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LEVERAGING GENERATIVE ARTIFICIAL INTELLIGENCE (GENAI) TO TRANSFORM EFL INSTRUCTIONAL PRACTICES IN THE CONTEXT OF 21ST-CENTURY SKILLS

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ABSTRACT

The research proposes the use of Generative Artificial Intelligence (GenAI) technologies to improve instructional practice in accordance with 21st-century skills among EFL teachers in Saudi Arabia. The study employed a descriptive quantitative design, utilizing a validated 32-item GenAI Utilization Scale with four dimensions: Critical Thinking and Problem Solving, Creativity and Innovation, Communication and Collaboration, and Digital and ICT Literacy. A total of 139 EFL teachers enrolled in graduate programs at King Khalid University served as the data source. Findings indicated that the general level of GenAI use is moderate (M = 3.00, 60.08%), with the highest and lowest scores in Communication and Collaboration and Digital and ICT Literacy, respectively. Gender-based conclusions revealed statistically significant differences in favor of male teachers ($p < .05$), and self-report of technology proficiency exhibited a strong positive correlation with GenAI use ($p < .001$). Nevertheless, they did not find any remarkable differences between school levels and years of experience. The results point to a period of transition in the use of GenAI, in which teachers use AI as a supportive, rather than a transformative, instructional resource. The paper highlights the significance of specific professional development to enhance teachers' digital integration in terms of competence, creativity, and critical thinking. In general, it provides empirical evidence that can inform policymakers and educators on how to utilize GenAI to promote sustainable, innovation-based EFL teaching.

KEYWORDS: Generative Artificial Intelligence, Instructional Practices, 21st-Century Skills, EFL Teachers.

1. INTRODUCTION

With the introduction of the GenAI, the paradigm of educational innovation has changed the design of instruction, practices of teaching, and language acquisition in history. GenAI technologies (ChatGPT, Bard, and other large language models) could be regarded as the subset of the broader Fourth Industrial Revolution and enable teachers to personalize the learning experience, automate feedback, and make the experience more interactive. These are the tools in the scenario of English as a Foreign Language (EFL) education that have introduced revolutionary opportunities to improve linguistic competence, cultivating critical thinking, and collaboration (Moorhouse, 2024a; Tafazoli, 2024).

The Vision 2030 of the Kingdom of Saudi Arabia focuses on technological innovation and educational change. In this context, the ability to communicate in English has become one of the essential competencies of global communication and economic involvement. Nevertheless, although GenAI has massive potential to ease the 21st-century learning process, its use by EFL teachers is uneven and not studied thoroughly. It is therefore important to understand how teachers can use these technologies to improve instruction practices and, in the process, realize sustainable educational reform.

1.1. Significance of the Study

This research is relevant because it contributes to the existing body of knowledge on AI integration in the educational context and provides empirical evidence. In addition to the rapid implementation of AI tools worldwide, there are scarce empirical studies on how EFL teachers in Saudi Arabia can utilize GenAI to develop the 21st-century competencies of critical thinking, creativity, communication, and digital literacy. The research also bridges a regional research gap and aligns with international efforts to conceptualize effective AI-enhanced pedagogies (Pack & Maloney, 2024; Chai et al., 2025).

In addition, the study can inform teacher training, policy-making, and curriculum development through the examination of how GenAI adoption is influenced by demographic factors (gender, experience, and digital competency) and how these factors can inform future actions to address these needs.

Its results will also inform institutions on how to use GenAI to promote sustainable, skills-based, and learner-centered teaching of EFL, and thus lead to both local and global educational change.

1.2. Objectives of the Study

This study aims to:

Summary: The purpose of this study is to investigate the extent to which EFL teachers in Saudi Arabia use GenAI technologies to improve the practices used in instruction that will align with the 21st-century skills.

- Determine demographic and contextual characteristics (e.g., gender, teaching level, years of experience, self-reported technology proficiency) that determine the level of GenAI use.
- Offer empirical data to support teacher training initiatives and policy changes to help incorporate GenAI in language instruction.

1.3. Research Questions

This research seeks to answer the following questions:

1. To what extent do EFL teachers utilize GenAI technologies to enhance instructional practices in alignment with 21st-century skills?
2. Are there statistically significant differences ($\alpha = 0.05$) in the extent of GenAI technology utilization for developing instructional practices in light of 21st-century skills among EFL teachers based on gender, school level taught, years of experience, and self-reported technology usage level?

1.4. Research Hypotheses

The study aims to test the following hypotheses:

H1: The level of utilizing GenAI technologies for developing instructional practices in light of 21st-century skills among EFL teachers is moderate.

H2: There are no statistically significant differences ($\alpha = 0.05$) in the extent of utilizing GenAI technologies for developing instructional practices in light of 21st-century skills among EFL teachers according to gender, school level taught, experience, and self-reported technology usage level.

2. LITERATURE REVIEW

2.1. Theoretical Framework

This research is based on the concepts of Social Cognitive Theory (SCT) (Bandura, 1986) and Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006). According to SCT, the adoption of GenAI by teachers can be characterized as a result of mutual effects between the personal beliefs, technological

affordance, and teaching environmental perspective that were supported by Guan et al. (2025) who showed that informal digital learning that utilizes GenAI leads to increased EFL engagement via social and cognitive reinforcement.

