post-test.

Table 4. Paired-samples t-test results for critical thinking sub-skills ($N = 35$)

Sub-skill	Pre *M* (SD)	Post *M* (SD)	*t*(34)	*p*	η^2
Identifies Key Issues (Analysis)	4.96 (2.13)	10.68 (1.52)	10.14	< 0.001	0.811
Prioritizes Information (Analysis)	5.40 (2.27)	14.56 (1.96)	15.15	< 0.001	0.905
Assesses Credibility (Evaluation)	6.20 (3.44)	14.88 (1.83)	12.33	< 0.001	0.864
Considers Alternatives (Evaluation)	5.00 (2.42)	10.92 (1.47)	9.74	< 0.001	0.798
Combines Information (Synthesis)	4.76 (2.50)	11.04 (1.43)	10.59	< 0.001	0.824
Integrates Diverse Perspectives (Synthesis)	5.04 (2.41)	10.92 (1.47)	11.23	< 0.001	0.840
Identifies Problems (Problem-Solving)	6.12 (2.74)	15.04 (1.74)	13.66	< 0.001	0.886
Explores Solutions (Problem-Solving)	5.96 (2.84)	14.88 (1.83)	13.56	< 0.001	0.884

Note: η^2 = effect size (Cohen, 1988). All results were significant at $p < 0.001$.

5) Measuring the effect of connectivism using Blake's modified gain ratio

Although the effect sizes reported earlier were very large, confirming the impact of the program on students' oral communication and critical thinking skills, Blake's Modified Gain Ratio (MG) was also calculated to provide an additional descriptive indicator of program effectiveness. The formula is given as:

$$MG = \frac{M2 - M1}{P - M1} + \frac{M2 - M1}{P} + \frac{M2 - M1}{M2}$$

where *M1* = pre-test mean score, *M2* = post-test mean score, and *P* = test full mark.Interpretation of *MG*:

- $MG < 1 \rightarrow$ ineffective
- $1 \leq MG < 1.2 \rightarrow$ average effectiveness
- $MG \geq 1.2 \rightarrow$ effective

As Table 5 showed, the calculated Modified Gain Ratio for oral communication skills was 2.09, while for critical thinking skills it was 1.97. Both values exceed the 1.2 threshold for effectiveness, suggesting that the connectivism-based program produced substantial learning gains in both domains. This supplementary measure reinforces the findings from the paired-samples *t*-tests and effect size calculations, and answered the main question of the study, demonstrating that connectivism had a strong and educationally meaningful impact on enhancing second-year EFL university students' oral communication and critical thinking skills at the Faculty of Engineering, Heliopolis University for Sustainable Development.

Table 5. Study participants' pre- and post-test mean scores and Blake's Modified gain Ratio

Skill	Pre *M1*	Post *M2*	Full Mark (P)	MG	Significance
Oral Communication Skills	26.72	70.64	76	2.09	Significant
Critical Thinking Skills	43.44	102.92	112	1.97	Significant

Note: MG = Modified Gain Ratio. MG ≥ 1.2 indicates program effectiveness.

B. Analysis of Qualitative Data on the Focused Critical Thinking and Oral Communication Skills

Qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006), derived from classroom observations, reflections, recordings, and screenshots. The analysis included four major themes highlighting students' developmental trajectory in oral communication and critical thinking skills over the intervention.

- Theme 1: Overcoming Affective Barriers and Technological Disengagement

The program provided students opportunities to reflect, analyze, and interact in ways that promoted autonomy, collaboration, and problem-solving. However, it is imperative to highlight that at start of the program a considerable number of students were hesitant to join collaborative activities and breakout rooms as they were afraid of peer judgment, while others were reluctant to turn on their cameras during the sessions. In some cases, students openly expressed these concerns during the online sessions:

"Please doctor, can I join the session but without opening my camera?" (S1)

"Can I work alone because I think better than working in groups?" (S2)

To address these concerns, the instructor fostered a supportive environment through small group work, anonymous posting, audio storytelling and low-stakes warm-up tasks that encouraged and valued every student's contribution. By the end of the program, participation increased, with students turning on cameras, participating group discussions, asking questions, defending their ideas, completing tasks confidently and giving feedback. As shown in Fig. 1, students engaged actively in a breakout room activity.

