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Integrating DeepSeek for Developing Secondary School Students' EFL Writing Skills

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Abstract

The research aimed to identify the effect of an English language program based on the DeepSeek AI-powered tool on developing secondary school students' EFL writing skills, Egypt. The main writing skills were analytical and argumentative, namely: writing form, forming ideas, organization of ideas, and mechanics of writing. The program utilized the DeepSeek AI-powered tool. Instruments of the research included a checklist of the analytical and argumentative writing skills, a DeepSeek AI-powered tool app questionnaire, a DeepSeek AI-powered tool app program, an EFL analytical and argumentative writing skills test, and a writing skills test rubric. The research followed the one-group quasi-experimental design with its pre and post-testing procedure over the participants, randomly selected from first-year secondary school students. Results of the research showed that there were significant mean differences between participants' scores in the pre and post-testing of EFL analytical and argumentative writing skills at a significance level (0.01). The research recommended using the DeepSeek tool in EFL writing skills. It also recommended integrating further AI technologies in the EFL writing skills instruction.

Keywords: EFL writing, DeepSeek, Secondary students

مستخلص البحث

هدف البحث إلى تحديد تأثير برنامج اللغة الإنجليزية القائم على أداة DeepSeek المدعومة بالذكاء الاصطناعي على تطوير مهارات الكتابة باللغة الإنجليزية كلغة أجنبية لدى طلاب المرحلة الثانوية في مصر. كانت مهارات الكتابة الرئيسية هي مهارات التحليل والجدلية، وهي: شكل الكتابة، وتكوين الأفكار، وتنظيم الأفكار، وميكانيكا الكتابة. استخدم البرنامج أداة DeepSeek المدعومة بالذكاء الاصطناعي. تضمنت أدوات البحث قائمة مرجعية لمهارات الكتابة التحليلية والجدلية، واستبيان تطبيق أداة DeepSeek المدعومة بالذكاء الاصطناعي، وبرنامج تطبيق أداة DeepSeek المدعومة بالذكاء الاصطناعي، واختبار مهارات الكتابة التحليلية والجدلية باللغة الإنجليزية كلغة أجنبية، ومقياس اختبار مهارات الكتابة. اتبع البحث التصميم شبه التجريبي للمجموعة الواحدة بإجراء الاختبار القبلي والبعدي على المشاركين الذين تم اختيارهم عشوائياً من طلاب السنة الأولى بالمرحلة الثانوية. أظهرت نتائج البحث وجود فروق متوسطة ذات دلالة إحصائية بين درجات المشاركين في الاختبار القبلي والبعدي لمهارات الكتابة التحليلية والجدلية باللغة الإنجليزية كلغة أجنبية عند مستوى دلالة (٠.٠١) أوصى البحث باستخدام أداة DeepSeek في مهارات الكتابة باللغة الإنجليزية كلغة أجنبية. كما أوصى بدمج المزيد من تقنيات الذكاء الاصطناعي في تدريس مهارات الكتابة باللغة الإنجليزية كلغة أجنبية

الكلمات المفتاحية: الكتابة باللغة الإنجليزية كلغة أجنبية، DeepSeek، طلاب المرحلة الثانوية.

Introduction

Using Artificial Intelligence (AI) in modern language teaching and learning helps learners overcome the difficulties they encounter in the learning process. Among the newest developments to the AI family is DeepSeek, which holds great promise for clear text generation, analysis, and context-dependent language modelling capabilities.

Many researchers assured the importance of integrating AI in language teaching and learning (AL-Raimi et al., 2024; Al-Saiari et al., 2024; Yamauchi,2009). The application of AI in language teaching and learning has a great influence on the teaching and learning process and helps learners to master language productive skills (Al Raimi et al., 2024).

Developing EFL students' writing tasks is complex and time-consuming, demanding significant expertise and resources (Neal, 2011; Tayyab et al., 2022). To overcome these challenges, EFL institutions continually seek innovative solutions to the development process, assuring the fairness and quality of educational outcomes. As generative artificial intelligence continues to develop, AI-powered tools have shown great impact for developing writing evaluation and feedback contexts (Bucol & Sangkawong, 2024; Ebadi & Bashir, 2021; Zawacki-Richter et al., 2019). Among the artificial intelligence tools is DeepSeek, which has become an available choice in developing EFL writing skills. By early 2025, about 1,045 universities across China began to integrate DeepSeek into university teaching practices (CERNET Authentication & Resource Sharing Infrastructure, 2025). DeepSeek, as an AI tool, can support scalable and consistent formative feedback in EFL contexts, especially in large classes where instructor workload makes individual feedback insufficient.