In the meantime, AI-TPACK model, which is an extension of the traditional TPACK, incorporates artificial intelligence into the fields of knowledge of pedagogy. Parviz and Arthur (2025) used this model to examine the behavioral intentions of teachers and found the model heavily predictive of the integration of GenAI because of the performance expectancy and social influence. Nevertheless, the increased need to be aware of the limitations of AI can counteract the trend, which is why balanced teacher preparation is a necessity.

These frameworks combined provide a two-pronged approach to exploring the concept of technological competence and psychological preparedness in GenAI-improved instruction, with the relationship between self-efficacy, digital literacy, and pedagogical innovation being a complicated relationship to consider.

2.2. Genai In Language Education: Transformative Potential and Challenges

The increased use of generative AI in language education has altered the teacher-learner roles. Tafazoli (2024) pointed out that it has democratising potential because it can result in equal access to language learning opportunities and individualized feedback without referring to a socioeconomic background. On the same note, both Baskara et al. (2024) and Yeh (2025) revealed that GenAI promotes creativity, autonomy, and communicative competence, particularly during project-based and inquiry-driven learning experiences.

However, there are still difficulties. Pack and Maloney (2024) warned that AI-generated content should not be over-relied upon, as it raises ethical concerns about authorship, accuracy, and student dependency. Cogo et al. (2024) also cautioned that AI must augment, rather than substitute for, human interaction and critical thinking. All of these studies support the idea that it is essential to have pedagogical frameworks that incorporate AI responsibly in the context of language learning.

2.3. Empirical Perspectives on Genai in EFL Instruction

Recent empirical research has provided insights into the pedagogical effectiveness of GenAI tools. According to Mohamed et al. (2025), ChatGPT demonstrated greater success in enhancing the ESP writing competence and autonomy of learners, whereas Jmaiel et al. (2025) identified gender-specific differences in AI-based writing performance. Similarly, Alzubi (2024) also reported medium scores of GenAI literacy in EFL learners, and proficiency and GPA played a powerful role in determining effectiveness.

Alfaleh et al. (2025) investigated AI-supported oral reading practices in the Saudi context and found that it made a considerable impact on motivation, engagement, and competence particularly in higher-level learners. These results indicate that although GenAI can facilitate the advancement of skills and learner motivation, the willingness and preparation of teachers are also the primary factors in the successful integration.

2.4. Genai And Development Of 21st-Century Skills.

The overlap between GenAI and skills required in the 21st century, in particular, critical thinking, creativity, communication, and digital literacy, is also one of the key changes in EFL pedagogy. Limiya and Kumar (2025) have compiled 55 articles and demonstrate that GenAI systems, including chatbots and speech recognition systems, improve all four language proficiencies by using computer-generated personalized learning environments that are adaptive. This was further supported by Yeh (2025) who revealed through a study that inquiry-based AI teaching facilitates cooperation and problem solving, thereby encouraging higher order thinking.

Tutton and Cohen (2025) redefined the functions of the university instructors by proposing a mixed pedagogical approach that includes interacting with students in the classroom as a human and the use of AI-driven learning beyond the classroom setting- a balance that is prerequisite to developing 21st-century skills.

2.5. Further Trends in Genai-Advanced Instructional Design.

Regarding instructional design, Chai et al. (2025) mapped the GenAI application to the ADDIE model and found advantages in the analysis and design stages, the development phase, and the evaluation phase, and noted ethical issues. Similarly, Ariza et al. (2025) and AlAli et al. (2024) emphasized the importance of AI literacy and evidence-based practices in promoting the ethical, scalable, and efficient use of education.

Nevertheless, Law (2024) pointed out that the empirical assessment has been lacking, as the majority of the research studies are purely theoretical

or exploratory. In a study by AlTwijri and Alghizzi, AI had a positive impact on affective factors (e.g., motivation, reduction of anxiety), which is prospective but under-explored (AlTwijri and Alghizzi, 2024), meanwhile, Xiao et al. (2025) observed the necessity of interdisciplinary and multimodal research of EFL writing instructions.

2.6. Research Gap

Empirical research in the Arab and Saudi EFL setting is still scarce, even though there has been growing attention throughout the world. The literature is primarily learner-centered and lacks detailed information on how EFL teachers can utilize GenAI to enhance the instructional process, making it more beneficial and aligned with 21st-century skillsets. In addition, the impact of demographic factors (gender, experience, proficiency) on the use of GenAI in actual classroom contexts is not investigated. Therefore, the proposed research bridges the gap in critical research by empirically investigating how EFL teachers use GenAI technologies to improve instructional procedures in terms of 21st-century skills. It brings something new to the understanding of teacher preparation, technology adoption, and pedagogical change, which is key to creating AI-enhanced, future-oriented education systems in Saudi Arabia and other countries.

3. METHODOLOGY

This research adopts a descriptive quantitative methodology to effectively address the research questions. Data will be collected through a validated Likert-scale questionnaire designed to assess the extent of GenAI utilization and its perceived impact on instructional practices aligned with 21st-century skills. Statistical analyses will include descriptive statistics, t-tests, and ANOVA to examine differences based on demographic and professional variables.

