The Impact of Self-Directed Learning on Academic Writing Skills of EFL Learners with Critical Thinking Ability

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Abstract

The mediating function of critical thinking ability (CTA) in the link between language learning techniques and the academic writing of EFL learners has garnered increased attention because of recent educational innovations. Present study aims to examine the impact of self-directed learning on the academic writing skills of Pakistani EFL learners by emphasizing the mediating function of critical thinking ability. Validated scales were used to measure all the research variables. Using a quantitative research approach, data was collected from 240 Pakistani students randomly selected based on the population of Punjab province. For data analysis, IBM SPSS AMOS 25 was used to analyze descriptive data, and then SEM was performed to analyze the structural relationship between constructs. Findings indicated that self-directed learning positively enhanced the academic writing skills of EFL learners, and critical thinking ability partially mediated the relationship between self-directed learning and academic writing skills. Moreover, a significant positive relationship was found among all these variables. This study emphasizes the significance of encouraging SDL and critical thinking to improve academic writing skills. These findings provide insightful information to educators and policymakers on how to improve EFL learners' writing performance through active and independent learning in self-directed learning by integrating critical thinking.

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Introduction

Proficiency in academic writing is essential for students to succeed academically because it allows them to effectively and convincingly communicate ideas, arguments, and supporting data in well-organized sentences (Zhang & Wu, 2024). Jaja (2024) stated that academic writing abilities significantly affect the academic achievement of learners as they improve their intellectual abilities, creativity, determination and motivation. Therefore, academic writing ability is essential in the educational process (Shulgina et al., 2024). In the context of English language learning, academic writing skills are essential component as it requires knowledge and understanding in diverse areas such as writing organization, sentence structure, grammar and coherence and cohesion of the writing (Campbell, 2019). Therefore, retaining knowledge and proficiency in academic writing is the predictor of academic accomplishment for EFL students at a higher level specifically in exams, writing theses, and publishing papers that require strong writing abilities to convey arguments and ideas in a creative and coherent language structure (Fontenelle-Tereshchuk, 2024). Although, academic writing is the most difficult task for EFL students majoring in English language since it requires an intricate process that leads to issues with vocabulary, syntax, and concept development (Asnas & Hidayanti, 2024). Moreover, reliance on conventional teacher-centered teaching techniques, lack of resources, and restricted access to English-speaking contexts make it more difficult and challenging for the EFL learners (Abbas, 2023; Rafi & Moghees, 2022). However, the rise in digitalization introduced innovative educational strategies for the language learners that assist them to acquire strong proficiency in academic writing (Al-Sofi, 2024). Morris and Rohs (2021) asserted that self-directed learning is a meta-competence and innovative educational strategy that enables the students to continuously and permanently acquire new competencies, knowledge, and abilities in the digitalization world. It is well acknowledged that self-directed learning (SDL) is a crucial 21st-century talent and a necessary competency in the quickly evolving social and technical landscape of today (Morris, 2019). Knowles (1975) asserts that SDL entails a person's capacity to assume accountability for determining their learning requirements, establishing objectives, locating resources, choosing efficient learning techniques, and assessing whether they receive outside assistance. Similarly, SDL empowers students to become active and involved participants in their educational journey by fostering self-confidence, independence, motivation, and lifelong learning (Wong et al., 2021). Zhao et al. (2024) emphasized that self-directed learning encourages deep learning, transforming students into active contributors to the learning process. Self-directed learning promotes learning independence and autonomy by assisting the students in choosing what to learn, when to learn it and how much to learn. Therefore, self-directed learners frequently actively define learning objectives, find resources, create learning techniques, and assess their progress on their own.

Self-directed learning has garnered significant attention of researchers and linguists because of its prospective benefits of learning and its relation to language proficiency to enhance learner autonomy (Alegado et al., 2023). Shalini Roy and Gandhimathi (2024) mentioned that self-directed learning is particularly significant for language learning outside of the classroom because it gives students the flexibility to participate in language learning activities at any time and from any location, utilizing a variety of actual scenarios and circumstances (Lai et al., 2022) Furthermore, Mitchell (2023) stated that self-directed learning

is a transit the teacher-centered learning method by allows EFL students to pick their own learning methods, set their own goals, and make independent decisions, which fosters autonomy and improves language learning skills. Mokoena (2023) explored self-directed learning can reduce pedagogical needs for English as a first additional language learner. It found that self-directed learning promotes learner-centered learning, accountability, and increased parental engagement, reducing pedagogical demands. Similarly, Rizkiani et al. (2023) highlighted the imperative role of self-directed learning particularly in academic writing skills.

Mujiono (2024) investigated the role of self-regulated learning and self-directed learning (SDL) affected EFL students' ability to solve academic writing problems. It found that self-regulation and self-directed learning greatly improves students' learning ability, which includes goal setting, self-monitoring, and strategic learning modifications that assist them to overcome the academic writing problems successfully. Aljasir (2025) conducted a study sought to empower adult EFL learners and showed that the participants' writing abilities had significantly improved in all evaluated areas, with coherence, content and ideas, and cohesiveness by developing a self-directed, process-oriented writing program. Moreover, students who engage in self-directed learning (SDL) actively complete their academic writing tasks by effectively evaluating and organizing information for their assignments (Ramahdani et al., 2021). Similarly, Aghayani and Janfeshan (2020) found that SDL motivates students, leading to notable improvements in their writing proficiency. Similarly, Rivera and Pinilla (2017) reported that EFL learners benefited from SDL when organizing their thoughts for creative writing tasks. Recently, Sriwichai et al. (2019) showed that SDL improved the writing abilities of EFL students in higher education, highlighting how well it works to build academic writing competency.