Despite recent progress in AI-assisted writing tools (Guo,2024; Yavuz et al., 2025), this research is an attempt to identify the effect of Deepseek for developing secondary school

students' analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing.

Literature Review

The Nature of EFL Writing Evaluation

Writing evaluation demands balancing quantitative assessment with qualitative instructional feedback to support students' development effectively (Lee, 2017; Pearson, 2022). Traditional methods for scoring EFL writing, either holistically or analytically, typically require one or more human raters (Li & Huang, 2022; Wang & Xie, 2022). However, the scores assigned by human raters to EFL writing may be challengeable due to different factors like linguistic backgrounds, interpretative frameworks, and tolerance for errors (Neittaanmaki & Lamprianou, 2024). Thus, human raters can be a potential factor of measurement error that can have an effect on score reliability (Li, 2022; Neittaanmaki & Lamprianou, 2024).

In 2022, Li & Huang found that the evaluation of EFL writing demands human raters to provide qualitative feedback on organization, content and coherence of writing. This feedback should be clear, and supportive of the efforts of learners in writing. However, its formative potential to develop students' metalinguistic awareness, and self-regulated revisions is overlooked in rubric assessments (Brookhart, 2017; Yu & Liu, 2022). To address these pedagogical challenges, the automated feedback provided by DeepSeek may be an alternative solution. Therefore, the present research attempts to use Deepseek to develop students' EFL writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing.

Analytical Writing

It is the writer's reaction to a body of work through a critical lens. Analytical writing can be defined as exploring relationships of ideas or parts of something; providing possible situations and

alternative responses; and comparing and contrasting (Whitaker, 2009).

An analytical essay depends basically on the research question. The question must be direct, related to the topic, and the answer must be related to the subject of the essay. The essay statement presents the topic question, and the following paragraphs explain and answer the topic question. The analytical essay is the student's thoughts, evaluations, and the viewpoint of a topic supported by credible statements.

Argumentative Writing

The elements of the argumentative essay are different. According to Endy (2011), there are various elements of the argumentative essay as follows: (1) title which should be brief, interesting, and indicate the topic of the essay, (2) introduction which is general information about the topic and what the writer will do without providing evidence or argument, (3) body which includes: first paragraph which includes the main argument and topic sentence. The writer can provide readers with details about the topic, related to facts, and discussion about the argument. This will help to better understand the claim.

At the end of the paragraph, the writer provides an answer to the topic sentence mentioned earlier in the paragraph. Purpose which proves one's argument, one mustn't try to put too much explanation otherwise; he/she will lose the purpose. Explaining topic sentence by the writer who decides how much explanation should be stated in the argument. Introducing evidence through which the writer presents the evidence with clear and brief sentences. Stating evidence supports the argument with examples, statistics, and reasons. Concluding sentence can assure the evidence, one's viewpoint, and the framework of the whole essay. Successive paragraphs will be the same. Finally, conclusion summarizes the topic discussed in the previous paragraphs. The summary of the main argument must be in simple words. The writer

emphasizes in his conclusion the general idea that flows from one's argument and evidence.

The Advantages of Artificial Intelligence (AI) in EFL Writing Development

The integration of artificial intelligence into EFL writing development has developed adaptive feedback and evaluative precision. Dong (2024) and Lim et al (2023) assured that AI models, such as ChatGPT-4, explain superior performance in evaluating syntactic complexity, lexical diversity, and grammatical accuracy. In a similar way, Chen & Zhang (2022) found that advanced Language Processing algorithms provide precise and corrective feedback on linguistic characteristics as article usage and collocation mistakes, with greater depth and specificity than traditional approaches.

