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Predicting EFL Teachers' Critical Thinking Tendencies: Metacognitive Skills, Teaching Experience and Gender in Focus

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ABSTRACT

Objective: The present study aimed to examine the correlation between metacognitive proficiencies and critical thinking tendencies among EFL (English as a Foreign Language) instructors in tertiary academic institutions. Additionally, it sought to investigate the potential effects of gender and teaching experience on these relationships.

Methods: A total of 100 EFL instructors (52 females and 48 males) teaching undergraduate English majors at Azad and Payame Noor universities in Isfahan and Ilam provinces participated in the study. Data were collected using two standardized instruments: the California Critical Thinking Disposition Inventory (CCTDI) and the Metacognitive Skills Scale (MSS). Pearson Product-Moment Correlation was employed to explore relationships between variables, while multiple regression analysis was used to assess the predictive power of independent variables on critical thinking disposition.

Results: The analysis revealed a positive but modest correlation between EFL instructors' metacognitive skills and their critical thinking tendencies. When categorized by teaching experience, novice instructors demonstrated a significant and strong positive correlation, whereas experienced instructors showed a moderate but meaningful relationship. Furthermore, a statistically significant difference was found between male and female instructors, indicating that gender played a role in the relationship between metacognitive skills and critical thinking disposition.

Conclusions: The findings suggest that metacognitive proficiency contributes to fostering critical thinking tendencies among EFL instructors, with variations influenced by gender and teaching experience. These results carry important theoretical and practical implications for EFL stakeholders—including educators, researchers, and policy-makers—by underscoring the need to enhance metacognitive training and critical thinking development in teacher education programs.

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Introduction

The significance of critical thinking (CT) in achieving success has become increasingly salient in the contemporary era. As the global landscape continues to evolve in complexity, there is a growing need for students and educators alike to engage in critical thinking. Thus, possessing a pliable cognitive framework and proficient critical thinking skills are imperative for educators and learners alike. The concept of critical thinking has been characterized as a cognitive process involving active, persistent, and meticulous deliberation of a belief or an alleged form of knowledge, with due consideration of the supporting evidence and the potential outcomes that may ensue (Dewey, 1934). There are a variety of approaches one can take to tackle this problem. However, it is important to carefully consider each option and evaluate its potential effectiveness in order to make an informed decision. Additionally, it may be necessary to gather data and conduct research before implementing any action to ensure that the chosen approach addresses the root of the problem. According to the definition proposed by Facione (1990), Critical Thinking (CT) refers to a deliberate and self-regulated cognitive process that involves the acquisition of knowledge, assessment of evidence, formulation of hypotheses, and drawing of logical inferences. CT also encompasses the articulation of the underlying abstract, methodological, and contextual considerations that guide judgment (Mentor, 2016). As posited by Halpern (1999), critical thinking embodies a synthesis of both effective and cognitive attributes. Specifically, it involves the deployment of strategic thinking alongside altitudinal competencies in order to arrive at reasoned and defensible conclusions. According to Paul and Elder (2008), critical thinking refers to a self-guided and self-disciplined cognitive process that strives to reason at the highest level of quality in an impartial manner.

In conformity with this line of thought, Glaser's (1941, as cited in Lin, 2018) conceptualization postulates that critical thinking constitutes an approach to reflection that involves thoughtful pondering of issues or problems within the purview of an individual's experiential realm. According to Han (2015), critical thinking involves a committed adherence to rationalism in the process of developing our beliefs. The process of critical thinking involves rational and comprehensive cognitive properties that include elements such as importance, relevance, accuracy, veracity, and authenticity. The EFL (English as a Foreign Language) teaching provides a conducive environment for improving key skills that are becoming increasingly important in the

21st century. These competencies encompass a range of skills including but not limited to responsibility, leadership, information and communication technology (ICT) literacy, collaboration, communication, social skills, creativity, cross-cultural skills, and critical thinking. Consequently, educators, researchers, and administrators in the field of EFL are encouraging instructional facilitators to incorporate the development of key competencies, such as critical thinking, in their teaching practices.

The focal point of scholarly inquiry pertaining to critical thinking has been predominantly concentrated on the investigation of critical thinking tendencies (CTT) and critical thinking skills (CTS) (Geçit & Akarsu, 2017). The concept of critical thinking tendencies pertains to an individual's inclination or disposition towards engaging in critical thinking, while critical thinking skills refer to an individual's aptitude for employing sound reasoning and effective decision-making strategies in order to solve problems (Genç, 2008). Therefore, it can be argued that these two concepts are inexorably linked, rendering a clear delineation between them virtually unattainable.