3.1. Research Sample

The research sample consisted of 139 male and female EFL teachers enrolled in the College of Education's graduate programs at King Khalid University during the 2025/2026 academic year. This purposive sampling strategy targeted graduate-enrolled teachers as they are actively engaged in advanced pedagogical study and are thus more likely to be reflective of contemporary teaching frameworks and technological innovations, providing a strategically informative cohort for this exploratory research. It should be noted that this focus may affect the generalizability of findings to the broader population of in-service EFL teachers who are not pursuing graduate studies.

The demographic characteristics of the participants are presented in Table 1.

Table 1: Description Of the Demographic Characteristics of the Sample.

Variables	Sub Variables	N	Percentage
Gender	Male	58	41.73%
	Female	81	58.27%
School Level Taught	Elementary	60	43.17%
	Intermediate	47	33.81%
	Secondary	32	23.02%
Experience	Less than 5 years	62	44.60%
	5 to 10 years	45	32.37%
	More than 10 years	32	23.02%
Self-Reported Technology Usage Level	Moderate	63	45.32%
	High	76	54.68%
	Total	139	100%

Table 1 shows demographic details of the research sample. The data show a more or less equal but a little more female dominated distribution where female teachers take up 58.27 % of the sample size in contrast to 41.73 % male teachers. This is an indication of a larger trend in the Saudi educational environment where female representation in English language teaching, especially at the primary and intermediate levels is relatively higher**.**

In terms of the level to be taught, the highest percentage of the participants were elementary level (43.17), intermediate level (33.81) and secondary level (23.02). This distribution indicates that a large section of the sample is studying English language at an early stage, at which the topics of pedagogical innovation and the incorporation of technologies are the most topical**.**

As regards teaching experience, almost 45 % of the respondents have less than five years of teaching experience, 32.37 % have five to ten years, and 23.02 % have more than ten years teaching experience. This means that the sample covers a wide group of teachers, and there is a significant composition of early-career teachers who can be more willing to

explore Generative AI technologies in their instruction**.**

Lastly, the self-reported level of technology use indicates that the participants consider their use of technology to be high, with 54.68% reporting a high level and 45.32% reporting a moderate level of technology use. The fact that there is no low usage category means that all participants are at least moderately engaged with technology, and thus make the right group of people to study the application of Generative AI in the teaching process.

3.2. Research Tool

To investigate the role of GenAI Technology in the professional settings of EFL teachers, the authors designed the GenAI Technology Utilization Scale to assess the degree of its use by EFL teachers in optimizing their teaching methods in accordance with 21st-century skills. The original scale included 32 questions having the same number of items in four dimensions which represented a fundamental set of 21 st century skills.

These dimensions are:

1. Critical Thinking and Problem Solving
2. Creativity and Innovation
3. Communication and Collaboration
4. Digital and ICT Literacy

All items were positively worded self-report statements rated on a five-point Likert scale: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5). For the interpretation of mean scores, the following ranges were applied: 1.00–2.33 = Low, 2.34–3.66 = Moderate, 3.67–5.00 = High.

3.2.1. Psychometric Properties: Validity And Reliability

A. Validity

The face validity of the scale was established through expert judgment. The instrument was reviewed by a panel of 13 specialists in Psychology, Educational Technology, and Curriculum and Instruction. The experts unanimously affirmed the clarity, relevance, and comprehensiveness of the items, as well as the appropriateness of the instrument for assessing GenAI utilization among EFL teachers.

B. Internal Consistency (Item–Total and Dimension–Total Correlations)

The internal consistency of the scale was examined after administering it to 139 EFL teachers. Table 2 presents the Pearson correlation coefficients between each item and both its corresponding dimension and the overall total score.

Table 2: Pearson Correlation Coefficients Between Individual Items and Their Dimension and Overall Scale (N = 139).

Items number	Correlation with its dimension	Correlation with overall Scale	Items number	Correlation with its dimension	Correlation with overall Scale
1	0.598**	0.563**	17	0.675**	0.539**
2	0.633**	0.570**	18	0.621**	0.534**
3	0.582**	0.501**	19	0.680**	0.636**
4	0.553**	0.487**	20	0.658**	0.560**
5	0.554**	0.451**	21	0.713**	0.646**
6	0.613**	0.508**	22	0.688**	0.604**
7	0.569**	0.485**	23	0.638**	0.609**
8	0.557**	0.504**	24	0.600**	0.571**
9	0.684**	0.633**	25	0.645**	0.541**
10	0.662**	0.604**	26	0.655**	0.526**
11	0.675**	0.638**	27	0.724**	0.558**
12	0.721**	0.650**	28	0.604**	0.488**
13	0.701**	0.580**	29	0.753**	0.579**
14	0.778**	0.684**	30	0.683**	0.628**
15	0.731**	0.683**	31	0.658**	0.596**
16	0.768**	0.705**	32	0.715**	0.690**
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 2 shows that all correlation coefficients between individual items and their respective dimensions, as well as the total scale, were positive and statistically significant at the 0.01 level.

The item–dimension correlations ranged between 0.55 and 0.78, and the item–total correlations ranged between 0.45 and 0.70, which are considered acceptable to high according to psychometric standards.

These results confirm that each item is meaningfully related to its intended construct and contributes to the overall coherence of the scale.

Hence, no items were excluded from further analysis.

C. Inter-Dimension Correlations

Table 3 displays the Pearson correlation coefficients among the four dimensions of the scale and their correlations with the total scale score.

Table 3: Inter-Dimension Correlation Matrix and Correlations with the Total Scale (N = 139).