Practical evidence shows AI's capacity to develop assessment precision and improve students' writing proficiency and engagement. Tsai et al (2024) reported significant developments ($p < 0.01$) in vocabulary use, grammatical accuracy, and textual coherence after the AI-assisted revisions. Stevenson & Phakiti, also, in (2019) found that learners' interaction with AI-driven platforms developed self-initiated revisions by 42%, promoting AI's role in autonomous learning processes. Additionally, Koltovskaia (2020) emphasized that AI tools evaluate higher-order competences, including argumentative structure and rhetorical coherence. Wilson et al (2021) confirmed that writing outcomes have been improved using AI-mediated assessment compared with traditional approaches. In a similar way, Haggag (2022) identified the impact of an EFL module based on AI-powered tools for developing tests of English reading and writing skills. Using AI tools in reading and writing education was recommended. It also recommended that further AI technologies should be integrated into the instruction of the TOEFL-iBT and TOEFLiBT tests.

Deep Seek

DeepSeek AI is a Chinese startup that has emerged as a challenge to the power of the Western technological giants (Brown, 2024). This open-source AI model is efficient and innovative, and it is a challenge to Western tech titans such as Microsoft, Meta, Google, and OpenAI. DeepSeek AI is a Chinese Artificial Intelligence company that focuses on advancing AI research beyond financial applications. It introduced open-source tools like DeepSeek Coder and models such as DeepSeek LLM and DeepSeek V-2 (Salam et al., 2025). DeepSeek AI consists of DeepSeek V3 and DeepSeek R1. DeepSeek V3 is more cost-effective and efficient for large-scale processing tasks. DeepSeek R1 provides faster and more accurate results in tasks such as prime factorization. On the other hand, DeepSeek V3 is suitable for content generation, multilingual translation, and real-time chatbot responses. Students should assess their demands carefully to choose the suitable AI model for their needs (Analytics Vidhya, 2025).

The initial application of DeepSeek depends on deep learning for content-based image retrieval using natural language queries (Piplani & Barmman, 2018). The launch of DeepSeek-V3 in December 2024 showed increasing attention because of its open-source, multilingual capabilities, and applicability in educational settings (Salam et al., 2025). Building on this foundation, the launch of DeepSeek-R1 in January 2025 has drawn academic attention for its prioritizing reasoning and analytical precision (He et al., 2025). DeepSeek-R1 enhances reasoning performance, internal consistency, and task-specific accuracy, making it suitable for tasks that require higher-order cognitive processing (DeepSeek-AI et al., 2025).

In 2025, Albuhairey & Algaraady compared the performance of DeepSeek to ChatGPT in various linguistic areas. DeepSeek stresses on the errors of the rule-governed language, while ChatGPT advances in contextual and communicative impacts.

DeepSeek users reported more satisfactory outputs for the types of inquiries for ChatGPT, which is excellent in conversational and creative contexts. According to Jargan Josh (2025) and Mashable India (2025), DeepSeek is cheaper than ChatGPT, where DeepSeek is a cost-effective option for learners and developers alike.

The architecture of DeepSeek shows a high priority on performance efficiency in areas like language interpretation and code creation. Additionally, the open-source nature of many DeepSeek models might result in faster progress and more specific applications compared to the closed-nature of ChatGPT. Moreover, DeepSeek emphasizes on democratizing AI, which might help many users and developers contribute to the development of technology. This would help in the evolution of an ecosystem that is more inventive and varied than the one connected with ChatGPT (Salam et al., 2025). In the same concern, Mohammed, Mudhsh, Bin-Hady, & Al-Tamimi (2025) explained in a study about DeepSeek and Grok after ChatGPT in English education that these three chatbots highlight the possibility of integrating these AI models to create more engaging, personalized, and effective learning experiences.

In (2025) Gao, Hashim, & Yunus assessed the reliability of holistic scores and qualitative feedback generated by DeepSeek for essays written in English by EFL learners, and these scores were compared with those assigned by four EFL teachers. The research concluded that DeepSeek showed consistently higher reliability coefficients than the EFL teachers did. The qualitative feedback analysis revealed that DeepSeek demonstrated more relevant feedback on the EFL essays than did the EFL raters. DeepSeek was relevant across language use, the content, organization, and coherence. The study recommended that DeepSeek could be useful to enhance EFL writing assessments.