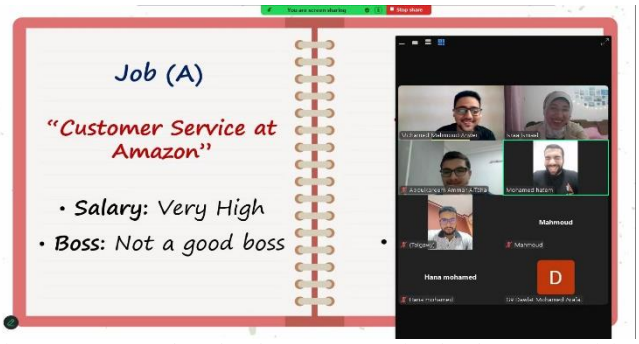

Fig. 1. Zoom screenshot of student engagement in a breakout room activity.

By week five, several students voluntarily gave impromptu oral presentations. Additionally, the utilization of current subjects and real-world assignments inspired students to engage in meaningful conversation and understand the language employed in informal, spontaneous communication. For instance, in a task examining educational challenges in the Middle East, one student critically analyzed challenges in the current education system:

"The mentality is the main reason behind our struggle. We just focus on memorization for the final exam, not our future. After *I finish the exam, I just forget everything. Personally, I can't even apply most of what I studied in my daily life. Nothing is related to the practical side, and they just think that we should memorize without making any connections between our generation and what we learn. So, when we graduate and go to the job market, we cannot apply what we studied." (S3)*

These excerpts reflect the student's ability to confidently synthesize experience with broader societal issues, a key outcome targeted by the intervention. To further reduce students' anxiety, the instructor designed warm-up tasks that blended creativity with purposeful language use. For example, in the "Invent an App" activity, students worked in small groups to design new online apps, explain their purposes and draw their logos, as shown in Fig. 2.

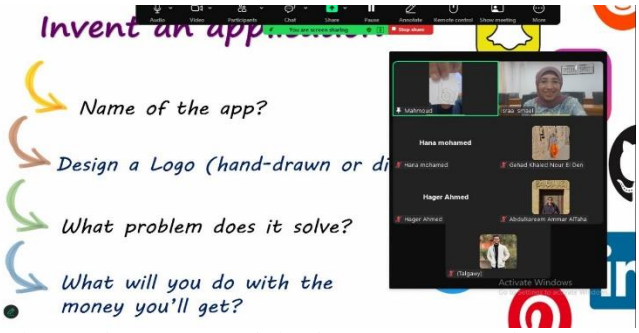

Fig. 2. Student engagement during the "Invent an App" task, promoting creativity and reducing online anxiety.

- Theme 2: Strategic Use of Language and Fluency Development

Classroom observations at the start of the program revealed that many pupils tend to use Arabic words to replace the words that they do not know and frequently relied on hesitation devices like (e.g., "aaaa"). Also, many students relied heavily on reading directly from their notes, and their speech often lacked organizational flow.

To address these issues, the instructor implemented a range of targeted strategies and digital tools aimed at improving strategic competence and fluency. Wordwall was used to generate spontaneous speaking prompts that encouraged quick thinking and response generation. Students were also encouraged to use mind maps to organize their thoughts instead of full scripts, gradually reducing dependence on full scripts. In addition, students submitted daily voice recordings via WhatsApp about personal experiences and everyday activities, after preparing and organizing their ideas beforehand. The following figures illustrate how these tools and activities supported students' fluency development and strategic language use:

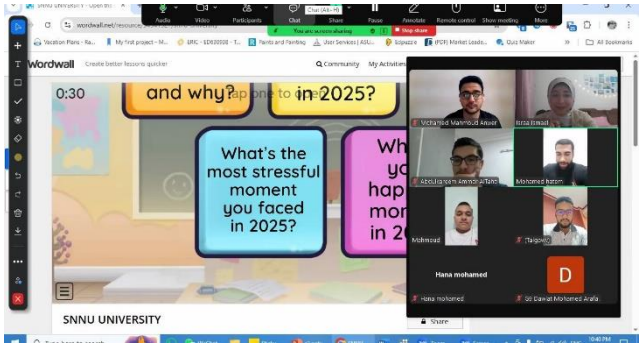

Fig. 3 Wordwall warm-up activity integrated with Zoom.

