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On the Plausibility of Integrating Synthetic vs. Analytic Artificial Intelligence (AI)-Powered Academic Writing Tasks into Iranian EFL Classrooms: State-of-the-Art

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Abstract

Concerning the rapid permeating trend of technologies into education realm, teachers and stake holders are to make the most of new approaches and lead EFL learners in the right path to have the best uptake possible from the teaching/learning innovations. The Artificial Intelligence (AI) has accelerated such rapid growth to a considerable large extent. The present study aimed to delve into the permeating AI-integrated applications into Iranian EFL teaching/learning realm to ascertain the enrichment of academic writing ability and skill acquisition. Needless to indicate that these AI-tools are considered as boosters for the amateur writers and the advance professional writers rarely do they need them. To conduct the study, an Oxford English language proficiency test was administered and three groups of 20 intermediate Iranian EFL undergraduates majoring at English translation discipline were selected and randomly assigned. They got prepared to attend a course of writing five-paragraph essay. The conventional method was practiced for the control group and other two experimental groups experienced the Synthetic and the Analytic AI tools. The design of this study was quantitative quasi-experimental pre-test post-test. The pre- and post-test was an academic writing task. Surprisingly, the experimental Synthetic AI outperformed Analytic AI group, and the experimental ones scores were higher and statistically significant than control group. It confirmed that applying AI tools in skill acquisition could significantly enhance the enrichment of obtaining boosted knowledge process and competence. The results obtained through this study might be useful and practicable for EFL teachers, materials developers and stake holders.

Keywords: Synthetic, Analytic, Artificial Intelligence, Academic writing

Introduction

It is taken for granted that reading and writing are the two passive offline skills to be acquired by EFL learners whereas listening and speaking are labeled as the active online skills. That could be true and effective once you consider the product of such skill acquisitions, but regarding the process of emerging such product, namely as writing skill, the process involves real-time active reasoning and refining learned chunks of knowledge as their thoughts. Many scholars such as Rahimi and Zhang (2018) believe that the main problem with EFL learners' poor writings is rooted in their inability to communicate their thoughts. That might be partly due to their deficiency in communicating their thoughts properly and also might be partly due to their

deficiency in knowledge acquisition trends. The truth is that both parts could be bests considered as the two sides of a single coin. Implementing technologies properly as Harunasari and Halim (2019) put, would in turn accelerate and foster the process of creating interactive knowledge acquisition to a large extent.

In recent years, learning another language especially English language has gained popularity due to reasons beyond migration and abroad job offers. Individuals tend to learn English language for they want to expand their communication with the world. In such process of learning a new language, individuals might face a plethora of challenges as William et al. (2019) signifies, most of which are rooted in the discrepancy exited in finding creative ways of practice in congruous with technologies prevalent in real world. Individuals seek new adaptable methods covering their needs in their learning process, motivating enough to lead them in an active participation and interaction in the process.

The shift of attention and desires from the learners' side has made language learning more comprehensive than a mere overcoming of a successful communication, rather, it has been manifested as establishing a maneuverable comprehensible and meaningful flow of words (Jones, 2020). Gaining such command over the prompt comprehensible utterances is the target aim of most EFL learners today. Tavakoli et al., (2020) defined that in line with many recent researches, the definition of language proficiency is tailored by the EFL learners' command on the maneuverability they could establish on various comprehensible meaningful events.

Comprehensible meaningful communication in speaking zone has its own weak points and strong points, namely the face-to-face interaction as the weak point could be stressful, and the possibility of using gestures and body language as the supportive strong points could in no way be dodged. On the contrary, writing skill could be so challenging as whatever is produced and manifested should be self-descriptive and self-justifiable. No means of extra clues such as gestures could be provided or no prompt correction or justification is allowed. Reviewing the related literature, despite the significance of challenges and threats laid in EFL learners' writing skills, less researchers showed interest to delve into those challenges (Van Waes & Leijten, 2015).

Many scholars draw a vague boarder line between the two skills of speaking and writing and label both skills as the two common ways of communication, the latter in written forms (Rouhani, et al., 2016). Of course through a micro lens of justification, both skills involve the same pattern, hence, to consider technically and through the macro fashion, writing fluently should be considered as the most distinguishing feature of language proficiency as Atasoy and Temizkan (2016) highlighted that the production of a well-organized comprehensible input which reflect the producer's intended target would properly mirror in the reader's perception and mind, which in turn, demands hard challenges and high level of mastery in EFL learners' language learning process. Scholars like Gayed et al., (2022) believes English language learners are mostly trained and catered for performing low level tasks like memorization of terms and some translation techniques, whereas high level of mastery in writing skill demands lifelong effort in a non-teacheable fashion of practice.