Dimensions	Critical Thinking & Problem Solving	Creativity & Innovation	Communication & Collaboration	Digital & ICT Literacy	Overall scale
Critical Thinking & Problem Solving	1	0.901**	0.839**	0.867**	0.979**
Creativity & Innovation	0.901**	1	0.638**	0.732**	0.905**
Communication & Collaboration	0.839**	0.638**	1	0.657**	0.889**
Digital & ICT Literacy	0.867**	0.732**	0.657**	1	0.845**
Overall scale	0.979**	0.905**	0.889**	0.845**	1
**. Correlation is significant at the 0.01 level (2-tailed).					

As shown in Table 3, all correlations among the four dimensions are positive, strong, and statistically significant at the 0.01 level.

The correlations range from 0.638 to 0.901, indicating that while the dimensions are interrelated, they still capture distinct yet complementary aspects of GenAI utilization in instructional practices.

The strongest correlation (r = 0.901) was observed between Critical Thinking & Problem Solving and Creativity & Innovation, suggesting that teachers who employ GenAI to enhance problem-solving are also more likely to integrate it for creative and innovative teaching.

Additionally, the very high correlations between each dimension and the total scale score (r = 0.845–0.979) provide strong evidence of the construct validity of the scale.

D. Reliability

The reliability of the scale was determined using both Cronbach's Alpha (α) and the Guttman Split-Half method.

Table 4: Reliability Coefficients of the Scale (N = 139).

Dimensions	No. of items	Cronbach's Alpha (α)	Guttman split-half coefficients
Critical Thinking & Problem Solving	8	0.836	0.753
Creativity & Innovation	8	0.863	0.807
Communication & Collaboration	8	0.814	0.646
Digital & ICT Literacy	8	0.833	0.790
Overall scale	32	0.940	0.864

Table 4 indicates that the Cronbach's Alpha coefficients for the four dimensions ranged from 0.814 to 0.863, and the overall reliability of the full scale was α = 0.940.

These values exceed the accepted threshold of 0.70, indicating excellent internal consistency across all dimensions.

Similarly, the split-half reliability coefficients ranged from 0.646 to 0.807 for individual dimensions and 0.864 for the total scale, further confirming the instrument's stability and reliability. Collectively, these psychometric indicators confirm that the GenAI Technology Utilization Scale is both valid and reliable for assessing the extent of Generative AI integration into EFL instructional practices, considering 21st-century skills.

3.3. Data Collection

This study used a cross-sectional survey on a purposive sample of EFL teachers pursuing graduate programs at King Khalid University to collect the required data. The ethics of the study were fully approved by the institutional review board prior to its commencement, ensuring that it was conducted in accordance with established ethical standards in research. The main tool was a 32-item GenAI Utilization Scale, which was a validated tool created to measure the use of the Generative AI tools in the instruction practice in agreement with the four primary 21st-century skill domains, namely: Critical Thinking and Problem Solving, Creativity and Innovation, Communication and Collaboration, and Digital and ICT Literacy. The questionnaire took the

Likert-scale format to result in the perception and self-report of the teachers. Participation has been done on a voluntary basis and informed consent has been taken among all respondents at the commencement of the survey clearly stating the purpose of the study, the confidentiality of their answers and their right of the survey to be withdrawn at their will. The survey was also administered electronically to the potential participants after they received the required institutional approvals. One hundred and thirty-nine responses were gathered, and the completed responses were the final data to be analyzed. This was done to make sure that quantitative data were collected effectively and in a moral manner, in a group of in-service teachers who are actively pursuing higher academics; hence form a significant population that can be used to explore the issue of technology integration in EFL teaching.

3.4. Data Analysis

The statistical software was used to analyze the data collected in accordance with the objectives of the research. The information was initially filtered and purified to make it ready to use in analysis. The descriptive statistics in the means, standard deviations, and percentage equivalents were used to establish the general and dimensional levels of GenAI use among the EFL teachers. Inferential statistical tests were used to research differences in the use of GenAI depending on the demographic variables. Namely, independent samples t-test was applied to contrast the scores in terms of gender whereas a one-way Analysis of Variance (ANOVA) measured the disparities in terms of school levels as well as years of teaching experience. Moreover, the Pearson correlation coefficient has been calculated to examine the relationship between teachers' self-reported technology proficiency and their degree of GenAI use. All tests were determined to have a statistical significance threshold of $p < .05$ that offered a standardized value of importance to identify the trustworthiness of the differences and relationships occurring in the data.

4. RESULTS AND DISCUSSION

RQ1: To what extent do EFL teachers utilize GenAI technologies to enhance instructional practices in alignment with 21st-century skills?

To address this research question, the descriptive statistics - specifically the arithmetic means, standard deviations, and percentages - were calculated based on the research sample's responses to each item of the scale.

The following Table 5 presents the descriptive statistics for the level of teaching practices using Generative AI among English as a Foreign Language (EFL) teachers (the study sample) in light of overall 21st-century skills and their four dimensions.

Table 5: Descriptive Statistics for the Level of Teaching Practices Using Generative AI In Light of Overall 21st-Century Skills and Their Four Dimensions (N=139).