Fig. 3 illustrates how the Wordwall warm-up activity was integrated with Zoom to enhance students' fluency, and support impromptu speech. Fig. 4, also shows how WhatsApp voice messages were used for spoken practice and cultural exchange, enabling students to prepare their content before recording, practice immediate self-correction and organize their ideas to talk about different traditions around the world. Along with the digital tools, the instructor implemented targeted activities aimed at improving strategic competence and oral fluency. These included warm-up tasks using substitution drills, guided fillers (e.g., "What I mean is…", "Let me rephrase that…"). In breakout rooms, they practiced paraphrasing unfamiliar terms using visual cues or contextual explanations. By the end of the program, students demonstrated growing proficiency in strategic competence (e.g., substitution, fillers), audience awareness, and tone adjustment. For example, in one discussion about famous influencers and bloggers who left a great impact on social media, one student said:

"When it comes to famous influencers, two Egyptian programmers come to mind: Usama Al-Zero and Yehia Tech. To me, they're not just content creators, but they have changed my life. Usama's ability to simplify the complex content was amazing and he made programming enjoyable to thousands of people. Yehia Tech, on the other hand, supports beginners with wisdom and science". (S4).

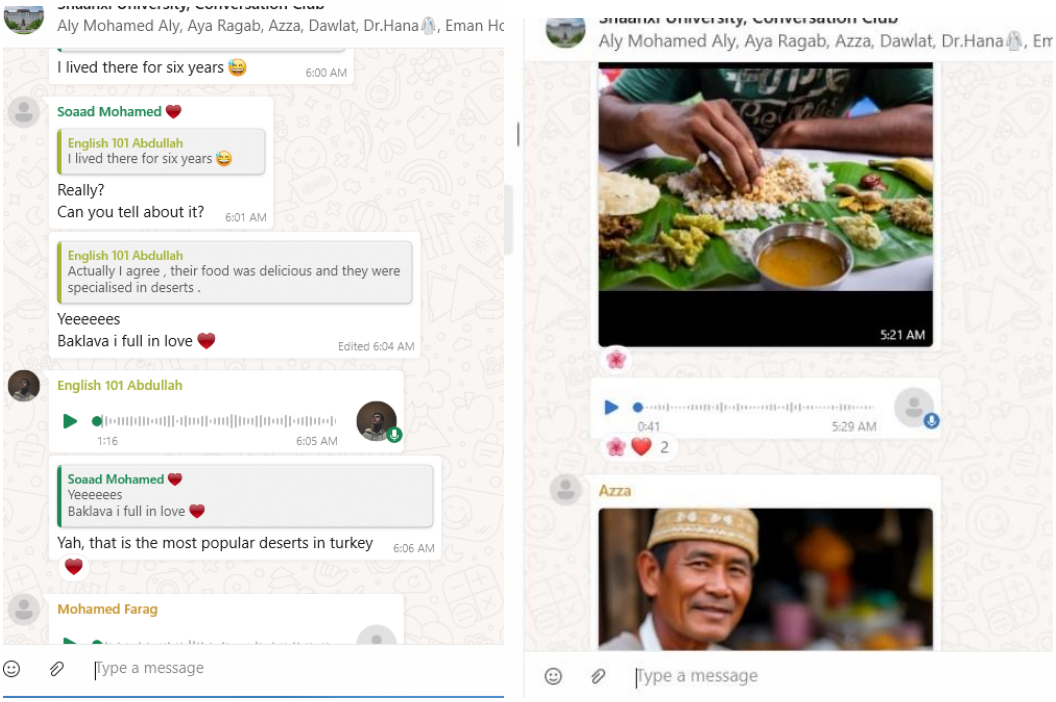

Fig. 4. WhatsApp voice messages for spoken practice and cultural exchange.