The term "writing" is an umbrella term covering various activities embracing online or offline modes, e.g. writing in academic or social networking zones, writing personal emails or business corresponding, writing online or punching a word processor program, and many other digital forms and formats (Zhao, 2022). Digital and online assistant tools such as Grammarly and

QuillBot might help individuals to offer the best manifestation of their thoughts. A plethora of research was conducted in the EFL academic and professional zones to highlight the prominence of effective writing (Lahuerta, 2017; McDonough & Crawford, 2018). Through effective writing process, individuals are empowered to maneuver on the synthesis and analysis of the produced texts and justify the aims and scopes of the intended concepts of the writers in their minds (Zhou & Hiver, 2022). The English-writing command of academic individuals from other disciplines (Hamzaoui, 2021; Ruscetti et al., 2018) - exclusively of academic individuals from English either TEFL/TESL or Translation discipline (Alsied & Ibrahim, 2017; Hanauer et al., 2019) - is so challenging as they are academically judged as proficient writers who are capable of persuading and engaging their readers(Geiser & Studley, 2001). For sure, such judgment performed by authorities in many aspects such as the writings' dictions, grammar, and other elements (Phuong, 2021; Singh, 2017; Singh et.al 2023), information structure (Flowerdew, 2019), and genre (Finn, 2018).

Most researchers conducted studies embracing application of technologies and AI writing bots assert that these bots and applications can boost the writing competency of academic practitioners (Nobles & Paganucci, 2015; Jowarder, 2023; Currie, 2023; Karyuatry, 2018; Coenen et al., 2021). It is taken for granted that Artificial Intelligence tools would empower its practitioners by simulating the intelligence of human beings as thinking machines (McCarthy et al., 2006), hence, the introduction of AI into education field deemed so provoking in recent years(Lin & Mubarok, 2021; Moussalli & Cardoso, 2020). The global websites and search engines or even the smart phones applications are updated regularly to help academic or non-academic users worldwide to present perfect and error-free texts in order to enrich their writing quality (Zheng & Warschauer, 2017). Researchers have admitted that such perfectionism in effective writing has touched and involved the EFL learners to a large scale, the reason of which might be rooted in the basic challenges EFL learners might face in the socio-cultural differences embedded in their mother tongues (Lin & Morrison, 2021; Hanauer et al.,2019).

The adaptability of online or digital resources is in turn a supportive arm in empowering the EFL learners to learn and practice at any time and in any pace they desire which bests suits their style (Moghimi & Mirzaei, 2024). In the new era of the introduction of new technologies and applications, the EFL learners as the real practitioners and users of the new technologies might find themselves on the right track of promoting their writing skill as they are exposed to various streams of thought with different approaches of depicting a topic by many authors, which in the long run, shape their cognitive patterns the same as typical writers (Fattah, 2024). Also, through various exposures to different texts and contexts, EFL learners would find their own interests in a specific genre and their motivation, critical thinking and creativity emerge and get promoted (Mirzamohammadi, 2024). It is taken for granted that the effect size concerning the accelerated trend of technologies' enhancement and their introduction into the education realm would be deeper and richer for EFL learners and practitioners.

Like any other field of research, implementation of applications and ChatBots like ChatGPT into education zone entailed positive and negative viewpoints. Some advocates refer to ChatGPT as the proper AI tools and consider it as the extension of human capabilities which facilitate personalized and complex learning (Farrokhnia, et.al. 2023). On the contrary, the supporters of dark and negative viewpoints concerning the application of ChatGPT in writing highlighted the availability of cheating (Cotton, et.al. 2023) instances and rule-breaking which

belittle the efforts of honest pupils' efforts (Zimmerman, 2023). Considering both sides without any bios, an overlapping issue would emerge which is the freedom of writers to take the responsibility of the outputs form any threat such as plagiarism accusations and ethical concerns of their produced texts, which could be wrapped up under the umbrella term as limited accountability (Loos and Radicke, 2024) they enjoy.