No.	Dimensions	Mean	SD	Percentage	Level	Rank
1	Critical Thinking & Problem Solving	3.03	0.64	60.52%	Moderate	2
2	Creativity & Innovation	2.98	0.68	59.57%	Moderate	3
3	Communication & Collaboration	3.08	0.68	61.62%	Moderate	1
4	Digital & ICT Literacy	2.93	0.64	58.62%	Moderate	4
	Overall 21st-century skills	3.00	0.57	60.08%	Moderate	

Table 5 shows that the overall utilization of GenAI in teaching practices among EFL teachers is moderate (within the 2.34–3.66 range) (Mean = 3.00, SD = 0.57, 60.08%). Among the four dimensions, Communication & Collaboration ranked highest (Mean = 3.08, 61.62%), followed by Critical Thinking & Problem Solving (Mean = 3.03, 60.52%), Creativity & Innovation (Mean = 2.98, 59.57%), and Digital & ICT Literacy (Mean = 2.93, 58.62%). These results suggest that teachers are moderately leveraging GenAI to support collaborative and communicative aspects of learning, while the integration of AI into digital literacy remains slightly less developed. Overall, the findings indicate a balanced but moderate adoption across all 21st-century skill dimensions.

Table 6 presents the results for the items comprising the first dimension: Critical Thinking & Problem Solving.

Table 6: Descriptive Statistics for the Level of Teaching Practices Using Genai Items Related to Critical Thinking & Problem Solving Among EFL Teachers (N = 139).

No.	Dimensions	Mean	SD	Percentage	Level	Rank
1	Generative AI helps me analyze students' learning problems more deeply.	2.76	0.88	55.25%	Moderate	8
2	I use generative AI tools to create questions that assess students'	3.04	0.97	60.72%	Moderate	4

	critical thinking.					
3	Generative AI supports data-driven instructional decision-making.	3.02	0.94	60.43%	Moderate	5
4	I use AI to interpret and analyze students' error patterns.	2.95	0.85	58.99%	Moderate	6
5	AI enhances my ability to ask questions that promote deeper thinking.	3.27	0.95	65.32%	Moderate	1
6	I use AI to compare students' solutions and identify the most effective ones.	2.86	0.96	57.27%	Moderate	7
7	AI assists me in prioritizing teaching objectives based on students' needs.	3.14	0.97	62.88%	Moderate	3
8	AI supports my ability to evaluate the credibility of scientific information.	3.17	1.03	63.31%	Moderate	2
	Overall	3.03	0.64	60.52%	Moderate	

Table 6 provides the analysis of the first dimension Critical Thinking & Problem Solving, which implies that the use of AI is moderate in all items (overall Mean = 3.03, SD = 0.64, 60.52). The highest-rated item was that of AI supporting higher-order thinking with the aid of questions (Mean = 3.27, 65.32%). The next step is AI assistance in assessing the scientific information credibility (Mean = 3.17, 63.31%) and teaching objectives (Mean = 3.14, 62.88%). Products pertinent to studying the learning issues of students and comparing the solutions obtained a bit lower rating (Means = 2.762.86), indicating that the use of data-oriented decision-making and individual analysis is practiced less often. In sum, the results demonstrate moderate levels of andragogy of teachers using GenAI to develop critical thinking and problem-solving abilities.

Table 7 presents the results for the items comprising the second dimension: Creativity & Innovation.

Table 7: Descriptive Statistics for the Level of Teaching Practices Using Genai Items Related to Creativity & Innovation Among EFL Teachers (N = 139).

No.	Dimensions	Mean	SD	Percentage	Level	Rank
1	I use generative AI to design innovative and engaging learning activities.	2.78	0.99	55.54%	Moderate	8
2	Generative AI helps me generate new ideas for lesson development.	3.04	0.93	60.86%	Moderate	4
3	I use AI to generate instructional texts suitable for my students' levels.	3.13	0.99	62.59%	Moderate	2
4	AI encourages me to try non-traditional teaching strategies.	2.88	0.90	57.70%	Moderate	6
5	I use AI to generate innovative visual or audio materials for lessons.	3.15	0.97	63.02%	Moderate	1
6	AI helps me design personalized learning activities for each student.	3.09	0.96	61.73%	Moderate	3
7	Generative AI stimulates my creative imagination in lesson design.	2.91	0.97	58.13%	Moderate	5
8	AI supports me in developing innovation-based learning projects.	2.85	0.94	56.98%	Moderate	7
	Overall	2.98	0.68	59.57%	Moderate	

Table 7 presents the results for the Creativity & Innovation dimension, showing that the overall level of GenAI utilization was also moderate (Mean = 2.98, SD = 0.68, 59.57%). Teachers reported the highest engagement in generating innovative visual/audio materials (Mean = 3.15, 63.02%), developing instructional texts suitable for students' levels (Mean = 3.13, 62.59%), and designing personalized learning activities (Mean = 3.09, 61.73%). Lower scores were observed in items related to designing innovative activities from scratch and supporting innovation-based projects (Means = 2.78–2.85), indicating that while teachers use AI to enhance creativity, fully transformative and experimental applications remain less common. These results align with literature emphasizing that AI is often utilized as a supportive, rather than generative, tool in innovative teaching practices.

Table 8 presents the results for the items comprising the third dimension: Communication & Collaboration.

Table 8: Descriptive Statistics for the Level of Teaching Practices Using Genai Items Related to Communication & Collaboration Among EFL Teachers (N = 139).