In earlier studies, self-directed learning (SDL) has improved EFL students' academic writing skills and assist them to encounter their academic writing challenges. However, the impact of self-directed learning on EFL students' academic writing abilities in Pakistan, when critical thinking skills are used as a mediator, is still being unexplored. Critical thinking is an essential ability for language learners because it allows individuals to learn from a variety of sources and critically examine, synthesize, and evaluate material to create written compositions that are accurate and coherent (Beniche, 2023). In self-directed learning process, where students establish their own learning goals, assess the usefulness of learning materials, and keep track of their own learning progress, critical thinking is an imperative factor to critically evaluate, analyze and synthesize effectiveness of learning (George et al., 2020; Nhat & Le, 2023). Therefore, at the higher level of education, the integration of critical thinking ability to empower the students to become skilled and autonomous writers into the curriculum is compulsory (Sabrina et al., 2022).

However, in Pakistan's EFL setting, it is crucial to comprehend how SDL might improve academic writing abilities and encourage critical thinking, where traditional teacher-centered techniques are frequently practiced. Thus, present study based on Garrison's (1997) SDL comprehensive model, fills the theoretical gap by examining the impact of self-directed learning on Pakistani EFL learners' academic writing performance. Additionally, it investigates how their critical thinking skills are affected by self-directed learning and how those skills affect their academic writing abilities. To provide a thorough grasp of these relationships in the

context of EFL learning in Pakistan, current study particularly investigates the mediating function of critical thinking ability in the relationship between academic writing abilities and self-directed learning of EFL learners. The findings of this study may assist in guiding treatments that support self-directed learning and critical thinking, which will help students become writers that are more proficient.

Literature Review

Theory of Constructivism

The theory of constructivism emphasizes a learner-centered approach in which students are seen as the knowledge makers and builders (Fox, 2001). Students use their experiences to construct their meaning and knowledge. Piaget and Vygotsky's cognitive theories serve as the foundation for constructivism. Piaget taught the notion of actively studying, developing plans, integrating, and adapting to all scientific disciplines. Similarly, group projects, internships, and other concepts are derived from Vygotsky's social constructivism. Therefore, researchers claim that constructivism is the origin of both the "top-down" and "bottom-up" learning methodologies (Aljohani, 2017). Lastly, John Dewey contributed significantly to implementing constructivism in the classroom by proposing that students need to work on real-world issues in a classroom context (Bodner & Orgill, 2007). Instead of using repetitive memorization to grasp the topics, learners should think independently and share their ideas with others. A cornerstone of this educational learning approach was Dewey's concept of "real-life experience."

Learning theory of constructivism has five principal characteristics. The first concept is that knowledge is constructed from preexisting knowledge. The second premise is that learning is an active process. It should be based on fresh experiences rather than passively absorbing information (Travers et al., 1993). Learning is a social process. The fourth principle is respecting everyone's viewpoints and acknowledging that each learner has a unique perspective. Learning is primarily subjective, and each learner will interpret it differently. This idea is essential to establishing a constructive setting where teachers may assist the students they require. The fifth constructivism theory premises with the mental model of learning and the idea that people are constantly changing (Olusegun, 2015). Among all these constructivist principles, it is crucial to remember that students are the main participants in this implementation process. Implementing this educational idea will only succeed if students are actively involved and engaged (Thampinathan, 2022). Additionally, Suhendi and Purwarno (2018) mentioned that according to the constructivist paradigm, learners become more curious about new things, and students can use what they have learned to design and make anything they want.

Thus, based on constructivism's principles, learning is an active, self-regulated process in which students gain information via meaningful experiences. The present study is grounded on the theory of constructivism, which provides a robust foundation for examining how EFL learners in Pakistan develop academic writing skills through self-directed learning and critical thinking. According to Olusegun (2015), the fundamental principle of constructivism philosophy is that students should actively and independently study. Therefore, constructivism is a unique strategy that allows students to interact with one another and draw knowledge from experiences, which promotes student-centric learning exposure and aids in the development of

language competency. Students' motivation, adaptability, flexibility, inventiveness, and diversity are all enhanced by this method. It encourages students to learn independently (Venkadeswaran & Ramanathan, 2024). Thus, SDL's autonomous character aligns with constructivist theory, which encourages students to actively participate in expanding their knowledge through their own experiences.

The Role of Self-Directed Learning in Academic Writing Skills of EFL Learners
Self-directed learning is key in the field of foreign language instruction because they enable students to achieve the best possible language learning outcomes by encouraging them to think critically, use language learning strategies, and confidently express their ideas (Nejati & Ilchi, 2023). Students actively create their language knowledge through self-directed language learning activities, recognizing their own learning requirements and developing individualized learning techniques and styles (Zhao et al., 2024). The advantages of self-directed learning for EFL students have been the subject of several research in language learning and acquisition (Lai et al., 2022; Xodabande et al., 2022). According to Alegado et al. (2023), self-directed EFL students exhibit high learning motivation and awareness levels. They also employ various suitable language learning techniques that greatly support their language competence improvement. Furthermore, Mitchell (2023) noted that self-directed learning allows ESL students to set learning goals, select their learning methods, and make independent decisions. Additionally, self-directed learning assists students in taking control of their education, especially when it comes to developing their academic writing abilities (Adnan & Shakirah Sayadi , 2021; Rammayadi et al., 2023). For instance, Adnan and Shakirah Sayadi (2021) investigated the impact of self-directed learning on academic writing abilities. They demonstrated that the self-directed learning strategies enhanced pre-intermediate and intermediate students' English writing skills. Moreover, the goal of a quasi-experimental study by Aljasir (2025) was to empower adult EFL learners by creating a process-oriented, self-directed writing program that would improve their writing skills and help them overcome the obstacles they encounter when trying to improve their writing outside of traditional classroom settings. It demonstrated that all the evaluated categories showed notable improvements in the participants' writing abilities, with coherence, content and ideas, and cohesiveness, sentence structure and grammatical improvement. Similarly, Wang et al. (2024) also highlighted the role of self-directed learning in AI-assisted writing process where students use different technological resources in their autonomous learning process to improve their academic writing skills. According to several participants, technological innovation in self-directed learning assisted them to become more self-monitor, self-assessed, motivated and inspired them to devote more time to writing practice. Rammayadi et al. (2023) explored the students' need for self-directed learning to improve their academic writing skills. This study revealed that students' ability to integrate self-directed learning into their English writing skills was positively correlated with their degree of self-directedness. Therefore, self-directed learning is essential to the writing process since it improves students' motivation and autonomy and significantly enhances their academic writing proficiency. Thus, the present study formulated the following hypothesis.