Obviously, it can be concluded that both analytical and argumentative writing skills can be effective if they are used in the classroom. To develop such skills, instructors need to be prepared

effectively to fill in the requirements of such a demanding task as the writing process. One method of approaching this issue is by the application of DeepSeek as an educational tool that can connect academic contexts and ease the learning process by effort and time saving.

Thus, it can be concluded that secondary school students in Egypt face difficulties in writing skills. They encounter difficulties in writing analytically and argumentatively. Most secondary students are not aware of the writing steps in the analytical and argumentative manner. Literature and related studies also supported this.

Context of the research

Through analyzing a sample of first-year English Language test answer sheets at Khozam Secondary School (N.22), the following data were obtained that explained the low scores of the participants in the essay writing question.

- 50 % (11 students) did not complete the essay writing question of the test.
- 90.90 % (20 students) have major writing difficulties such as (coherence - cohesion - writing form - forming ideas - organization between ideas -spelling- grammar-drafting).
- 68.18 % (15 students) achieved low scores in writing the essay question (1 or 2 marks out of 7 marks).
- 77.27 % (17 students) followed fixed writing strategies.

This challenge in integrating artificial intelligence, such as DeepSeek, as well as the difficulties that secondary school students face in writing, was supported by literature. For example, the studies of Albuhairey & Algaraady (2025), Haggag (2022); Mohammed, Mudhsh, Bin-Hady, & Al-Tamimi, (2025); recommended integrating AI tools to develop writing instruction and create effective learning experiences. Other studies, such as Koltovskaia, (2020); Wilson et al (2021) reported that writing

outcomes have been improved using AI-mediated instruction and assessment compared with traditional methods.

Based on the previous analysis of results and literature review, the problem of the research can be stated as most secondary school students lack the analytical and argumentative writing skills needed for their academic progress. Teachers use traditional methods in teaching writing skills. There is a need to implement authentic smart technology in the writing skills instruction of secondary school students. Therefore, the research attempts to identify the effect of Deep Seek on developing analytical and argumentative writing skills of secondary school students.

The statement of the problem can be expressed by asking the following main question:

What is the effect of using DeepSeek for developing participants' analytical and argumentative writing skills?

The research attempts to answer the following sub-questions:

- 1- What are the analytical and argumentative writing skills that can be developed by using a program based on DeepSeek?
- 2- What is the effect of using a program based on DeepSeek on developing the participants' overall analytical and argumentative writing skills?
- 3- What is the effect of using a program based on DeepSeek on developing the participants' analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing?

Aims of the research

The research aims to the following:

- 1- Designing an analytical and argumentative writing program based on DeepSeek.
- 2- Identifying the effect of the DeepSeek program on participants' overall analytical and argumentative writing skills.
- 3- Identifying the effect of the DeepSeek program on participants' analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing.

Hypotheses of the research

The research hypothesized the following:

1. There would be statistically significant mean differences between the participants' mean scores in the pre-post testing of the overall analytical and argumentative writing skills, favoring the post-testing.
2. There would be statistically significant mean differences between the participants' mean scores in the pre-post testing of the analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing, favoring the post testing.

Significance of the research

The research is thought to be significant for the following:

1. For curricula designers: the DeepSeek program can be useful for secondary school students' instruction and training. The program is an attempt to integrate smart technology in the instruction of secondary school students apart from the traditional practices.
2. For EFL teachers: providing EFL instructors with activities that depend on artificial intelligence for the instruction of secondary school students.

3. For secondary school students: the program can develop participants' analytical and argumentative writing skills.

Methodology

Participants

Participants of the research were 21 first-year secondary school students selected randomly from Khozam Secondary School in Qus town, Ministry of Education, Egypt. The average age of the participants was between 14 and 16 years old. All participants studied English for 9 years, in addition to 2 years in the nursery stage.

Research design

The research employed the one-group quasi-experimental design with its pre and post-testing procedure. Variables of the research included an independent variable (English language program based on DeepSeek AI-powered tool) and dependent variables (analytical and argumentative writing skills). Using the quasi-experimental design with its pre-post testing procedure, means of the participants were compared and analyzed statistically to verify the difference in means before and after running the experiment. The research adopted the task-based approach to plan materials and teach the sessions around performing the analytical and argumentative writing tasks in this program, which aimed to develop (4) analytical and argumentative writing skills.