- Theme 3: Development of Evaluation and Perspective-Taking

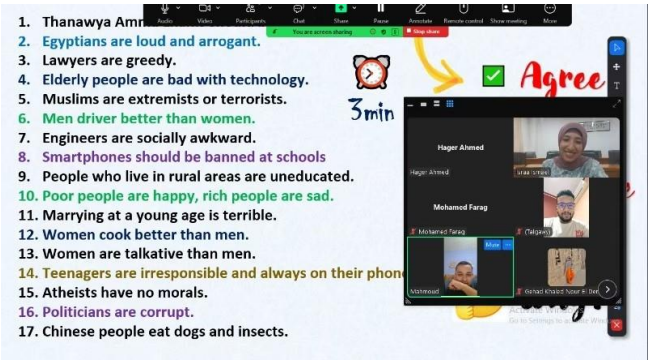

Fig. 5 Students engaged in a controversial topics activity to weigh pros and cons and defend views.

At the start of the program, students' ideas were generally vague and unclear. Many people avoided taking firm positions during discussions because they couldn't defend or justify their viewpoints. To address this, the instructor designed tasks that explicitly targeted evaluative and reflective thinking, including structured debates, role-play arguments, and speaking prompts. They were also taught how to identify bias, consider pros and cons, and assess the credibility of sources. In one debate session, as shown in Fig. 5, a student expressed disagreement with the superiority of online learning, offering a more developed rationale:

"Actually, I disagree with online learning is better than face-to-face. I think that online learning is not a good tool because some of us have bad internet connection and it's hard to ask teachers questions about the things that I do not understand. During COVID, many doctors asked me to give presentations, but most of us couldn't do it in a good way." (S5)

Students were also challenged with critical reading and listening tasks that motivated them to analyze content rather than simply understand it. To improve this, the instructor introduced guided listening worksheets with sentence frames like "The speaker believes … because …." and "This reminds me of ….. in my context." As shown in Fig. 6, tools like EdPuzzle were also used to allow students to pause, reflect, and record their thoughts directly in response to video prompts. For instance, after watching a video about an American YouTuber experiencing culture shock in Spain, one student reflected:

"The first culture shock she faced was greeting. It is very common in Spanish speaking countries *as well as our middle east countries where a man can greet another man by giving him a kiss on cheeks. However, for her this is something strange, and she did not like it."* (S6)

Fig. 6. Screenshot from EdPuzzle task where students analyzed videos critically via voice recordings.

- Theme 4: Synthesis, Reflection, and Application

In the final phase of the program, Students showed increased autonomy in selecting, organizing, and applying ideas in a variety of communicative contexts. In contrast to earlier sessions, where responses were often short or task-driven, students began to develop their own speaking content, creatively adapting classroom resources, and engaging in extended real-world scenarios. For example, students participated in a "Become an Influencer" task, where they imagined launching a social media channel, introduced their content theme (e.g., sustainable development goals), and explained how their channel would add value to their

followers.

In addition, students used tools, such as Gliglish (an AI-powered speaking platform) to practice impromptu conversations with each other and generate spontaneous questions and answers in a peer-led exchange. Another activity invited students to design and deliver original presentations about topics of their choice, such as their favorite travel destinations. Using Google Arts & Culture, students selected a country and shared cultural insights. Students reflected on their travel choices, as follows:

"I think one of the culture shocks that I will face in India is food. I saw in many videos that Indians usually eat with their hands, actually their right hands, as they use their left hands in the washroom. When I heard that at the beginning, I did not like this idea, but now I think this will be interesting because I want to experience this interesting way in their culture and see how they enjoy the food." (S10)

Across the 70 h of instruction program, students achieved noticeable progress in both oral communication and critical thinking skills. Thematic analysis revealed progress in affective engagement, strategic language use, evaluative thinking, and reflective synthesis.