RH₁: Self-directed learning significantly affects the academic writing skills of EFL learners in Pakistan.

The Role of Self-Directed Learning in Critical Thinking Ability of EFL Learners

Critical thinking ability and self-directed learning (SDL) are closely intertwined, as unique learner traits and the demands of higher-level of education learning drive. Independent and self-directed learners must question and critically evaluate the information and knowledge they encounter throughout their learning process (Chukwunemerem, 2023). Self-directed learning requires learners to build knowledge autonomously, employing their cognitive skills and individualized approaches. In the context of independent learning, critical thinking ability and metacognitive strategies are essential by enabling learners to objectively assess information, analyze concepts, and critically evaluate the learning process. Furthermore, the use of self-directed learning significantly influences the other 21st century skills such as metacognition and problem-solving skills including critical thinking ability. This innovative educational approach assists the students to take the initiative for their learning that involves metacognition skills as they encounter the learning challenges and solve their problems on their own by using their thinking ability and other learning skills. Thus, self-directed learning positively interlinks the metacognition, critical thinking ability and problem-solving skills of the students to make their learning process easy (Karatas & Arpaci, 2021). Saiz and Rivas (2023) stated that developing the essential competencies of critical thinking such as decision-making, problem solving and interpretation that allow the individual to make inferences in the context of independent and autonomous learning is imperative. However, Turan and Koc (2018) explored a positive relationship between self-directed learning and critical thinking ability and. Moreover, a study by Lu (2025) highlighted the link between self-directed learning tactics and cognitive load theory suggesting that students enhanced their learning efficiency by applying constructivist concepts, controlling knowledge structures, and actively processing information. It also suggested that a comprehensive approach to self-directed learning, combining motivation and creative handling of cognitive strategies as the key factor of critical thinking ability significantly improved students' academic success. Shin and Song (2022) claimed that students who get instruction in autonomous learning techniques such as self-directed learning are better able to control their thinking ability as they are more conscious of the additional time and resources required to complete the academic task with the best possible learning outcomes. Similarly, a study on self-directed-based training among nursing students demonstrated that their critical thinking skills, including cognitive, personal, interpersonal, and technical abilities alongside motivational factors such as self-efficacy and strategy use, were significantly enhanced through self-directed learning techniques (Arizo-Luque et al., 2022). In conclusion, self-directed learning is essential for developing critical thinking by granting learners autonomy to evaluate, research, and synthesize information independently. Through SDL activities like goal setting, resource-seeking, and reflective practice, learners cultivate an open-minded, inquisitive mindset that strengthens their critical thinking skills (Huang et al., 2023). Based on these insights, the following hypothesis is proposed.

RH₂: Self-directed learning significantly affects the critical thinking ability of EFL learners in Pakistan.

Critical Thinking Ability in Academic Writing Skills

Critical thinking is imperative to enhance learners' metacognitive skills, which are essential for successful language acquisition (Gelder, 2005). Ramezani et al (2016) mentioned that

critical thinking ability assists language learners in analyzing, synthesizing, and evaluating information. According to Starfield (2019), adult learners are required to acquire academic writing skills and critical thinking ability at higher levels. Critical thinking ability fosters creative and analytical skills among the students. This suggests that critical thinking helps students become more daring and analytical in their academic literacies specifically in academic writing skills. Ybyrayeva et al. (2023) stated that critical thinking ability enables the students to analyze, synthesize, and evaluate the assertions in academic writings, and they also improve their problem-solving abilities because academic writing requires students to demonstrate proficiency in these skills to reach accurate and valid conclusions. Pramonojati et al. (2020) described critical thinking as a creative writing process that integrates facts and ideas rationally and concisely. They argued that critical thinking involves problem-solving, argument development, and presenting evidence to support those arguments. Their study demonstrated that applying critical thinking skills significantly improved academic writing, making it more explicit and structured. Similarly, Beniche (2023) noted that argumentative essays grounded in logic and facts contribute to the clarity and depth of academic writing, highlighting a robust positive relationship between argumentative writing and critical thinking. Moreover, Kurniati and Muin (2022) investigated how students' critical thinking abilities affected their ability to write English essays using cognitive and metacognitive learning methodologies. The findings showed that students who were given metacognitive strategies and had high critical thinking skills outperformed those who were given cognitive techniques and had poor critical thinking capacity when producing English essays. Teng and Yue (2023) also examined the relationship between Chinese EFL leaners' critical thinking skills, metacognition and academic writing skills and revealed a strong correlation. Khairuddin et al. (2024) conducted research to investigate how students felt about their academic writing and critical thinking abilities as well as the link between both. A cross-sectional study approach was used and findings suggested that students thought they were competent at both academic writing and critical thinking, and there was a strong link between how they thought they were doing at both. Chukwuere (2024) explored that critical research thinking helps students to examine, assess, and synthesize material efficiently, which is essential for academic writing success and publications. This study investigated the value of critical thinking in improving scholars' and students' capacity to assess material critically, formulate arguments that are backed by evidence. Thus, based on these insights, the present study formulated the following hypothesis:

RH₃: Critical thinking ability significantly affects the academic writing skills of EFL learners in Pakistan.

Critical Thinking Ability as Mediator

Many educators are keen to educate learners to think critically since it is widely recognized as an essential and vital component of modern education (Schafersman, 1991). Critical thinking enables students to evolve in circumstances and face new challenges. It enables them to independently analyze information, draw well-informed conclusions, and effectively manage large volumes of data. This skill set is crucial for evaluating outcomes and making sound judgments (Shamboul, 2022). Brookfield (2020) stated that one of the primary objectives of education is to help students develop critical thinking abilities because they help them deal with uncertainty and accept or adapt to continuous social, cultural, and technological change.