Delimitations of the research

The research was delimited to the following:

1. Participants: a group of (21) participants - the number of participants was limited to lab capacity- from Khozam Secondary school in Qus Administration, Ministry of Education, Egypt.
2. Variables: the independent variable is a program based on the DeepSeek AI-powered tool, while the dependent variables are

some analytical and argumentative writing skills. These analytical and argumentative writing skills are, namely, writing form, forming ideas, organization of ideas, and mechanics of writing.

The following table shows how the DeepSeek AI-powered app was used in the program during (8) sessions.

<i>Sessions</i>	<i>skills</i>	<i>DeepSeek AI-Powered App Use</i>
1. Introduction 2. Pre-writing 3. During writing 4. Post writing 5. Assessment	Analytical and argumentative writing skills.	a. DeepSeek is used for checking writing form. b. DeepSeek is used for forming ideas. c. DeepSeek is used for checking the organization of ideas. d. DeepSeek is used for auto-correction of grammar and spelling.

Instrumentation

The research utilized the following instruments, which followed three main stages: the design, validation, and application.

1. *A checklist of the analytical and argumentative writing skills:* it aimed at identifying the analytical and argumentative writing skills needed for the participants. The checklist was validated in terms of validity and reliability. Validity of the checklist was run through content validity (jury validation) and through the root of the (r) value, and was (0.88). Using the Cronbach Alpha statistic, r value was (0.89) which is a high reliability coefficient.
2. *DeepSeek AI-powered tool app questionnaire:* it aimed at identifying the DeepSeek AI-powered tool to be included in the program. It was validated by a jury of TEFL experts. The EFL jury reported the questionnaire validity.

3. DeepSeek AI-powered tool app program: it included the analytical and argumentative writing instructional units for first-year secondary school students. The frame of the program was designed and validated before designing the program, which was also validated by a list of jury members who agreed on the suitability of the frame to the objectives of the program.
4. A test in analytical and argumentative writing skills: it aimed at measuring the participants' analytical and argumentative writing skills.
5. Writing skills test rubric: it was used to assess first-year secondary school students' analytical and argumentative writing essays.

Results and Discussion

The obtained results from the research were generated from both quantitative and qualitative assessment instruments. The quantitative results were obtained from analytical and argumentative writing tests that were run in a pre and post-testing, while the qualitative results were obtained from the participants' feedback in their feedback sheets and a WhatsApp group. The following is a description of the data obtained from the test through SPSS analysis, and a discussion of the results of the hypotheses of the research.

1. *First hypothesis*

H.1. There would be statistically significant mean differences between the participants' mean scores in the pre-post testing of the overall analytical and argumentative writing skills, favoring the post-testing.

The paired sample T-test was used to compare the mean scores of the participants in the overall analytical and argumentative writing skills in the pre and post administrations of the analytical and argumentative writing skills test.

To verify this hypothesis, the following statistical procedure was run:

Table (1): T-Value for the Overall Analytical and Argumentative Writing Skills in the Pre and Post Testing Administrations (n=21)

Test	Mean	No.	Std. Deviation	T-value	P-value
Pre-testing	20.11	20	2,91	25.879	0,000
Post-testing	41.49	20	4.02		

Table (1) shows the differences between the mean scores of the participants (the pre testing is 20.11 and the post testing is 41.49), T-value is (25.879), and the P-value in the pre and post testing of the overall analytical and argumentative writing skills is (0.000) which is less than the significance level (0.05). This indicates that there is a statistically significant difference between the mean scores of the participants in the pre testing and that in the post testing at (0.01) level in the overall EFL analytical and argumentative writing skills, in favor of the post testing administration.

To determine the effect of the program on the participants' analytical and argumentative writing skills, the effect size was run using Cohen's equation 'D' to find out the percentage of the variance of the dependent variable (analytical and argumentative writing skills) attributed to the effect of the independent variable (*DeepSeek AI-powered tool*) (Cohen, 1988). Table (2) presents the effect size of the *DeepSeek AI-powered tool* on developing the overall analytical and argumentative writing skills.