Concerning the great literature in the introduction of AI-tools embracing writing skills, most researchers have studied the lexically and grammatically correctness of produced texts by the aid of AI tools. The present study aimed at delving into the efficacy of applying Synthetic vs.Analytic Artificial Intelligence tools in preparation phase of writing tasks in EFL education realm. The quantitative research conducted to provide a statistically justifiable answer to the Research Questions (**RQ**) below:

Research Questions

RQ1- Does integrating Synthetic Artificial Intelligence (AI)-powered tools have statistically significant effect on enriching the academic writing ability of Iranian intermediate EFL learners?

RQ2- Does integrating Analytic Artificial Intelligence (AI)-powered tools have statistically significant effect on enriching the academic writing ability of Iranian intermediate EFL learners?

RQ3- Does there exist any statistically significant discrepancy between the impact of integrating Synthetic AI-powered bots versus Analytic AI-powered bots on enriching academic writing ability of Iranian intermediate EFL learners?

Methods

Design

The present study employed the quantitative pre- and post-test descriptive design. The experimental and control groups' obtained scores from the academic writing task in both phases as prior to and after the treatment were gathered and the quantitative data obtained.

Participants

The available 128 sophomores majoring at translation discipline in Tehran Islamic Azad University were the initial population. The students attended the first academic year 2023-2024. Their age ranged from 18- to 32-year-old male and female university students. In order to ascertain the homogeneity index, they were advised to take English proficiency test prior to commencement of the study. This OPT was done to reassure their language proficiency level meet the criteria of attending the research. The 60 successful students who were intermediate randomly assigned to three groups, two of them as experimental (20+20) and one control (n=20).

Instruments

In order to determine the language proficiency before the commencement of the treatment, the instrument designated for conducting the present quantitative study was an OPT test of language proficiency as the criteria for the participants was intermediate level. For considering academic writing ability obtained by the participants in the present research, the accredited piloted

academic writing task of writing a five-paragraph-essay along with the outlining questions was as the second instruments prior to treatment and also for post-test phase for all the three experimental and control groups. As the present research was designed for the sophomore university students majoring at English translation discipline in Iran, the participants attended a two-credit course of academic writing. As mentioned earlier, the accredited academic writing test was piloted with students of the same conditions as the students in the present research, then the result was checked for reliability index, and accredited by two expert university professors.

The data obtained from the three groups through OPT language proficiency test prior to the study, and Academic Writing test were all went through statistical analysis via SPSS 24 program and were analyzed quantitatively. The statistical indices such as means, standard deviations were calculated and analyzed. Then paired sample t-test and independent sample t-test also implemented.

Procedure

In the present study, procedure was as follows: this study lasted for fourteen sessions of 90 minutes for the three groups of experimental and control groups. This research was conducted in the first academic semester 2023-2024. The participants were all sophomore male/female university students majoring at English translation discipline attending a two-credit course of academic writing in English. The first session of the treatment was devoted to giving OPT test of language proficiency. The second session was assigned to administering the Academic Writing test. It is worth mentioning here that after administering language proficiency test, sixty successful participant in intermediate level were assigned into three groups of twenty participants in random fashion in the present study. Two experimental classes of 20 students for implementing the two independent variables were assigned and one control class was considered.

Treatment

Ten consecutive sessions of the academic writing course was the core treatment. After the ten sessions of the treatment, the same pre-tests of Academic Writing test was once again given to the participants after the tenth session as post-test of the study. The ten sessions of treatment for the control group was held in conventional fashion of practice as the participants followed the units in the book, received the instructions and did the drills. The two experimental groups also received the instruction of utilizing Artificial Intelligence tools as the ChatGPT and WordTune. They were instructed and allowed to utilize the AI tools while preparing for the sessions and even use the suggestions and clues provided by the AI-tools wherever they needed.

The two experimental groups were labeled as Synthetic Artificial Intelligence (AI)-powered group and Analytic Artificial Intelligence (AI)-powered group. As the names of the two experimental groups signifies, in Synthetic Artificial Intelligence (AI)-powered group, the participants were trained to utilize the AI tools as ChatGPT and WordTune tools in a bottom-up fashion of practice, i.e., the participants were allowed to use the AI tools in making topic sentences, thesis statements, offering divisions of a topic, and in sum, no more than one to two complete sentences were they allowed to be provided with. The help they received from AI tools were in atomistic fashion. They were not allowed to get a complete paragraph by AI tools. That's why the first experimental group was labeled as Synthetic or Bottom-Up group. The reason was that they were allowed to receive help from AI tools only on details in such a way that they would use their

own intuition and knowledge of world along with the materials of the course content in order to produce a five-paragraph essay.