Therefore, the imperative role of critical thinking ability in education cannot be overlooked. Tasgin & Dilek, 2023). Boran and Karakus (2022) investigated the mediated effect of critical thinking ability on students' metacognition awareness and problem-solving abilities and revealed the full mediation of critical thinking ability. Similarly, Ali and Awan (2023) investigated the mediating function of critical thinking in the relationship between a university faculty's instructional strategies and students' academic achievement. The results showed that critical thinking ability partially mediated the relationship between faculty's instructional strategies and students' academic achievement. Moreover, Acosta-Enriquez et al. (2025) also examined critical thinking, academic stress and students' performance expectations as mediators in the context of AI dependency. These results suggested that academic stress and performance expectation were significantly mediated the link between AI dependency and academic self-efficacy of college students, however, critical thinking ability was not significantly mediated this relationship. Akpur (2025) investigated the relationship between metacognitive awareness and creativity while measuring critical thinking as mediator and revealed that although the relationship between metacognitive and awareness was positive, the mediational effect of critical thinking was not significant between them. Thus, the present study formulated the following hypothesis:

RH4: Critical thinking ability significantly mediates the relationship between self-directed learning and academic writing skills of EFL learners in Pakistan.

Conceptual Framework

The conceptual framework of the present study based on the Garrison's (1997) comprehensive model of self-directed learning (Motivation, self-management and self-monitoring), academic writing skills and critical thinking ability, filled the gap in the existing literature by examining the role of critical thinking ability as mediator between self-directed learning and academic writing skills of EFL leaners in Pakistan. Additionally, this current model is based on theory of constructivism which highlights how learning is a dynamic and self-controlled process influenced by personal and peer relationships. This study offers new perspectives into how autonomous and critical engagement with learning information might improve academic writing abilities for EFL learners, using constructivism theory to support the function of self-directed learning and to justify the necessity of critical thinking ability in academic writing. Thus, based on the previous literature review, this study proposes a unique conceptual framework that has been shown in Figure 1.

Figure 1
Conceptual Framework
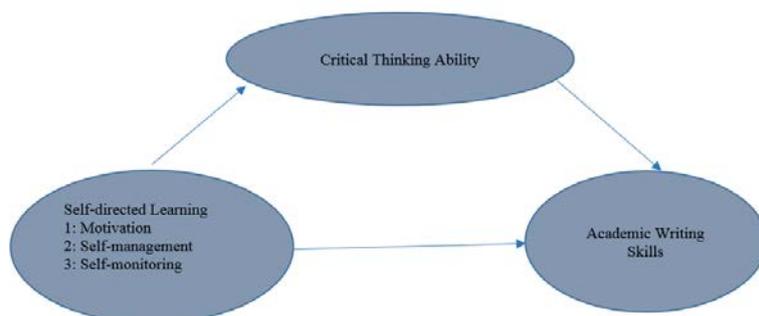
Research Methodology

Population and Methods

According to a positive paradigm, this quantitative study examined the causal relationship between constructs using an explanatory and deductive research technique (Creswell, 2013). The population of this study consists of Pakistani EFL students enrolled in Functional English during the first semester. The selection of the target population in this study is based on two criteria. The first criteria are by examining the university students from Punjab since it is the largest province with 52.95 percent contribution into Pakistan population (Higher Education Commission, 2020). The second criterion is based on the number of universities. There are large numbers of universities, including public and private universities in the province of Punjab (Higher Education Commission, 2020). Thus, the present study selected the target population of university students from the Punjab Province. The present study used multi-stage sampling techniques which are cluster-sampling techniques and simple random sampling techniques to collect data. Firstly, this study developed a sample frame as Punjab is largest province in Pakistan, and then cluster sampling was used, at second stage simple random sampling technique was used. Sedgwick (2015) revealed that cluster sampling is a probability sampling technique that aimed to increase both the homogeneity of groups and the variability within each group. As a result, cluster sampling has the advantage of being more economical than other sampling methods. However, random sampling works well among populations that are homogenous and equally gathered (Bhardwaj, 2019). With this selection approach, everyone has an equal chance to be a part of the study, and the selection procedure depends completely on chance (Rehman et al., 2022). Thus, the present study used the combination of these two sampling techniques because it ensures the validity and generalizability of the results by minimizing bias and optimizing resource allocation. As a result, these sample strategies are ideal for accomplishing the goals of the study while considering real-world limitations. However, this study recommended that several parameters, such as multivariate normality, missing values, model complexity, estimate methods, and the average error of variance of the reflecting components, should be clear before determining the appropriate sample size for data collection (Hair et al., 2017). Therefore, this study employed sampling technique suggested by Hair et al. (2014) as several items x 5 = sample size to calculate the accurate sample size for multivariate data analysis. As this study contained 50 items, 50 multiplied by 5 = 250. Thus, the present study collected data from 250 Pakistani EFL students Via Google Forms. These Google forms were sent by email to the students that was possible with the cooperation of university administration. Four public universities were selected from four districts of Punjab including Sahiwal, Faisalabad, Lahore and Gujranwala. After the data collection, ten responses were removed due to outliers and missing responses. After this, the final sample size was 240 graduate students.

Instruments

This study adapted the scales from previous studies to measure the latent constructs. Firstly, this study adapted the scale of self-directed learning based on its dimensions, i.e., motivation, self-management, and self-monitoring from Abd-El-Fattah (2010). This scale consists of 20 items. Secondly, this study adapted the 18-item scale of critical thinking ability (Imtiaz & Hassan, 2020). Thirdly, this study adapted the 12-item scale of academic writing skills (Gundin

et al., 2021). Lastly, this study used a five-point Likert scale, applying 1 for "strongly disagree" to 5 for "strongly agree" to measure all these variables.