Table (2): The Effect Size of the DeepSeek AI-powered tool on Developing the Overall Analytical and Argumentative Writing Skills

<i>skill</i>	<i>Cohen 'D'</i>
Overall Analytical and Argumentative Writing Skills	4.71

(Cohen's D values are specified as follows:

D = 0.2 Small Effect

D = 0.5 Medium Effect

D = 0.8 Large Effect

Table (2) shows that Cohen's value is (4.71), which is greater than (0.80), which is a very large effect size. This explained the strength relationship between the independent and the dependent variables.

2. Second hypothesis

H.2. There would be statistically significant mean differences between the participants' mean scores in the pre-post testing of the analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing, favoring the post testing.

To test this hypothesis, the paired sample T-test was used to compare the mean scores of the participants in the writing form, forming ideas, organization between ideas, and mechanics of writing skills on the pre and post-administrations of the analytical and argumentative writing skills test.

To verify this hypothesis, the following statistical procedure was run:

Table (3): T-value for the Analytical and Argumentative Writing Skills in the Pre and Post Testing Administrations Concerning the Skills' Writing form, Forming ideas, Organization of Ideas, and Mechanics of Writing (n=21)

<i>Skill</i>	<i>Test</i>	<i>Mean</i>	<i>No.</i>	<i>Std. Deviation</i>	<i>T-value</i>	<i>P-value</i>
Writing Form	Pre-test	3.31	20	0.712	19.135	0,000
	Post-test	7.33		0.761		
Forming Ideas	Pre-test	3.25	20	8.72	20.527	0,000
	Post-test	7.38		0.812		
Organization of Ideas	Pre-test	4.71	20	0.987	20.279	0,000
	Post-test	9.61		0.979		
Mechanics of Writing	Pre-test	4.65	20	1.059	19.407	0,000
	Post-test	9.61		1.064		

Table (3) shows the differences between the mean scores of the participants (the pre testing is 3.31 and post testing is 7.33), T-value is (19.135), and the P-value in the writing form skill of the pre and post testing is (0.000) which is less than the significance level (0.05). This indicates that there is a statistically significant difference between the mean scores of the participants in the pre testing and that in the post testing at the level (0.01) in the writing form skill, in favor of the post-testing administration.

According to table (3), it was found that the differences between the mean scores of the participants (the pre testing is 3.25 and the post testing is 7.38), T-value is (20.527), and the P-value in the pre and post testing of the forming ideas skill is (0.000) which is less than the significance level (0.05). This indicates that there is a statistically significant difference between the mean scores of the participants in the pre testing and that in the post testing at the level (0.01) in the forming ideas skill, in favor of the post testing administration.

Findings in table (3) indicate that the differences between the mean scores of the participants (the pre testing is 4.71 and the post testing is 9.61), T-value is (20.279), and the P-value in the pre and post testing of the organization between idea skills is (0.000), which is less than the significance level (0.05). This indicates that there is a statistically significant difference between the mean scores of the participants in the pre testing and that in the post testing at the level (0.01) in the organization between idea skills, in favor of the post testing administration.

Table (3) shows also that the differences between the mean scores of the participants (the pre testing is 4.65 and the post testing is 9.61), T-value is (19.407), and the P-value in the pre and post testing of the mechanics of writing skill is (0.000) which is less than the significance level (0.05). This indicates that there is a statistically significant difference between the mean scores of the participants in the pre testing and that in the post testing at the level (0.01) in the mechanics of EFL writing skills, in favor of the post testing administration.

Findings in Table (3) show that there is a statistically significant difference at (0.05) level between the mean scores of the participants on the EFL analytical and argumentative writing skills pre and post testing related to writing form, forming ideas, organization of ideas, and mechanics of writing of the participants in the pre and post testing administration.

Based on the results using Cohen's equation 'D' to find out the percentage of the variance of the dependent variable (writing form, forming ideas, organization of ideas, and mechanics of EFL writing skills) attributed to the impact of the independent variable (*DeepSeek tool*). Table (3) presents the effect size of the *DeepSeek tool* on developing the analytical and argumentative writing skills: writing form, forming ideas, organization of ideas, and mechanics of writing.