To put it technically, as in the course content of the materials for academic writing course, there are two approaches to establish the content knowledge: Moving from details towards the production of an academic essay namely as Bottom-Up fashion of practice which is also labeled synthetic version in the present paper versus moving from the whole production towards the details of an academic essay namely as Top-Down fashion which is also labeled as analytic version in this research. In synthetic fashion, the EFL learners are trained the outline of a five-paragraph essay (Bottom-Up), and then they are required to synthesis the details and the ingredients in order to come up with a five-paragraph essay. On the other hand, the Top-Down fashion of practice, they are trained in holistic view and are offered examples of five-paragraph essays, then they are trained how to analyze the details and draw outlines in analytic format. In Top-down fashion or Analytic Artificial Intelligence (AI)-powered group, participants could request ChatGPT or other AI-tool to provide them at least a paragraph, for instance, "write an introduction paragraph on the title of advantages and disadvantages of living in metropolitan", or "write a descriptive five-paragraph essay on the topic of advices to follow before moving to Japan for starting a business". The point was that the EFL learners were allowed to utilize ChatGPT in the basic unit of paragraph. One paragraph of introduction or conclusion, three paragraphs of the body, or five-paragraph essays were allowed, along with its formats and types, for example, compare or contrast essay, descriptive essay, etc. That's why the two experimental groups of the present study were labeled as Synthetic Artificial Intelligence (AI)-powered group and Analytic Artificial Intelligence (AI)-powered group.

The two experimental groups were empowered by utilizing the Artificial Intelligence tools such as ChatGPT and WordTune. In better words, participants were scaffold by Artificial Intelligence tools. The point is that, during the course treatment sessions in experimental groups, the teacher did not focused on whether or not the participants had done their writing by themselves or by the aid of academic writing AI-tools, instead, the teacher asked each participants to be ready for a prompt lecture on the writing s/he had provided as each session homework. NO excuses or lack of mastery on the details of their academic writings were allowed. The participants were informed enough to work on their writing tasks which had already been prepared by the academic writing AI-tools. This study attempted to depict probable statistically significant differences which might have been encountered by the feedbacks and the effects of integrating academic writing AI-powered tools into Iranian EFL curriculum, meanwhile, also considering the degree of significance the EFL learners might put on statistically due to the facilities provided for the Iranian EFL learners through stress-free AI-supported environment of learning a language.

Verification of scales

The researcher conducted a pilot study in order to check the reliability of the instruments. A group of 23 intermediate EFL undergraduates at the same age and situation were selected. The pilot study was supervised by faculty members and TEFL university experts. The statistical analysis and indices were presented in table 1 below:

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Table 1

Pilot Study Result

	Language Proficiency Test (OPT)	Academic Writing Test
Alpha	.82	.78
Mean	16.91	24.77
SD	8.12	9.02
# of items	100	30

Table 1. displays the indices obtained from pilot study. The alpha value OPT test of language proficiency was .82 and the respected Cronbach's alpha for the Academic Writing Test was .78. As it is noticed, the alpha value for both instruments was calculated in the pilot study and ranked as good fit as the instruments utilized in the study and considered as reliable.

Results

Investigation of RQ1

Concerning research question one as whether integrating synthetic Artificial Intelligence powered tools could enrich academic writing skill of intermediate level EFL learners in Iran. At first, the normal distribution value of data was checked and shown in Table 2.

Table 2

Normal Distribution Value

		Shapiro-Wilk		
	Groups	Statistic	df	Sig.
Pre-test	Synthetic AI	.931	20	.191
	Analytic AI	.919	20	.173
	Control	.911	20	.071
Post-test	Synthetic AI	.913	20	.057
	Analytic AI	.905	20	.056
	Control	.944	20	.782

Table 2 displays that the p-values of the academic writing ability pre- and post-tests of Synthetic AI-powered group are .191 and .057. Thep-values for Analytic AI-powered group include .173 and .056. Also, the p-values for the learners in the control group are .071 and .782. So it could be inferred that the p-values for the three groups are more than .05, this confirms that normal distribution of data observed. In table below, the data for synthetic AI-powered learners' academic writing ability on the pre-test are displayed and analyzed.

Table 3. Descriptive Statistics for the Pre-Test of Synthetic AI-powered Learners in the Experimental and Control Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	Exp.	20	30.0000	4.84371	1.17467
	Con.	20	29.0000	5.51079	1.22054

Table above (table 3) displays mean value of the Synthetic AI-powered learners in the Exp. group (M= 30.00) and the Con. group (M=29.00) in the pre-test phase were somehow similar; hence, the exp. group obtained slightly scores than the con one.