Table 1

Demographic Profile of Respondents

Variables	Number of Students= 240	Percentage %
Gender		
Male	105	44%
Female	135	56%
Total	240	100%
Age		
18-22	121	50%
22-26	119	49%
26-30	9	3%
Total	240	100%
Level of Study		
Diploma	60	25%
Degree	180	75%
Total	240	100%

Common Method Biases

Using self-reported data-collecting measures from the same respondent group may result in common method variance (Podsakoff & Organ, 1986). The same respondents provided cross-sectional data for the dependent and independent constructs in the study. Thus, Harman's single-factor test checks the quantity of misleading variation. Three variables with eigenvalues greater than one were identified by principal component analysis (PCA) of the entire measuring instrument's components; these factors accounted for 57.88% of the variance. Despite this, the variance of the first unrotated component was just 41.93%. Less than 50% of the variation is explained by a single component, suggesting that the data is unaffected by common technique bias.

Results

The three phases that proceed with the data analysis were highlighted in the current study. First, SPSS version 25.0 was used to assess descriptive data preliminarily, including mean, standard deviation, kurtosis, and skewness values. Secondly, data analysis was conducted using SEM; a two-step model construction procedure was employed following Hair et al. (2014) advice. Firstly, the measurement model was validated using CFA. Secondly, to verify the hypothesis and identify causal route coefficients, a structural model was employed. SEM provides an improved method for experimentally examining theoretical models by combining measurement and structural models into a single study (Hair et al., 2014).

Furthermore, rather than doing regression analysis one at a time, SEM enabled one to investigate the mediation impact concurrently (Sarstedt & Hwang, 2020). Using structural model analysis, the current study used standard factor loading of path coefficient and t-value to determine the path strength and significant level of the latent components. Both SEM and confirmatory factor analysis were performed using AMOS version 25.0. Lastly, the

mediational effect of the mediator was assessed by employing the bootstrapping method on the 5000 bootstrapping model.

Descriptive Statistics
According to the findings of this study, descriptive values of self-directed learning, critical thinking ability, and academic writing skills are presented in Table 2.

Table 2
Descriptive Statistics of Research Variables

| Variables	Mean	Std. Deviation	Skewness	Kurtosis
Self-directed learning	4.74	0.451	-1.468	0.930
Critical Thinking Ability	4.71	0.335	-1.466	0.566
Academic Writing Skills	4.70	0.368	-1.253	0.089

According to these findings, most students acknowledged that self-directed learning behavior with high critical thinking ability significantly improved their academic writing skills. Although there is substantial variance in the scores that the low standard deviation and negative skewness indicated.

Validity and Reliability of Constructs
CFA was used to evaluate the constructs' validity, reliability, and unidimensionality to validate the measurement model. Items belonging to latent constructs must have enough factor loading (above 0.60) for the constructions to which they belong, and a single construct must explain each measured variable to guarantee unidimensionality. Composite reliability (CR) was used to evaluate the measurement model's reliability. The average variance extract (AVE), which shows the average proportion of variance between latent constructs explained by components of the measurement model, was computed to guarantee convergent validity. When all the structures' fitness indices satisfied the necessary standards, the validity of the structure was verified. Sets of fitness indicators vary slightly between SEM programs.

Nonetheless, at least one fitness indicator is advised to be used for every model type (Hair et al., 2017). The model's fitness was determined in this study by calculating the ChiSq/df values, RMSEA, CFI, TLI, and NFI. The CFI, TLI, and NFI values must be more than 0.90 $p < 0.005$, and RMSEA up to 0.08 is acceptable to get an acceptable fit (Hair et al., 2014). Overall, fitness indices were achieved with values 0.059 for RMSEA, 0.966 for CFI, 0.962 for TLI, and ChiSq/df 1.821 and $p < 0.000$. The factor loading for each item was more than 0.7, and the AVE value for each construct was more significant than equal to 0.5, which was achieved as suggested by (Fornell & Larcker, 1981). However, items that failed to meet the factor loading threshold over 0.70 were removed from the measurement model. Four items of self-directed learning, three of critical thinking ability, and three of academic writing skills were removed. The results are also presented in Table 3 and the diagram is shown in Figure 2.
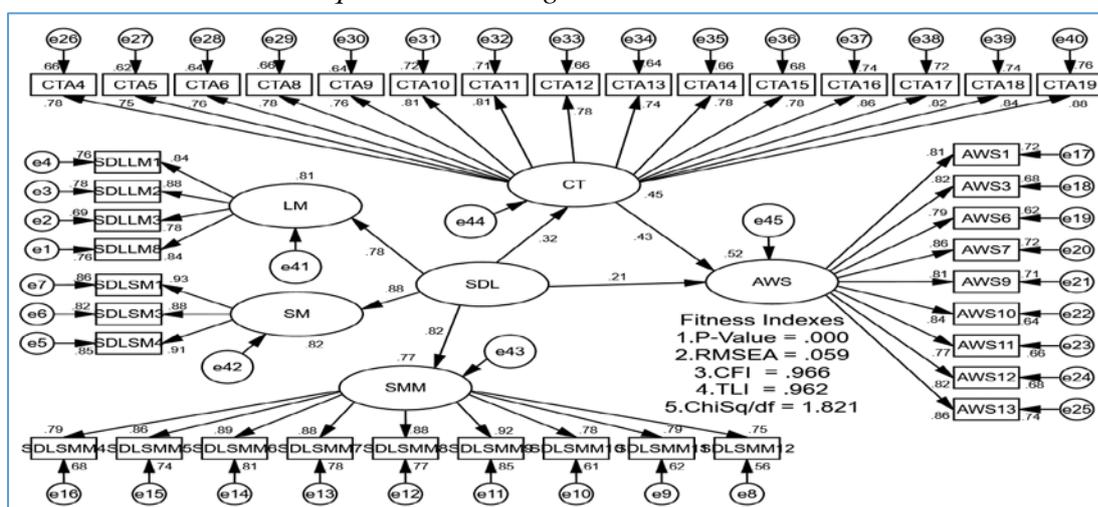
Figure 2
Confirmatory Factor Analysis
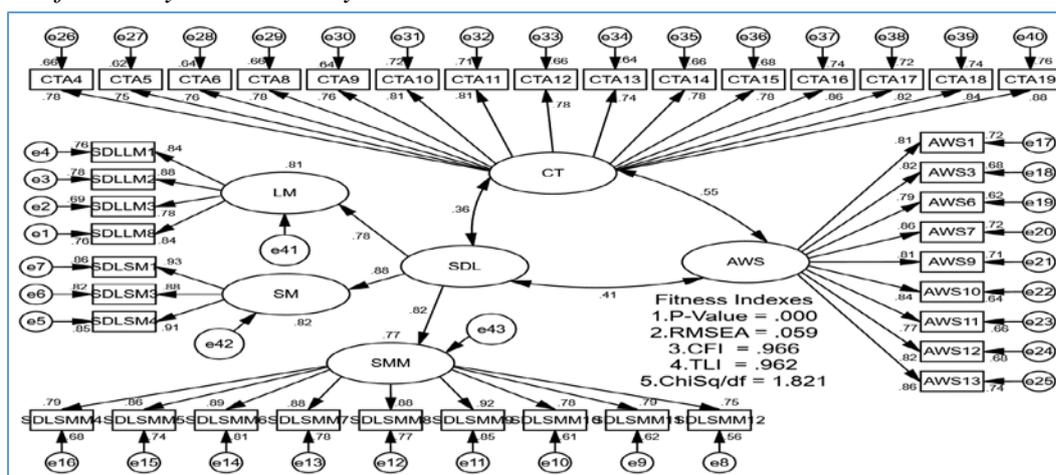
Path Analysis through CB-SEM