V. Discussion

The current study examined the effect of a connectivism-based program in enhancing EFL university students' oral communication and critical thinking skills. The quantitative findings revealed statistically significant differences between pre- and post-test mean scores, with very large effect sizes across both the overall tests and all measured sub-skills of oral communication and critical thinking. These findings were further supported by Blake's Modified Gain Ratio, which confirmed the program's remarkable effectiveness. While these results indicate substantial learning gains over the intervention period, they should be interpreted with caution due to the single-group design. Rather than establishing definitive causality, the findings suggest that participation in the connectivism-based program was associated with notable improvements in students' communicative and higher-order thinking performance. Qualitative findings provided complementary evidence of this improvement, highlighting that EFL university students not only improved their strategic, paralinguistic, sociolinguistic competencies but also developed greater confidence and autonomy in expressing ideas, evaluating sources, identifying problems, and exploring solutions. Together, these outcomes provide tangible evidence that connectivism can enhance students' communicative and higher-order thinking skills.

Several factors may account for these results. First, the integration of authentic, real-life topics and tasks created opportunities for students to bridge classroom learning with real-world language use. By discussing cultural traditions, workplace challenges, and social media trends, pupils were able to replicate on their lived experiences and engage in meaningful, situated communication. This aligns with the findings of Corbett and Spinello, who reported that connectivism enhanced adults' communicative competence by linking classroom activities to authentic social contexts [9]. Similarly, Jalinus indicated that connectivism supported students' critical thinking development by embedding everyday life scenarios into instruction. This process was mirrored in the present study, where students shared relevant information, formulated hypotheses to explain various topics, and debated conflicting concepts to persuade others [40].

Second, the use of multimodal digital platforms (e.g., Zoom, Padlet, EdPuzzle, WhatsApp, WordWall) appeared to support learner autonomy, interaction, and collaboration, core principles of connectivism. Previous studies have similarly highlighted the role of digital tools in facilitating networked learning and peer interaction [22, 41]. However, unlike research conducted in highly resourced contexts, this study was implemented within a relatively constrained institutional environment. The observed gains therefore suggest that connectivist strategies may be adaptable even in settings with limited technological infrastructure, provided that tools are used strategically and aligned with pedagogical goals. This finding contributes to ongoing debates regarding the feasibility of connectivism beyond technologically advanced contexts.

Third, visualization-based tasks, such as virtual exploration of cultural sites and scenario-based presentations, appeared to support both oral fluency and reflective thinking by providing concrete cognitive anchors for language production. This observation is consistent with Lee et al., who argued that visual thinking strategies can reduce cognitive load and support clearer oral expression [42]. In the present study, students' ability to link visual stimuli with spoken explanations may have facilitated more coherent discourse and deeper engagement with content, particularly for learners who initially lacked confidence in spontaneous speech.

Fourth, collaborative learning and peer feedback emerged as salient features of the intervention. Activities such as debates, group presentations, and problem-solving tasks required students to negotiate meaning, evaluate peers' contributions, and refine their arguments. These findings resonate with Alzubi et al., who emphasized that peer interaction and collaborative tasks can enhance communicative confidence, creativity, and self-directed learning [43]. Qualitative observations in the present study suggested that peer-supported environments encouraged risk-taking and experimentation with language, as students increasingly relied on clarification strategies and lexical substitution to sustain interaction. Such behaviors are indicative of developing strategic competence rather than mere test performance.

Despite these promising findings, the results should be interpreted in light of several methodological considerations. The absence of a control group limits the extent to which improvements can be attributed exclusively to the connectivism-based intervention. Additionally, the small, volunteer-based sample from a single institution may have amplified observed effects due to high motivation and close instructor support. These factors may partly explain the exceptionally large effect sizes and underscore the need for replication using larger samples and comparative designs.

Nonetheless, the study makes a meaningful contribution to the literature by addressing a notable gap: the simultaneous investigation of oral communication and critical thinking within a connectivist framework in an under-researched EFL

higher-education context. While previous studies have often examined these skills separately or in technologically advanced environments, the present research provides context-sensitive evidence suggesting that connectivist pedagogy may offer a viable approach for fostering integrated skill development in Egyptian EFL classrooms. As digital technologies increasingly shape educational practice, these findings highlight the importance of pedagogical models that emphasize networking, autonomy, and critical engagement rather than content transmission alone [44].