Table (4): The Effect Size of DeepSeek AI-powered Tool on Developing the Analytical and Argumentative Writing Skills' Writing Form, Forming Ideas, Organization between Ideas, and Mechanics of Writing

skill	Cohen 'D'
Writing Form	3.44
Forming Ideas	3.67
Organization of Ideas	3.51
Mechanics of Writing	3.71

Table (4) shows that Cohen's values of the skills' writing form, forming ideas, organization between ideas, and mechanics of writing are (3.44, 3.67, 3.51 & 3.71) respectively, which are greater than (0.80). This indicates that the value of the effect size was very large. This explained the strength relationship between the independent (*DeepSeek AI-powered tool*) and dependent variables (writing form, forming ideas, organization between ideas, and mechanics of writing).

Discussion

The obtained results highlight the effect of the artificial intelligence applications, such as the DeepSeek AI-powered tool used in the research, and agree with the studies that emphasized the value of AI applications in language learning. Some of these studies include the studies of Chen & Zhang, (2022); Dong, (2024); Haggag, (2022); Lim et al, (2023); and Tsai et al, (2024). The development of analytical and argumentative writing skills was due to the positive effects that the DeepSeek tool has on the learning environment. These effects agree with Gao, Hashim, & Yunus, (2025) in enhancing EFL writing assessments.

Results of the research assure the interrelated strategies that were followed by the participants during the DeepSeek AI-powered

tool-based program. Finally, the type of feedback given by the participants during the instruction of the program explained their satisfaction and positive attitudes. A WhatsApp group was created to instantly receive inquiries, comments, and feedback by the students. The students reported that they feel eager to use new technologies such as the DeepSeek AI-powered tool that can even correct their paragraphs. Participants expressed their satisfaction with the spontaneous feedback received from the DeepSeek AI-powered tool. Briefly, the qualitative and quantitative feedback provided by the students confirms the positive developments that the DeepSeek AI-powered tool could add to their analytical and argumentative writing skills.

With reference to the mentioned results, it was concluded that the present research offered evidence for the effect of using the DeepSeek tool on developing analytical and argumentative writing skills (writing form, forming ideas, organization between ideas, and mechanics of writing) of first-year secondary school students.

Conclusion and Implications

In this research, the DeepSeek AI-powered tool was used in writing skills instruction. In a pre and post testing, results emphasized the development of participants' scores in EFL analytical and argumentative writing skills. This result can be useful for secondary school students, EFL teachers, and curricula designers. As for secondary school students, they can benefit from DeepSeek activities and tasks during the program. EFL teachers can use the suggested program to individualize the learning environment during their instruction for writing skills. Similarly, curricula designers can adapt the DeepSeek AI-powered tool as a means to design interactive curricula in this digital era. There are some challenges that faced the researcher during applying the program, these challenges included acoustic, internet connectivity, and challenges related to mobile use. To conclude, DeepSeek AI-powered tool can be used not only in instruction but also in grading

writing since it provides instant feedback about areas such as writing form, forming ideas, organization between ideas, and mechanics of writing.

Recommendations

Based on the findings and conclusions of this research, the following recommendations are

presented as follows:

- It is recommended that curricula designers should integrate the DeepSeek tool for secondary school students' instruction and training apart from the traditional practices.
- EFL teachers should integrate Information, Communication and technology such as the DeepSeek tool to cope with the global requirement which calls for replacing traditional teaching methods with technology-based teaching. Teachers are recommended to use the DeepSeek tool in EFL writing instruction for secondary school students.
- Secondary school students should be trained to use the DeepSeek tool in their EFL writing classes.

Suggestions for Future Researches

- Using AI tools such as Grok and Gemini for developing English language teaching.
- Integrating the DeepSeek tool for developing EFL creative writing of EFL student teachers.
- Exploring the effect of using DeepSeek for developing gifted students' EFL writing skills.
- Investigating the effect of using the DeepSeek tool for developing preparatory stage students' EFL writing.
- A program based on the DeepSeek tool for developing other types of EFL writing.
- Using the DeepSeek tool for enhancing EFL students' motivation towards learning EFL writing.

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