To verify the structural model, the multicollinearity issue between the constructs needs to be examined. Therefore, the variance inflation factor (VIF) was calculated, and all the VIF values for each construct ranged from 1.211 to 1.356. Since the obtained values fall below the 3.0 threshold, multicollinearity problems do not harm the model. Furthermore, the structural model analysis (SEM) revealed that the model reaches several threshold values of model fitness indices, such as Chisq/df = 1.821, p 0.001, RMSEA =.059, CFI =.966, and TLI =.962 were all outstanding model fit for data as per suggested by (Byrne, 2001; Kline, 2023). *H1-H3* hypothesis were investigated by using regression analysis tools in SEM and all of them were validated. It demonstrated that self-directed learning has positive significant effect on academic writing skills (β= 0.209, p-value=0.001). Secondly, self-directed learning skills has significant effect on critical thinking ability (β= 0.319, p-value=0.001. Lastly, critical thinking has profound positive effect on academic writing skills (β= 0.429, p-value=0.001). All the hypothetical results are displayed in table 4 and SEM model fitness also presented in Figure 3.

Figure 3
Standardized Structure Equation Modeling

Table 3

Convergent Validity of Research Items

Variable	Dimension	Code	Statement	FL	AVE	CR
Self-directed Learning (SDL)	Motivation	SDLM1	I am willing to learn new things that help me to improve my academic writing skills.	0.84	0.747	0.973
		SDLM2	I am willing to communicate and collaborate with other people for comments on my writings.	0.88		
		SDLM3	I am determined to use different techniques to improve my academic writing skills.	0.78		
		SDLM8	I enjoy enhancing my academic writing skills at my own pace.	0.84		
	Self-management	SDLSM1	I have excellent management skills.	0.93		
		SDLSM3	I am methodical and self-managed in my learning process.	0.88		
		SDLSM4	I divided my time efficiently according to my academic writing assessments.	0.91		
	Self-monitoring	SDLSMM4	I prefer my own learning abilities and academic writing skills.	0.79		
		SDLSMM5	I believe that the teacher's role is to be a resource in the academic writing process.	0.86		
		SDLSMM6	I systematically improved my academic writing skills.	0.89		
		SDLSMM7	I critically evaluate new information for my written content.	0.88		
		SDLSMM8	I evaluate my academic writing performance.	0.88		
		SDLSMM9	I am logical and use logical arguments in my writing.	0.92		
		SDLSMM10	I can focus on problems and solve them by using different techniques.	0.78		
		SDLSMM11	I can find different sources of information to enhance my academic writing skills.	0.79		
		SDLSMM12	I confront the academic writing challenges.	0.75		
Critical Thinking Ability (CTA)		CTA4	I suspend judgments and decisions in the absence of sufficient evidence.	0.78	0.613	0.950
		CTA5	I anticipate the consequences of alternative actions.	0.75		
		CTA6	I will accurately explain decisions.	0.76		
		CTA8	I curb their emotional reactions to others' arguments.	0.78		
		CTA9	I determine the truth or falsity of assumptions.	0.76		
		CTA10	I develop and present reasoned and persuasive arguments.	0.81		
		CTA11	I distinguish between primary and secondary sources of information.	0.81		
		CTA12	I distinguish credibility from non-credible sources of information.	0.78		
		CTA13	I differentiate evidence from opinion, common sense, and anecdotes.	0.74		
		CTA14	I gather data from multiple sources relevant to a problem to solve related to academic writing or a decision to be made.	0.78		
		CTA15	I identify preconceptions about important issues.	0.78		
		CTA16	I listen attentively to others and provide them with appropriate feedback.	0.86		
		CTA17	I assess and evaluate statements.	0.82		
		CTA18	I have a keen sense of curiosity.	0.84		
		CTA19	I have a strong tendency to validate statements.	0.88		
Academic Writing Skills (AWS)		AWS1	While writing, I regularly check whether my text does not contain sentences that are too long or incorrect.	0.81	0.673	0.949