An independent sample t-test was run as the inferential analysis of Synthetic AI-powered learners' performance in exp. and con. groups in pre-test phase of the present study is displayd in Table 4. This statistical analysis is performed to highlight the significance level prior to the treatment sessions.

Table 4. Independent-Samples T-Test for the Pre-Test of Synthetic AI-powered Learners in the Experimental and Control Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.183	.688	.832	38	.421	1.0000	1.0031	-2.0217	4.8231
Equal variances not assumed			.832	38	.421	1.0000	1.0027	-2.0225	4.8304

Table 4 displays the calculated Levene's test p-value as p=.688 which is higher than .05 and this ascertains the equality of means and variance in the pre-test phase. The value for significance level was calculated as p=.421which is higher than .05 and confirms that the descriptive statistical analysis measured confirms there exist no significant discrepancy within the mean scores of Exp and Con. groups in measuring the learners' academic writing ability pre-test phase. In better words, both groups were the same prior to the treatment in the present study. Now in Table 5, the statistical analysis of the Synthetic AI-powered learners in the exp and con groups after the treatment is presented.

Table 5. Descriptive Statistics for the Post-Test of Synthetic AI-powered Learners in the Experimental and Control Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Post-test	Exp.	20	36.0000	3.01439	.91382
	Con.	20	29.0000	4.98251	1.31567

The statistical description in performance of both exp and con groups in post-test of academic writing test concerning the Synthetic AI-powered learners is shown in Table 5. There exists a considerable discrepancy within the means which shows integrating Artificial Intelligence tools improved exp academic writing scores (M= 36.00) higher than con one (M=29.00).

The researcher run an independent sample t-test for post-test scores of exp and con groups of learners concerning academic writing ability of Synthetic AI-powered learners' performance in both groups and the inferential statistics was offered in Table 6 below:

Table 6. Independent-Samples T-Test for the Post-Test of Synthetic AI-powered Learners in the Experimental and Control Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.529	.317	4.973	38	.000	6.0000	1.0152	3.9923	9.5628
Equal variances not assumed			4.973	38	.000	6.0000	1.0152	3.9879	9.6179

The Table above highlights the p-value (p=.317) through the Levene's tests which is greater than .05 and it means that both groups variance is the same. The significance value is p=.000 which is lower than .05 and it highlights that there is a statistically significant discrepancy within Synthetic AI-powered academic writing ability within the control and experimental groups (mean difference=6.00). In better words, it was highlighted that concerning academic writing ability, the exp group obtained higher scores and performance than con group after treatment of the present study, i.e., it could be concluded that integrating Artificial Intelligence tools significantly affected the Iranian EFL intermediate Synthetic AI-powered learners' academic writing ability. The Analytic AI-powered learners' performance would be statistically analyzed in the next section.

Investigation of RQ2

Regarding second question in the present research as to examine whether integrating Analytic Artificial Intelligence powered tools could enrich academic writing ability of intermediate EFL practitioners in Iran, the following data analysis was performed. First of all, statistical description of Analytic AI-powered learners' academic writing ability prior to the treatment was considered and displayed in Table 7.

Table 7. Descriptive Statistics for the Pre-Test of Analytic AI-powered Learners in the Experimental and Control Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	Exp.	20	31.0000	5.10287	1.15182
	Con.	20	30.0000	5.21934	1.14927

As shown in Table 7. both mean scores in pre-test of Analytic AI-powered learners' academic writing ability are M(exp)=30.00 and M(con)=31.00 respectively, which means that both (experimental and control) groups' academic writing ability was approximately equal prior to the commencement of treatment in the present study.

A Levene's test run to highlight the significance level of both exp and con performance in pre-test phase prior to the treatment sessions and the result was displayed in Table 8. and the inferential analysis of the Analytic AI-powered learners' performance would be followed.

Table 8. Independent-Samples T-Test for the Pre-Test of Analytic AI-powered Learners in the Experimental and Control Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.173	.534	.920	38	.417	1.0000	1.1873	-2.2916	4.9107
Equal variances not assumed			.920	38	.417	1.0000	1.1385	-2.2894	4.9281

In above table, p=.534 obtained which is greater than .05 and highlights that the variance of the academic writing scores obtained from both groups are equal in pretest phase of study. Also, the significance level of both groups' scores which is obtained from the independent sample t-test is p= .417 and higher than .05 which confirms that there exists no considerable discrepancy within the mean score (mean difference=1.00) of the Analytic AI-powered learners' academic writing ability for both groups prior to treatment of present study in pretest phase. Table 9 presents posttest results for the Analytic AI-powered learners in both groups.