The study of critical thinking, according to the works of Kuhn (1999) and Lai (2011), exhibits a substantiated link with metacognition. The term "metacognition", originally introduced by Flavell in 1979, refers to a self-regulatory system that encompasses various components such as strategies, objectives, experiences, and knowledge. Metacognitive knowledge pertains to information or presuppositions regarding one's own and others' cognitive capacity, the nature of tasks, various behaviors and techniques employed, and the interplay of these elements in determining the outcome of intellectual pursuits. Metacognition is a multifaceted ability that pertains to "cognition about cognition" (Flavell et al., 2002) and encompasses two essential components, namely, metacognitive knowledge and metacognitive regulation. The initial component encompasses an assemblage of knowledge concerning the various factors that hold the potential for impacting one's progress, as well as knowledge of oneself as a learner in a declarative sense. The second element of metacognition involves the observation and evaluation of an individual's cognitive processes. The concept of metacognition is characterized by cognition and denotes the regulation and surveillance of cognitive procedures that are engaged in the process of learning. Metacognition pertains to the cognitive ability to engage in higher-order thinking, which enables individuals to exercise active control over various cognitive processes (Sonowal & Kalita, 2017). According to the findings of Tunca and Alkın-Şahin (2014), metacognition is reflective of an individual's

awareness of the structure and function of their cognitive system, as well as their capacity to understand the rationale and techniques for effective learning (Altındağ & Senemoğlu, 2013).

The acquisition of metacognitive skills has been shown to afford learners the ability to exercise self-regulation, demonstrate self-direction, and adopt self-responsibility (Listiana et al., 2016; Sonowal & Kalita, 2017). Additionally, such skills enable learners to attain awareness of their learning process (Shank, 2017) and enhance their strategic and conscious engagement in the learning process (Zhao & Mo, 2016). The learning process is enhanced by the provision of a self-evaluation mechanism, which allows learners to assess their performance with precision (Zimmerman & Martinez-Pons, 1988; Molenberghs et al., 2016). It is imperative that learners demonstrate mindfulness towards their cognitive processing and evaluate it, as there exist significant variations in their metacognitive capabilities. The cultivation and instruction of metacognitive abilities can be achieved through the application of efficacious methods within the pedagogical environment. The concept of metacognition, regarded as a form of cognitive activity at a higher level, is recognized for its notable impact on pedagogical practices and learning outcomes within academic environments (Karaduman & Erbaş, 2017). Metacognition represents an indispensable component of critical thought, with both constructs being encompassed under the rubric of self-regulated learning. Metacognition may be posited as a conducive factor to critical thinking, specifically in light of its potential to facilitate the engagement of reflective and rigorous cognitive processes.

In Turkey, Sen (2016) undertook a study to evaluate the metacognitive proficiency, motivation, and consequent influence of varying metacognitive abilities on pre-service chemistry teachers. A survey methodology was employed in order to assess the effects of varying degrees of metacognitive skill on motivational tendencies. "The study included a cohort of 80 individuals who were pursuing certification as chemistry teachers. " The development of the Chemistry Motivation Scale was carried out by researchers Glynn and co-authors. In 2011, the text was translated into Turkish by Sen and Yılmaz (2014), thereby providing a local adaptation of the original content. The instrument was employed with the purpose of evaluating the level of motivation exhibited by teachers. In order to assess metacognitive proficiency, the Metacognitive Activities Inventory (MCA-I), developed by Cooper and Sandí-Ureña (2009) and translated by Temel et al. (2011) was used. The results indicated notable disparities in self-determination and

intrinsic motivation among diverse sets of pre-service chemistry instructors possessing varying metacognitive proficiencies.

Cakici (2018) in his study aimed to explore the interrelation between metacognitive awareness (MA) and critical thinking skills (CTS) of pre-service EFL teachers, with a special emphasis on their application in foreign language learning. Furthermore, the influence of gender and level of professional experience on the association between metacognitive awareness and critical thinking skills among educators was investigated. In this investigation, a group of 218 pre-service EFL teachers were recruited as participants. In order to obtain the requisite data, the utilization of both the CT Questionnaire and the MA Inventory was implemented. The results indicated a robust and affirmative association between metacognitive awareness and critical thinking abilities. The findings of the study suggested a significant correlation between teachers' duration of professional experience, capacity for critical thinking, and level of metacognitive awareness. Specifically, the results indicated that senior teachers exhibited greater levels of metacognitive awareness and critical thinking skills than their junior counterparts. In contrast, it was observed that gender exhibited no discernible effect on the aforementioned variables.

In 2019, Kozikoğlu undertook a correlational inquiry to investigate the potential influence of critical thinking tendencies exhibited by future educators on various cognitive abilities, including metacognitive aptitude, academic self-efficacy, and problem-solving proficiency. A sample of 229 potential educators was purposefully chosen from the population of Van Yüzüncü Yıl University. The data necessary for the study were obtained through the utilization of the Metacognitive Skills Scale, Critical Thinking Disposition Scale, Academic Self-Efficacy Scale, and Problem-Solving Inventory. Avaried set of statistical methods for data analysis, including descriptive statistics, multiple regression analysis, and Pearson's Product Moments Correlation were utilized. The findings of the investigation indicated a robust and moderately noteworthy correlation among the critical thinking proclivities of the prospective educators, their academic self-efficacy perceptions, and their problem-solving proficiencies. Thus, it can be concluded that nearly fifty percent of the variability observed in critical thinking propensities among individuals can be elucidated by their metacognitive aptitude, academic self-efficacy, and acumen in tackling complex problems. Furthermore, the investigation revealed that the problem-solving aptitude of these educators did not play a role in their propensity toward critical thinking.