AWS3	I usually write a text without checking whether the paragraphs are well arranged or connecting the ideas.	0.82
AWS6	When I rewrite my texts, the organization of paragraphs often changes a lot and improves.	0.79
AWS7	I reread my texts repeatedly to improve them coherently and cohesively.	0.86
AWS9	Before I start to write a text, I prefer to write down some thoughts on a scribbling paper to discover what I think about the topic.	0.81
AWS10	I have clear thoughts before starting to write.	0.84
AWS11	I reread the texts to prevent redundancies.	0.77
AWS12	I sometimes write paragraphs that I know are not yet correct, but I prefer to continue writing.	0.82
AWS13	When I reread and rewrite my text, my sentence structure greatly improves.	0.86

Table 4

Discriminant Validity of Research Variables

Variable	VIF	SDLM	CTA	AWS
SDL	1.211	.86		
CTA	1.233	.54	.83	
AWS	1.356	.11	.23	.82

Table 5

Path Analysis and Path Coefficient

Construct	β	S.E.	T-Value	P-value	Results
SDL→CT	.319	.089	5.325	.001	Supported
CT→ AWS	.429	.098	5.984	.001	Supported
SDL→AWS	.209	.052	3.142	.001	Supported

Mediational Hypothesis Results

Analysis for mediation effect refers to how well a variable explains the relationship between independent and dependent variables (Rijnhart et al., 2022). By employing bootstrapping statistical tools, the present study investigated the mediational effect of critical thinking ability between self-directed learning and academic writing skills. Thus, **H4** measured the mediational effects of critical thinking ability and results show that critical thinking ability partially mediates the relationship between self-directed learning and academic writing skills ($\beta = .223$, SE = .062, p = 0.002). Thus, with the lower bound valued 0.311 and upper bound valued 0.513 that were calculated on 5000 bootstrap sample indirect effect was significant along with the direct effect. Therefore, H4 supported which explains the partial mediating relationship. Mediational results are presented below in Table 6.

Table 6

The Significant Mediational Effect of Critical Thinking Ability between Self-Directed Learning and Academic Writing Skills

Mediational Path	(β)	(SE)	P-Value	Lower Bound	Upper Bound	Mediation	Results
Self-directed learning $\rightarrow$ Critical Thinking $\rightarrow$ Academic Writing Skills	0.223	0.062	0.002	0.311	0.513	Partial Mediation	Supported

Discussion

The main objective to conduct this study was to address the critical role of academic writing skills in Pakistan, where EFL leaners face many challenges in organizing their ideas, maintaining coherent, Grammatical sentence structure and exhibiting critical engagement with academic materials (Abbas, 2023). In Pakistan, where EFL students face the lack of analytical skills and learning autonomy because of traditional teaching methods, outdated curriculum and lack of resource as the students are unable to practice the innovative educational strategies (Sheikh et al., 2018). However, the present study investigating the combined effects of self-directed learning (SDL) and critical thinking ability (CTA) as 21st century innovative educational techniques to improve the academic writing skills (AWS) of EFL learners in Pakistan. With an appropriate research method, the present study suggests that the incorporation of self-directed learning and critical thinking ability empowers students to take ownership of their writing development promotes deeper engagement with texts and arguments. Initially, by examining the descriptive data, this study indicated that most students have high levels of self-directed learning, critical thinking, and academic writing skills in Pakistan. By examining the data, this study shows that self-directed learning and critical thinking ability significantly improve EFL learners' academic writing skills. Moreover, this study also examined the fact that academic writing is strongly correlated with critical thinking ability, and it has been demonstrated that writers with higher critical thinking performed better, mainly when the topic is more controversial.

The study's findings indicated that self-directed learning based on Garrison's (1997) model, has a significant positive effect on the academic writing skills of EFL learners as it empowers students to take control of their education, especially when it comes to developing their academic writing abilities. Additionally, this study looked that EFL students were positive

about self-directed learning to efficiently finish their academic writing assignments as it provides the opportunity to collaborate with others and gather knowledge from various sources. The present study's results are in line with the previous research conducted by Adnan and Shakirah Sayadi (2021). This quantitative study investigated the impact of self-directed readiness on English academic writing abilities and demonstrated that students who high level of self-directedness scored higher than those with a lower level to improve their English writing abilities. Besides, the present study also confirmed the findings of Aljasir (2025) who conducted quasi-experimental research to empower adult EFL learners by designing self-directed learning that improved their writing skills and help them overcome the obstacles they encounter when trying to improve their writing outside of traditional classroom settings. It demonstrated that EFL students with self-directed learning showed notable improvements in writing abilities, with coherence, content and ideas, and cohesiveness, sentence structure and grammatical improvement. In congruence with the findings of Wang et al. (2024) and Rammayadi et al. (2023), this study's findings showed a positive effect of self-directed learning on academic writing skills. Moreover, present study demonstrated that students prefer to complete self-directed tasks like collecting notes, making assessments, and taking quizzes, which greatly enhance their learning process for academic writing aligning the findings of Buque (2023).

Moreover, the present study finds that motivation, as the key component of self-directed learning, notably helps EFL learners improve their academic writing skills. Motivation played a significant role in enabling the EFL leaners to take charge of their learning, finding the resources for accurate writing materials, learning new ideas, collaborating with others for appropriate feedback, and practicing their writing task on their own, which enabled them to become proficient writers at their own pace. These findings are in line with Alzubi and Nazim (2024) and Patmasari et al. (2023) conducted research studies to analyze the students' motivation in academic writing skills of EFL learners and explored the high level of motivation in their essay writing, mainly in terms of organization, cohesion, grammar, sentence structure, and language use. Moreover, this study examined self-management as the second dimension of Garrison's (1997) model of self-directed learning. The current study revealed that self-management enabled the learners to divide their time for revising and editing their writing drafts, which significantly improved their academic writing skills. The present study confirmed the findings of Li et al. (2024) who significantly highlighted the positive role of self-management in self-directed language learning process. Additionally, this study measured the self-monitoring as the dimension of self-directed learning and revealed that self-monitoring as an essential component of self-directed learning has a significant effect on the development of academic writing skills of EFL learners in Pakistan. Findings suggested that self-monitoring skills allow the EFL students to review their written work independently, remove grammatical errors, and improve sentence structure, coherency, connectivity, and organization of written text, notably improving their writing skills. These results confirmed the findings of Jameel (2023) who revealed that self-monitoring positively improves the speaking skills of EFL learners. Thus, the present study provides compelling evidence in favor of Garrison's (1997) Self-Directed Learning Model, which holds that motivation, self-management, and self-monitoring are the main drivers of learning autonomy. The high levels of self-directed learning

found in this study indicate that students are better able to organize and polish their academic writing when they successfully manage their learning process.