Table 9. Descriptive Statistics for the Post-Test of Analytic AI-powered Learners in the Experimental and Control Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Post-test	Exp.	20	38.0000	3.11863	.11891
	Con.	20	30.0000	4.93128	1.21537

In table above, statistical description concerning the academic writing ability of Analytic AI-powered learners after the treatment in exp and con groups displayed which shows a great discrepancy within the means since integrating Artificial Intelligence tools has led to enhancement of the experimental group's mean score (M= 38.00) in comparison to con group mean (M=30.00) regardingthe learners' academic writing ability.

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The researcher runs a Levene's test and Table 10 which shows the significance level between the Analytic AI-powered learners' performance after the treatment in both groups' academic writing ability through inferential statistics.

Table 10. Independent-Samples T-Test for the Post-Test of Analytic AI-powered Learners in the Experimental and Control Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.834	.427	3.837	38	.000	7.0000	1.8987	3.0176	9.9104
Equal variances not assumed			3.837	38	.000	7.0000	1.8987	3.8915	9.3719

In Table 10 the p value is calculated as p=.427 which is greater than .05 and it means that both experimental control group are the same. Also the significance level is p=.00 which is smaller than .05 and it means there is a considerable discrepancy within Analytic AI-powered academic writing ability in both groups (the difference of mean=7.00). In better words, the t-test clarifies concerning academic writing ability performance of both groups after the treatment, exp group did better and obtained higher scores than con group after treatment.Therefore, integrating Artificial Intelligence tools significantly affected the Iranian EFL intermediate Analytic AI-powered learners' academic writing ability. The third research question concerning the comparison of Synthetic and Analytic AI-powered learners' performance would be present in the next section.

Investigation of RQ3

The researcher posed question three to shed light at the Synthetic AI-powered and Analytic AI-powered learners' probable discrepancy in their academic writing ability once they were exposed to the integration of Artificial Intelligence empowerment. At first, the two experimental groups' performance on the academic writing was compared prior to treatment to investigate theprobable discrepancy in their academic writing ability. It was displayed in table below:

Table 11. Descriptive Statistics for the Pre-Test of Synthetic AI-powered and Analytic AI-powered Learners in the Two Experimental Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	Synthetic AI	20	31.0000	4.97608	1.14618
	Analytic AI	20	30.0000	4.89255	1.15391

As shown in Table 11, both Synthetic AI-powered and Analytic AI-powered learners performed similarly on academic writing pre-test before the treatment. Hence, the learners in Analytic AI-powered group (M=30.00) had only one mean score difference with the Synthetic AI-powered learners (M=31.00). In table 12 which follows, t-test was run and inferential analysis was provided as follows in order to figure out the significance level between the two experimental performances on pre-test.

Table 12. Independent-Samples T-Test for the Pre-Test of Synthetic AI-powered and Analytic AI-poweredLearners in the Two Experimental Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0.473	.219	3.592	38	.557	1.0000	1.1759	3.1515	9.1249
Equal variances not assumed			3.592	38	.557	1.0000	1.1683	3.1491	9.0916

The value p=.219 which is greater than .05 and signifies the variance was equal and the same. The level of significance gained by the t-test also shows p=.557 which is greater than .05 and confirms there is no considerable differences (discrepancy= 1.00) within pretest means in both Synthetic AI-powered and Analytic AI-powered experimental groups concerning their academic writing ability prior to the treatment sessions. In Table 13 which follows, it provides both Synthetic AI-powered and Analytic AI-powered experimental groups in posttest.

Table 13. Descriptive Statistics for the Post-Test of Synthetic AI-powered and Analytic AI-poweredLearners in the two Experimental Groups

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Post-test	Synthetic AI	20	34.0000	3.00723	.83576
	Analytic AI	20	38.0000	3.01411	.21078

The descriptive statistics in Table 13 concerning the academic writing ability of Synthetic AI-powered and Analytic AI-powered learners in the two experimental groups in posttest displays a slight discrepancy within two exp groups which justifies that integrating Artificial Intelligence tools implemented to the Analytic AI-powered group made more enhancement (M= 38.00) than the Synthetic AI-powered group (M=34.00) regarding their academic writing ability.