No.	Dimensions	Mean	SD	Percentage	Level	Rank
1	I use AI to improve my written communication with students.	3.40	1.10	67.91%	Moderate	2
2	AI helps me design digital collaborative tasks for students.	3.34	1.00	66.76%	Moderate	3
3	I use AI to provide constructive feedback to students.	2.85	1.00	56.98%	Moderate	6
4	AI enhances effective communication with colleagues in lesson planning.	3.57	1.08	71.37%	High	1
5	I use AI to create interactive activities that promote classroom dialogue.	3.04	1.00	60.72%	Moderate	4

6	AI contributes to improving students' language communication skills.	2.78	1.11	55.54%	Moderate	7
7	I use AI to design online collaborative learning tasks.	2.97	0.94	59.42%	Moderate	5
8	AI supports me in building an effective virtual learning community.	2.71	1.04	54.24%	Moderate	8
	Overall	3.08	0.68	61.62%	Moderate	

Table 8 outlines the Communication & Collaboration dimension that resulted into the highest overall mean of all dimensions (Mean = 3.08, SD = 0.68, 61.62%), indicating moderate-to-high utilization. The best-rated one was the statement that AI improves efficient interactions with co-workers in lesson planning (Mean = 3.57, 71.37%), which means a high perceived value of collaborative professional environment. Other items like enhancing written communication with students (Mean = 3.40, 67.91%) and creating digital collaborative tasks (Mean = 3.34, 66.76%) were well rated as well. Things that focus on active use and development of virtual learning community by students were rated lower (Means = 2.712.97). These results indicate that educators use AI with more emphasis on structured collaboration and communication and less emphasis on encouraging student-initiated collaborative interactions.

The fourth dimension is the Critical Thinking and Problem Solving, the results of which are in Table 9.

Table 9: Descriptive Statistics for the Level of Teaching Practices Using Genai Items Related to Critical Thinking & Problem Solving Among EFL Teachers (N = 139).

No.	Dimensions	Mean	SD	Percentage	Level	Rank
1	I use AI to enhance my technical teaching skills.	2.75	0.94	54.96%	Moderate	7
2	AI supports me in managing the digital learning environment efficiently.	2.83	0.94	56.69%	Moderate	6
3	AI helps me produce safe and ethical digital content.	2.90	0.93	57.99%	Moderate	4
4	I use AI to select appropriate digital learning resources.	3.20	0.96	64.03%	Moderate	1
5	I use AI to design effective digital assessments.	2.85	1.02	56.98%	Moderate	5
6	AI helps me develop my ability to analyze educational data.	3.14	0.96	62.88%	Moderate	2
7	AI helps me integrate emerging technologies into daily lessons.	3.03	0.91	60.58%	Moderate	3
8	I use AI to improve my awareness of cybersecurity and data protection.	2.74	0.87	54.82%	Moderate	8
	Overall	3.03	0.64	60.52%	Moderate	

Table 9 shows the Digital and ICT Literacy dimension that showed moderate use in general (Mean = 3.03, SD = 0.64, 60.52%). The highest rating of the AI use in choosing the right type of digital resources was (Mean = 3.20, 64.03%), then the development of the skills to analyze the educational information (Mean = 3.14, 62.88%), and applying the new technologies in the lessons (Mean = 3.03, 60.58%). The least rated ones were the development of awareness of cybersecurity and data protection (Mean = 2.74, 54.82%), as well as the development of technical teaching skills (Mean = 2.75, 54.96%). The trend shows moderate yet uneven interest in digital literacy practices, which should be used as the basis of professional development in the sphere of technology integration and digital safety.

The results in the four dimensions constantly indicate moderate scores of GenAI integration in teaching practice among EFL teachers. Optimal engagement is observed in communication and collaborative work, and digital literacy and totally innovative applications are underdeveloped. These findings indicate that teachers are aware of the potential of AI tools; their application attempts are, nonetheless, hesitant and mainly supportive, which is an indication of a transitional stage of adoption of GenAI to the development of skills in the 21st century. The findings are consistent with the existing literature that highlights the moderate use of AI in pedagogical practices and the necessity to provide specific training to make the most of its application in the areas of critical thinking, creativity, and digital competence (e.g., Holmes et al., 2023; Luckin et al., 2016).

RQ2: Are there statistically significant differences (α = 0.05) in the extent of GenAI technology utilization for developing instructional practices in light of 21st-century skills among EFL teachers based on gender, school level taught, years of experience, and self-reported technology usage level?

To answer this question, independent samples t-tests were employed to examine the influence of gender and self-reported technology usage level, while one-way ANOVA was conducted to test differences across school level taught and years of teaching experience.

Table 10: Independent Samples T-Test Results for Differences in Genai-Based Instructional Practices—

Specifically for Developing 21st-Century Skills—Across Gender.