Additionally, this study examined the effect of self-directed learning on the critical thinking ability of EFL learners in Pakistan. According to the results of the present study, the self-directed learning process enables EFL learners to develop their critical thinking ability. The study's findings are consistent with Turan and Koc (2018), who explored a positive correlation between critical thinking skills and self-directed. According to this study, when students are involved in independent learning, they must examine, assess, and evaluate the logical material using their critical thinking skills. Moreover, the present study revealed self-directed leaners critically assess their writing proficiency, synthesize accurate data, analyze their mistakes, and improve their performance. These results are in line with the study done by Chukwunemerem (2023) who revealed that independent and self-directed learners critically evaluate the information and knowledge they encounter throughout their learning process. It proves that students who have a high level of self-directedness have high critical thinking ability, as Garrison (1997) also mentioned. The results of the present study showed a high positive impact of self-directed learning on critical thinking ability of EFL learners. These results are consistent with Karataş and Arpaci (2021) and Lu (2025) who investigated the positive and meaningful correlation between self-directed learning and thinking load of students.

This study examined the effect of critical thinking ability on the academic writing skills of EFL learners in Pakistan. According to the statistical analysis, critical thinking ability greatly enhanced EFL students' academic writing abilities, particularly in sentence construction, coherence, and paragraph organization. In the alignment of Beh and Ganapathy (2020) and Hapsari et al. (2023), the present study revealed that strong critical thinking skills enable EFL students to independently examine, assess, interpret, and condense reliable material for their academic writing projects. These results are in line with Chukwuere's (2024) findings, which also explored the positive effect of critical thinking ability to improve academic writing skills and revealed that by using critical research thinking skills, scholars and students enhance their capacity to evaluate information sources, analyze data, and effectively communicate research findings in written form. Similarly, these findings also align with other studies that investigated the curial role of critical thinking ability in the academic writing skills of English language learners (Teng & Yue, 2022; Yin et al., 2023). Moreover, in line with Beniche (2023), the present study demonstrated that high level of critical thinking helps EFL learners develop their academic writing abilities by allowing them to construct logical arguments, employ correct grammar and vocabulary, and gather accurate information from various sources in written texts. Thus, in congruence with Khairuddin et al. (2024) present study revealed that critical thinking ability positively enhances the EFL students' academic writing ability.

Lastly, the present study examined the mediational role of critical thinking ability. Path analysis results revealed a large partial mediation effect, meaning that while self-directed learning directly affects academic writing skills, critical thinking ability also affects a significant portion of this effect. It demonstrated that critical thinking ability significantly partially mediated between self-directed learning and academic writing skills. Therefore, the present study indicated that during the self-directed learning process, students' academic writing skills significantly increased as they experienced analyzing evidence and developing arguments to write more clearly and coherently by using critical thinking ability. This

demonstrated that critical thinking abilities such as analyzing, evaluating, and synthesizing information assist the learners in self-directed learning to improve their writing skills. In contrast, Boran and Karakuş (2022) investigated the mediational effect of critical thinking ability on students' metacognition awareness and problem-solving abilities and revealed the full mediation and insignificant effect of critical thinking ability. However, the significant partial mediating effect of critical thinking in the present study is in line with the study done by (Akpur, 2025) who revealed the positive mediational effect on critical thinking between metacognitive awareness and creativity. However, the present study focused on infusing critical thinking ability in the self-directed learning process to improve the academic writing skills of EFL learners, particularly in Pakistan.

In conclusion, the present study's findings highlight the imperative role of self-directed learning with the integration of critical thinking ability to improve the academic writing skills of EFL leaners in Pakistan. These results suggest that teachers and educators should use SDL-based teaching techniques such reflective writing activities, peer review, and self-assessment checklists to promote autonomy and independence to fulfill the academic writing tasks. Moreover, the present study suggests that students' argumentative, analytical and reasoning abilities may also be greatly improved by including critical thinking exercises like argument mapping, problem-solving conversations, and debate-based writing projects. Therefore, educational institutions should promote critical thinking exercises to help students organize, monitor, and revise their work in a methodical manner at their own pace. Hence, a self-directed learning approach with critical thinking ability will help EFL learners to become better academic writers while also preparing them for success in the workplace and lifetime learning in the knowledge-driven world.

Conclusion

This study examined the link between self-directed learning and academic writing skills of EFL learners in Pakistan, examining the mediating function of critical thinking ability. The results revealed that SDL significantly improved EFL learners' academic writing and that critical thinking ability played a significant role as a mediator to enhance this effect. These findings imply that students are more likely to enhance their writing skills when they simultaneously cultivate critical thinking skills if they actively participate in self-directed learning, characterized by self-management, self-monitoring, and motivation. Moreover, analyzing, synthesizing, and evaluating practical information is a critical thinking ability students must develop to write academically. This study underscores the beneficial mediating function of critical thinking ability. Thus, self-directed learning and critical thinking improve the ability of Pakistani EFL learners to write cohesive and well-structured academic work even though they frequently encounter difficulties in developing advanced writing abilities. Future research studies should examine the intricate relationships that exist between SDL, critical thinking, and other academic abilities in various educational and cultural contexts. These kinds of research might provide in-depth information about how different learner characteristics and teaching methods affect the growth of academic abilities in EFL settings.

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No, there are no conflicting interests.

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