The final table as Table 14 depicts the significance level between the post-test of the Synthetic AI-powered and Analytic AI-powered learners' performances in their academic writing ability through inferential statistics as follows:

Table 14. Independent-Samples T-Test for the Post-Test of Synthetic AI-powered and Analytic AI-poweredLearners in the Two Experimental Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0.628	.173	3.276	38	.012	2.0000	1.0238	3.0037	8.9012
Equal variances not assumed			3.276	38	.012	2.0000	1.0315	3.8803	8.9534

The t-test for both experimental groups posttests was run and the statistical analysis was displayed in Table 14. As it signifies, the p value of both groups was p=.173 which is greater than .05 and confirms that both groups embrace the equality of variances. The value for the level of significance is also p=.012 which is smaller than .05 which signifies that a significant difference is noticed between the Synthetic AI-powered and Analytic AI-poweredlearners' academic writing ability (difference=2.00). In better words, t-test signifies Synthetic AI-powered group obtained higher grades than Analytic AI-powered group learners in their academic writing ability after the treatment.Therefore, integrating Artificial Intelligence tools significantly affected the Iranian intermediate Synthetic AI-powered and Analytic AI-powered EFL learners' academic writing

ability to the considerable extent, while the Synthetic AI-powered learners performed better than the Analytic AI-powered ones when they were exposed to Artificial Intelligence empowering tools in an academic writing course.

In sum, quantitative descriptive analyses of gathered data confirmed that integrating Artificial Intelligence empowering tools could significantly affect and enhance the Iranian intermediate EFL learners' academic writing ability. Moreover, both Synthetic AI-powered and Analytic AI-powered learners could significantly benefit from Artificial Intelligence empowering tools in enriching their academic writing ability. Finally, Synthetic AI-powered learners outperformed the Analytic AI-powered ones in doing the academic writing tasks by integrating Artificial Intelligence empowering tools.

Discussion

The researcher studied probable impact of applying Artificial Intelligence-powered applications and bots on the academic writing ability of Iranian intermediate EFL learners in two approaches as Synthetic AI-powered and Analytic AI-powered. To this aim, three groups of intermediate EFL learners were selected as two experimental and one con group. The data gathered and analyzed via computer statistic program SPSS 24 and were interpreted in details.

The first research question posed that whether integrating Synthetic Artificial Intelligence (AI)-powered tools has any statistically prominent effect on enriching academic writing ability of intermediate students of English language. Synthetic AI-powered group was trained in a bottom-up fashion to utilize the AI-writing tools as ChatGPT and WordTune whenever the participants needed help for writing academic five-essay paragraphs. The outcome of the academic writing test was astonishing as synthetic AI-powered students obtained higher grades than con group at posttest. Obtained data underwent statistical analysis through t-test to defend the outcome statistically. Then second research question was examined which posed that whether integrating Analytic Artificial Intelligence (AI)-powered tools has any statistically considerable impact on enriching academic writing ability of intermediate students of English language. The students in second experimental group labeled as Analytic AI-powered group were informed and taught to use AI-powered academic writing tools as ChatGPT and WordTune wherever possible in the class or at home in a holistic or top-down fashion, i.e., they could even asked the AI-tools to provide them with an academic five-paragraph essay on a certain topic and in a certain style, for example in compare and contrast style. The procedure of both experimental groups was carefully defined in the procedure section. Then the Analytic AI-powered group was post-tested and surprisingly, the Analytic AI group had a greater performance in posttest.

To interpret collected data statistically, the results were calculated through statistical indices as pair sample t-test and independent sample t-test. Till then, the researcher made sure that integrating both Synthetic AI and Analytic AI were successful in enhancing the academic writing ability of Iranian intermediate EFL learners. Final step, once both experimental groups as the Synthetic AI and Analytic AI displayed statistically significant difference with the control group, paired sample t-test and independent sample t-test were run for both experimental groups to ascertain the degree of difference each approach of practice had made. The findings proved

Synthetic AI-powered bots were more effective than Analytic AI-powered tools on enhancing and enriching the academic writing ability of undergraduates in Iran.