Dimensions	variables	N	M	SD	df	t	Sig. (2-tailed)
Critical Thinking & Problem Solving	Male	58	99.97	16.26	137	2.113	0.036
	Female	81	93.38	19.32			
Creativity & Innovation	Male	58	25.05	5.05	137	2.268	0.025
	Female	81	22.95	5.62			
Communication & Collaboration	Male	58	25.93	4.67	137	2.391	0.018
	Female	81	23.73	5.79			
Digital & ICT Literacy	Male	58	24.50	4.96	137	2.074	0.040
	Female	81	22.69	5.14			
Overall 21st-century skills	Male	58	132.84	22.08	137	2.585	0.011
	Female	81	121.88	26.31			

Table 10 presents the results of the independent samples t-test examining differences in GenAI-based instructional practices across gender. Findings revealed statistically significant differences ($p < 0.05$) between male and female teachers across all dimensions and in the overall score. Male teachers reported higher mean scores than female teachers in Critical Thinking & Problem Solving (M = 99.97 vs. 93.38, t(137) = 2.113, p = 0.036), Creativity & Innovation (M = 25.05 vs. 22.95, t(137) = 2.268, p = 0.025), Communication & Collaboration (M = 25.93 vs. 23.73, t(137) = 2.391, p = 0.018), and Digital & ICT Literacy (M = 24.50 vs. 22.69, t(137) = 2.074, p = 0.040).

The overall 21st-century skills mean score also significantly favored male teachers (M = 132.84 vs. 121.88, t(137) = 2.585, p = 0.011).

These results indicate that male EFL teachers exhibit a higher level of GenAI utilization in instructional practices across all dimensions of 21st-century skills. This difference might reflect gender-related variations in technology confidence or access, a pattern observed in previous educational technology studies (e.g., Wiseman et al., 2018).

Table 11: Independent Samples T-Test Results for Differences in Genai-Based Instructional Practices—Specifically for Developing 21st-Century Skills—Across Self-Reported Technology Usage Level.

Dimensions	variables	N	M	SD	df	t	Sig. (2-tailed)
Critical Thinking & Problem Solving	Moderate	63	83.78	14.93	137	-9.140	0.000
	High	76	106.37	14.14			
Creativity & Innovation	Moderate	63	20.67	4.91	137	-7.283	0.000
	High	76	26.45	4.44			
Communication & Collaboration	Moderate	63	21.71	5.00	137	-6.616	0.000
	High	76	27.08	4.55			
Digital & ICT Literacy	Moderate	63	19.60	3.67	137	-10.988	0.000
	High	76	26.63	3.82			
Overall 21st-century skills	Moderate	63	109.66	20.72	137	-9.018	0.000
	High	76	140.38	19.36			

As was demonstrated in Table 11, statistically significant differences were identified in all dimensions based on the degree of self-reported technology use. Group teachers that indicated a high rate of technology use displayed a much higher usage of GenAI tools compared to those who indicated a moderate rate of technology use (all $p < 0.001$).

In particular, the average scores of the group with high usage were much greater in all the dimensions:

- Critical Thinking & Problem Solving: M = 106.37 vs. 83.78, t (137) = -9.140, $p < 0.001$
- Creativity & Innovation: M = 26.45 vs. 20.67, t (137) = -7.283, $p < 0.001$
- Communication & Collaboration: M = 27.08 vs. 21.71, t (137) = -6.616, $p < 0.001$
- Digital & ICT Literacy: M = 26.63 vs. 19.60, t(137) = -10.988, $p < 0.001$
- Overall 21st-century skills: M = 140.38 vs. 109.66, t(137) = -9.018, $p < 0.001$

These findings suggest a strong positive relationship between teachers' self-perceived technology proficiency and their effective utilization of GenAI in enhancing 21st-century skills. This supports the argument that digital self-efficacy has a significant influence on AI integration in educational contexts (Zawacki-Richter et al., 2019; Holmes et al., 2023).

Table 12: One-Way Analysis of Variance (ANOVA) Results for Differences in Genai-Based Instructional

Practices—Specifically for Developing 21st-Century Skills—Across School Level Taught.

Dimensions	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Critical Thinking & Problem Solving	Between Groups	1928.448	2	964.224	2.948	0.056
	Within Groups	44479.221	136	327.053		
	Total	46407.669	138			
Creativity & Innovation	Between Groups	176.814	2	88.407	3.046	0.051
	Within Groups	3947.042	136	29.022		
	Total	4123.856	138			
Communication & Collaboration	Between Groups	84.351	2	42.175	1.431	0.243
	Within Groups	4009.376	136	29.481		
	Total	4093.727	138			
Digital & ICT Literacy	Between Groups	83.218	2	41.609	1.594	0.207
	Within Groups	3549.127	136	26.097		
	Total	3632.345	138			
Overall 21st-century skills	Between Groups	3195.841	2	1597.921	2.586	0.079
	Within Groups	84027.159	136	617.847		
	Total	87223.000	138			

Table 12 presents the results of the one-way ANOVA conducted to investigate whether GenAI-based instructional practices vary across school levels (primary, intermediate, and secondary). The results revealed no statistically significant differences across school levels in any of the four dimensions or in the overall utilization of GenAI technologies ($p > 0.05$).

For instance, differences in Critical Thinking & Problem Solving ($F(2,136) = 2.948$, $p = 0.056$) and Creativity & Innovation ($F(2,136) = 3.046$, $p = 0.051$) approached but did not reach statistical significance. These results suggest that school level does not substantially influence the extent to which EFL teachers integrate GenAI into their instructional practices. This uniformity may be attributed to consistent exposure to similar technological infrastructures and professional development opportunities across school stages.

Table 13: One-Way Analysis of Variance (ANOVA) Results for Differences in Genai-Based Instructional Practices—Specifically for Developing 21st-Century Skills—Across Years of Teaching Experience.