VI. Conclusion

The current study investigated how connectivism enhanced EFL university students' oral communication and critical thinking skills. Using a mixed-method, quasi-experimental single-group design, the study found significant differences in students' oral communication as well as critical thinking skills, in favor of the post-test scores. Large effect sizes, as supported by Blake's Modified Gain Ratio, demonstrated the program's notable effectiveness. Qualitative evidence from classroom observations and student reflections demonstrated how authentic tasks, digital tools, and collaborative learning enhanced oral performance, fluency, problem-solving, and reflective judgment. Taken together, the findings suggest that connectivist learning environments can provide a supportive and pedagogically coherent context for integrating oral communication and critical thinking practice in digitally mediated EFL higher-education settings, particularly when instruction emphasizes interaction, autonomy, and real-world relevance.

A. Implications

1) Theoretical implications

The findings extend existing connectivism literature by offering empirical support for its applicability to EFL instruction that targets both oral communication and critical thinking within a single instructional framework. While prior research has largely emphasized connectivism's role in knowledge networking, digital engagement, or isolated skill development, this study demonstrates how its principles may align with integrated language–cognition outcomes in a university EFL context. Moreover, by situating the intervention within a resource-constrained environment, the study contributes to ongoing theoretical debates regarding the contextual adaptability of connectivism, suggesting that its pedagogical value lies not only in advanced technologies but also in how learning networks, peer interaction, and learner autonomy are intentionally designed and scaffolded.

B. Practical Implications

From a pedagogical perspective, the findings suggest several implications for EFL teaching practice. First, incorporating actual, real-world tasks can help students connect classroom learning to personal and professional contexts, making language use more meaningful. Second, using digital platforms like Zoom, Padlet, and Google Arts and Culture and Gliglish can promote students' autonomy and cooperation, particularly in online or hybrid environments. Third, creating a supportive classroom environment that includes peer feedback and collaborative projects can minimize students' reliance on their first language and boost communicative confidence.

Beyond classroom practice, the findings also have implications for teacher training and institutional policy. Teacher education programs may benefit from integrating professional development modules that focus on connectivist pedagogy, digital task design, and strategies for facilitating online interaction and critical dialogue. At the institutional level, curriculum designers and policymakers may consider supporting flexible, technology-enhanced learning models and assessment practices that value oral communication and higher-order thinking alongside traditional knowledge outcomes. Such support can help ensure that connectivism-based approaches are implemented sustainably and equitably within higher-education EFL contexts.

VII. Limitations and Directions for Future Research

Despite its contributions, the present study had certain limitations that should be acknowledged. First, the reliance on a single-group design, due to contextual and ethical constraints, limits internal validity. The absence of a control group makes it difficult to fully exclude alternative explanations for the significant gains in students' oral communication and critical thinking skills, such as prior knowledge or other contextual factors. Although the large effect sizes and triangulation with qualitative findings strengthen in the results, future studies should adopt quasi-experimental or randomized control group designs to allow for robust causal inferences. Second, the sample consisted of 40 EFL students from a single faculty at one private Egyptian university, which limits generalizability. Thus, including larger and more diverse samples from multiple institutions and educational contexts would improve the external validity of findings. Also, replicating this intervention across different proficiency levels (secondary, technical, or adult learners) could also reveal how connectivism operates in diverse contexts.

Third, unstable internet connections also prevented some students from attending every session. While the researcher solved these issues by providing technical support, and uploading recorded sessions on Google Drive, future studies should consider integrating blended models to reduce technology-related barriers. Fourth, the study targeted only on oral communication and critical thinking skills. Consequently, future research should therefore broaden the scope to examine its impact of connectivism on other skills such as writing and listening, as well as its potential influence on digital literacy and cross-cultural awareness. Fifth, the study measured outcomes only in the short term. Longitudinal research is needed to determine whether the observed improvements in oral communication and critical thinking are sustained over time. Finally, future work could also compare connectivism with other innovative pedagogies (e.g., inquiry-based learning, gamification, or blended learning learning) to provide deeper insights into its effectiveness.