The result of the present research was in line with researches conducted earlier in this realm. Kim (2019) studied the effects of utilizing AI on enhancing Korean EFL learners and confirmed that Cleverbot as an AI writing Chatbot was very effective on strengthening the involvement of EFL learners and Korean students' skill acquisition remarkably enhanced in this respect. In another study by Kukulska-Hulme (2019), it was highlighted that integrating AI apps had high influence and boosted the performance and motivation of the learners. In the same vein, Alamer & Al Khateeb (2021) rectified the great influence of AI tools on learners and found that the freedom sensed by learners to propagate their time, place and speed while learning through AI tools might be the core positive point which render the integration of AI tools more effective and successful. Kessler (2023) conducted a research and emphasized the great impact of AI apps in learning as learners find the opportunity to practice independence in their learning activities. Some scholars, inspired in the same vein as the researcher of this study, shed lights on writing ability. Researchers like Suh and Prophet (2018) studied the effects of applying Grammrly as an AI tools on enhancing students' writing skill. Needless to highlight that they utilized free version (not premium version) due to ease of access and the availability of the Grammarly. Again their study affirmed the statistically significant difference of the practitioners of Grammarly regarding their writing skill. There has been a plethora of growing research on the introduction and integration of the Artificial Intelligence tools and apps into the EFL classrooms, researchers such as Bowen & Thomas (2022), Li & Bonk (2023), Nejati et,al. (2018), and Rad. et.al (2023), all of which confirm unanimously that the emergence of AI tools into EFL learning zone could be regarded as the best breakthrough in this century as the demand for such necessity had long been searched for (Safadi et,al, 2023). The researcher of this study hoped to delve into the less-touched aspect of integrating AI tools into Language skill acquisition which was the two approaches as Synthetic AI-powered tools versus Analytic AI-powered tools on enrichment of the academic writing ability of Iranian intermediate EFL learners.

Conclusion

This research aimed at depicting the impact of integrating AI bots in skills acquisition of Iranian EFL learners. For sure, such integration was followed in two fashions of Synthetic AI and Analytic AI. The available literature in the same vein as training EFL learners through implementing Artificial Intelligence highlights that the convergent pulse of technology and its manifestation has reached the education realm. From among the AI tools and apps, ChatGPT has been spotlighted as scholars like Cong-Lem & Daneshfar (2024) labeled ChatGPT as the Generative Artificial Intelligence (GAI) bots because their manifestations are numerous. In the present study, the researcher delved into the two approaches of Bottom-Up and Top-Down processing of involving EFL learners into the tasks at hands in language acquisition. The Synthetic AI-powered tools as ChatGPT and WordTune displayed greater effect size and the EFL learners' uptake were significantly higher than the Analytic AI-powered tools. The reason for such discrepancy might reside on the creativity and intuition index embedded in the Synthetic fashion and could be a good topic of research for further studies. Syllabus designers and materials developers should welcome the technology-integrated learning models (AliSalimi and

Karimabadi, 2021) with the focus on the enrichment of the capacity of learner engagement in new materials. Stake holders should in turn invest more on the new technology CALL courseware (Wang, Chen, & Zhang. 2021) in order to accelerate the learning/teaching pace of language acquisition in line with the demands of its practitioners in order to meet their needs and enrich the outcomes.

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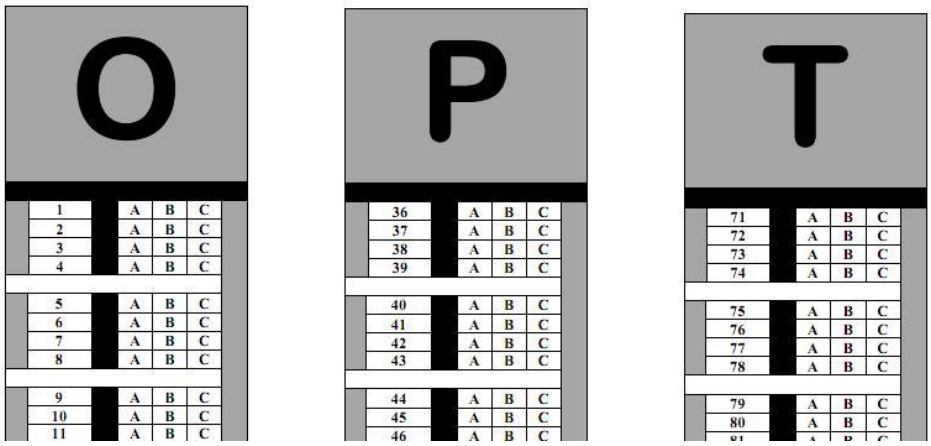
Appendix - A

Oxford Placement Test



Kindly it is asked to find the Oxford Placement Test (Appendix A) and the Academic Writing Test Scale(Appendix B) in attachment of supplementary files.