Dimensions	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Critical Thinking & Problem Solving	Between Groups	1294.832	2	647.416	1.952	0.146
	Within Groups	45112.837	136	331.712		
	Total	46407.669	138			
Creativity & Innovation	Between Groups	111.313	2	55.656	1.886	0.156
	Within Groups	4012.543	136	29.504		
	Total	4123.856	138			
Communication & Collaboration	Between Groups	84.103	2	42.052	1.426	0.244
	Within Groups	4009.624	136	29.483		
	Total	4093.727	138			
Digital & ICT Literacy	Between Groups	30.224	2	15.112	.571	0.567
	Within Groups	3602.122	136	26.486		
	Total	3632.345	138			
Overall 21st-century skills	Between Groups	2199.118	2	1099.559	1.759	0.176
	Within Groups	85023.882	136	625.176		
	Total	87223.000	138			

Table 13 presents the ANOVA results examining differences in GenAI utilization based on years of teaching experience. The results indicate no statistically significant differences across any dimension or in overall 21st-century skills utilization ($p > 0.05$). For example, the overall score showed $F(2,136) = 1.759$, $p = 0.176$.

These results suggest that the level of experience is not a significant factor in defining the levels of GenAI application among EFL instructors. It appears that both beginners and professionals use AI-based tools on similar levels. It may mean that AI integration is more heavily affected by existing digital skills and desire to innovate than experience in the profession, which has provided consistent conclusions with the existing results of technology adoption literature (Ali El Deen et al.,2025; Moorhouse, 2024b).

All the statistical analyses point to the fact that gender and level of technology use are important predictors of GenAI use in instruction practices, but not school level and years of experience.

Male teachers and those who self-report having a higher level of technology proficiency are more engaged with the GenAI technologies to support current 21st-century teaching skills.

These results highlight the relevance of specific professional growth initiatives to enhance the levels of digital confidence and AI literacy of female educators and those who indicate decreased use of technologies. Empowering these competencies may favor more inclusive and constructive AI implementation in teaching environments.

5. CONCLUSION

The current research paper examines how GenAI can be utilized to enhance instructional activities in alignment with the skills required in the 21st century for EFL instructors in Saudi Arabia. Results showed a moderate level of overall utilization of GenAI tools in four major dimensions: Critical Thinking and Problem Solving, Creativity and Innovation, Communication and Collaboration, and Digital and ICT Literacy. Communication and Collaboration had the highest mean, indicating that GenAI is primarily used by EFL teachers as a means of interaction and professional collaboration. On the other hand, Digital and ICT Literacy was at the bottom, which indicates that teachers of digital skills use AI insufficiently.

The research also found statistically significant variations in accordance with gender and self-reported technology proficiency, with male teachers being preferred and those who reported being the most technologically competent. Nevertheless, there were no significant differences in relation to school level taught or years of experience, which means that the level of GenAI use is not determined by the teaching stage or experience but by the digital confidence and exposure to technology. On the whole, the results portray an intermediate stage of GenAI use, where educators implement AI technology as an auxiliary tool, rather than a transformative learning tool.

Such findings highlight the significance of professional development initiatives that can be adapted to improve the digital literacy, creativity, and pedagogical innovation of teachers with the help of GenAI. Providing teachers with the competencies to implement AI successfully can enhance more dynamic and learner-oriented and future-oriented learning experiences that are in line with the objective of transforming the educational environment in the Saudi Vision 2030.

5.1. Limitations

Although this study has some useful implications, it also has several shortcomings. To begin with, it was also limited to graduate-level EFL instructors in King Khalid University, which restricted the extrapolation of results to other institutions and other regions. Second, the research design used descriptive quantitative design based on self-reported data, which is prone to subjective perceptions or social desirability bias. Third, due to the fast development of AI technologies, the findings are a snapshot that can easily alter with the development of new tools and policies. Lastly, the research lacked qualitative data that would provide a more in-depth understanding of the teachers, their motivations, and the difficulties they encountered when utilizing GenAI.

5.2. Future Studies Recommendations

Further studies must use mixed-method or longitudinal designs to capture the changing trends in addition to a more sophisticated experience of teachers who adopt GenAI in their teaching practices. The external validity of the findings would be improved by increasing the sample to cover the EFL teachers in different levels of education and institutions. The research on the future should also examine the attitude of students towards GenAI-mediated learning as a means of assessing the impact of GenAI on student engagement, creativity, and language performance. Additionally, the causal influence of AI-based interventions on specific language competencies, such as writing, speaking, or problem-solving, can be measured through experimental or quasi-experimental research.

In addition, it is recommended that future researchers explore ethical and pedagogical models for applying GenAI, including data privacy, authorship integrity, and the balance between AI assistance and human creativity. Research into teacher training and professional development paradigms would be of additional use to policy and curriculum design, and warrants educators having the capability to leverage the transformative potential of AI in an engaged and responsible manner.

In conclusion, this research paper can be integrated into the existing discourse on AI-based pedagogical innovation in the Saudi EFL system. It could contribute to increased AI literacy, non-discriminatory provision, and sustainable technology implementation in language education, which are the main pillars of assisting teachers and students in complying with the needs and possibilities of the 21st century by understanding their current patterns of use, limitations, and

influencing factors.

Declarations: We attest that we have utilized the AI applications DeepSeek and Grammarly to enhance the readability of the paper, and we have not employed any Generative AI applications during the writing process.

Data availability: The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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