Appendix

Table A1. Oral communication skills list

Oral communication skills	Description	Very important	Important	Less important	Notes
Strategic proficiency	Substitution: Describes a problematic word using different terms (e.g., "electric stairs" for "escalator").				
	Fillers: Uses words or phrases to gain time or maintain the flow of conversation (e.g., "sort of", "let me think", "you know").				
	Clarification: Asks for clarification or rephrasing a message to make it clearer (e.g., "Did you mean...?", "Could you explain that again?").				
Sociolinguistic competence	Cultural Appropriateness: respects cultural norms in different social contexts (e.g., avoiding inappropriate language in formal situations).				
	Audience Awareness: Adjusts language based on the listener's background, knowledge, and communication preferences.				
Paralinguistic competence	Tone and Intonation: Uses appropriate tone (serious, humorous, sarcastic, etc.) and intonation patterns for clarity.				
	Pacing and Rhythm: Speaks at a pace that is neither too fast nor too slow, ensuring clarity and comprehension.				

Table A2. Critical thinking skills list

Critical Thinking Skills	Description	Very important	Important	Less important	Notes
Analysis	Identifies Key Issues: Breaks down complex problems into manageable and logical parts				
	Prioritizes Information: Determines which information is most relevant or critical in understanding a problem.				
Evaluation	Assesses Credibility: Focuses on what is most relevant, reliable, and useful for a specific purpose.				
	Considers Alternatives: Looks at multiple perspectives when evaluating information and making decisions.				
Synthesis	Combines Information: Integrates information from multiple sources to generate reasoned judgments and informed decisions.				
	Integrates Diverse Perspectives: Draws on different viewpoints to create a richer understanding of a topic.				
Problem-Solving	Identifies Problems: Recognizes and clearly articulates issues or challenges.				
	Explores Solutions: Considers multiple angles and evaluates conventional ideas.				

Table A3. Oral communication scoring rubric

Competence Area	Sub-Skill	Outstanding (4)	Effective (3)	Adequate (2)	Ineffective (1)
Strategic proficiency	Substitution	Learn how to explain a troublesome term with a different one by using replacement.	Somehow use substitution to explain a challenging word.	Rarely uses substitution to describe a problematic word and depends mostly on his or her mother tongue.	Unable to use substitution to describe a problematic word and relies heavily on his or her mother tongue.
	Fillers	Naturally employs efficient fillers to prevent hesitation and pauses.	Uses a few fillers to convey their thoughts.	Stops and use few fillers to finish their thoughts.	Relies on reading notes, pauses most of the time, and seldom ever tries to use fillers.
	Clarification	Frequently asks for clarification or rephrases accurately, ensuring clear understanding.	Asks for clarification when needed, with minor lapses in clarity.	Sometimes seeks clarification, but responses may remain unclear.	Rarely asks for clarification; misunderstands or fails to resolve confusion.
Sociolinguistic Competence	Cultural Appropriateness	Always uses language suitable for the context, showing strong awareness of cultural norms.	Generally appropriate language use, with few minor lapses.	Occasionally uses language unsuitable for the context.	Often uses inappropriate language, ignoring cultural norms.
	Audience Awareness	Consistently adjusts language and style appropriately for different listeners and situations.	Usually adapts language to the audience, with some inconsistencies.	Occasionally adjusts language, but sometimes misjudges audience needs.	Rarely adapts language, regardless of audience or situation.
Paralinguistic Competence	Tone and Intonation	Uses varied and appropriate tone and intonation to clearly convey meaning and	Generally appropriate tone and intonation, with minor lapses.	Tone and intonation sometimes flat or inconsistent, causing slight	Tone and intonation are incorrect or monotonous, hindering communication.

		nuance.		misunderstandings.	
	Pacing and Rhythm	Maintains a natural, clear speaking pace to enhance listener understanding.	Speaks generally at an appropriate pace, with occasional speed fluctuations.	Sometimes speaks too fast or too slow, slightly affecting clarity.	Speaks too quickly or too slowly and lacks the natural flow of language, making understanding difficult.

Table A4. Critical thinking skills scoring rubric

Skill Area	Sub-Skill	Outstanding (4)	Effective (3)	Adequate (2)	Ineffective (1)
Analysis	Identifies Key Issues	Clearly identifies all significant issues and distinguishes between major and minor points.	Identifies most key issues with minor omissions.	Recognizes too little key issues but overlooks others.	Fails to identify key issues; focuses on irrelevant details.
	Prioritizes Information	Skillfully ranks information by importance and relevance, showing logical organization.	Prioritizes information with minor lapses in organization.	Prioritizes some information, but sequence or relevance is inconsistent.	Fails to prioritize; presents information in a disorganized or random manner.
Evaluation	Assesses Credibility	Thoroughly evaluates the credibility and reliability of sources or information.	Assesses credibility but misses minor factors.	Shows limited ability to judge credibility; accepts information without question.	Fails to assess credibility; accepts information at face value.
	Considers Alternatives	Identifies a sufficient number of solution ideas and alternatives that are feasible to implement and selects effective solutions that meets all criteria	Often considers alternatives and clear solution ideas that are related to the context.	Occasionally mentions alternatives but without explaining them.	Unable to create alternative perspectives or explanations.
Synthesis	Combines Information	Effectively integrates information from multiple sources into a cohesive whole.	Integrates sufficient information, with minor gaps in connections.	Combines some information, but integration is incomplete or unclear.	Fails to integrate information; presents disconnected ideas.
	Integrates Diverse Perspectives	Skillfully merges different viewpoints into a well-reasoned, balanced argument.	Often integrates perspectives but may lack depth.	Attempts integration but with minimal synthesis.	Fails to incorporate diverse perspectives; presents a single, narrow view.
Problem-Solving	Identifies Problems	Clearly articulates problems, recognizing underlying causes and complexities.	identifies problems but may miss subtle aspects.	Recognizes obvious problems but overlooks deeper issues.	Fails to identify problems or misunderstand their nature.
	Explores Solutions	Generates creative, feasible solutions and logically evaluates their potential outcomes.	Proposes practical solutions with some evaluation of outcomes.	Suggests solutions but without critical evaluation.	Demonstrates little to no ability to propose a solution or offer unrealistic ideas.

A. Part 1: Critical Thinking Skills Pre/posttest

Scenario 1 – Job vs. Salary Dilemma
Time: 3 minutes
Prompt:
"Imagine you receive two job offers after graduation:

- Job A is in a field you love, with interesting tasks and a positive work environment, but offers a low salary.
- Job B pays a high salary but involves tasks you find boring and a stressful work environment.

1. What are the key issues you need to consider in making this decision?
2. Which job will you choose and why?
3. What solution would you follow to overcome the challenges of the job offer?"

Scenario 2 – Workplace Conflict
Time: 3 minutes
Prompt:
"Two colleagues in your department are arguing. One says the team isn't sharing information, and the other says the first person is just too demanding.

1. What are the key issues in this conflict?
2. How would you decide whose viewpoint is more credible?
3. What practical solutions would you suggest?"

B. Part 2: Oral Communication Pre- and Post-Test

Task 1: Individual Presentation

1. Give a 2–3-minute presentation on a childhood memory that you cannot forget.
   a) Task 2: Role Play
   Imagine a foreign friend is visiting Egypt for the first time:
2. What places would you recommend they visit?
3. What foods and traditions should they experience, and why?"
   b) Task 3: Group Discussion

Students were divided into groups of four using Zoom breakout rooms to discuss the question:

4. "Is social media more helpful or harmful for communication among young people and why?"

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

I.A. conducted the intervention, collected the data, and wrote the manuscript; Y.A. performed the statistical analysis; S.L., K.R., and N.A. contributed to writing, review and editing, theoretical framing, and critical revisions. All authors had approved the final version of the manuscript.

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