The study by Karaoğlan-Yılmaz and colleagues (2019) examined the relationship among critical thinking standards, metacognitive thinking skills, and academic self-efficacy among educators. This study utilized a relational survey approach and employed structural equation modeling to analyze the gathered data. A cohort of 244 trainee educators, representing diverse academic disciplines within a publicly funded higher education institution, were involved in the research endeavor. The data collection process entailed the utilization of the Critical Thinking Standards Scale, Personal Information Form, Academic Self-Efficacy Scale, and Metacognitive Thinking Scale. The findings evinced a moderate positive correlation between metacognitive cognitive aptitudes and critical thinking benchmarks among instructors. A positive correlation of limited magnitude was observed between critical thinking standards and academic self-efficacy. There was a discernible correlation of moderate positive magnitude that existed between the levels of academic self-efficacy and those of metacognitive thinking skills.

Moslemi and Habibi (2019) made inquiries about the relationships among professional identity, self-efficacy, and critical thinking skills in the teaching process of Iranian EFL teachers. A total of 75 EFL teachers teaching English as a foreign language in private language institutes in Iran took part in the study. The participants were chosen using availability sampling. The Watson-Glaser Critical Thinking Appraisal test, the Professional Identity questionnaire, and the Teachers' Efficacy Beliefs System-Self (TEBS-Self) form were employed to collect the required data. The results showed that there was a positive relationship among EFL teachers' self-efficacy, critical thinking skills, and professional identity. The ANOVA (analysis of variance models) test revealed that the professional identity of EFL teachers was a good predictor of their self-efficacy and critical thinking abilities.

In a qualitative study, Sadeghi et al. (2020) investigated EFL teachers' and learners' perceptions of core principles and structures of critical thinking, as well as the main characteristics of a critical thinker and techniques for improving critical thinking capacity. The constructivist grounded theory methodology was used to conduct semi-structured interviews with eight EFL teachers and ten learners who were theoretically sampled from three separate public, private, and seminary schools in Sabzevar and Qom, Iran (Charmaz, 2008). The data were analyzed using the MAXQDA software version 12 and the three levels of grounded theory coding (open, axial, and selective). The findings of the study revealed many pedagogical implications for EFL teachers who want to

help their students improve critical thinking skills, for EFL students who want to think more deeply, solve issues more efficiently, interact and communicate more effectively, and for curriculum developers and syllabus designers who want to include critical thinking exercises in textbooks.

The critical thinking-based teaching techniques that Iranian high school EFL teachers use in their classrooms were scrutinized by Abarghoui et al. (2020). The teaching strategies survey was distributed using an edited version of an email-based questionnaire developed by Barnhill (2010). This research involved 120 teachers teaching EFL in 35 high schools across four provinces (Yazd, Lorestan, Fars, and Kordestan) during the 2019-2020 school year. The data analysis was conducted using means, frequencies, standard deviations, percentages, exploratory factor analysis (EFA), correlation coefficient, and a five-point Likert scale. Among the 50 items, "questioning and asking students to consider all points of view" was rated as the most frequently used item, and "creative projects in the classroom involving different materials" was identified as the most efficient item. For each of the four variables of the study, the results revealed a positive and direct relationship between perceived efficacy and frequency of usage.

Serin (2013) investigated the level of critical thinking skills of teacher candidates to see whether there was a significant difference in critical thinking skills based on the institutions, gender, and class of the teacher candidates, as well as the frequency with which they read humor magazines. The sample of the study comprised 117 teacher candidates who were chosen using a convenience sample method. This study employed a descriptive general survey model with a quantitative approach. The findings revealed that teacher candidates' critical thinking abilities differed significantly in terms of their institution sensibility, consciousness, empathy, adoption, assumptions, gender, critical thinking about media, and critical thinking skills. The results revealed that female teacher candidates had better critical thinking skills than male teacher candidates. When comparing the findings of this study to the results of previous studies, it was obvious that the first-year candidates' critical thinking skills were at a low level, and that critical thinking skills improved as candidates advanced through higher classes and semesters.

Having a glance on the related literature, gender as a predictor of CT skills or dispositions and such conflicting results was a variable that has been tested by nearly all of the CT studies. One study which examined gender in CT research was Wilson (1989). Using the Watson-Glaser test and ACT College Reports, he found that gender was a significant predictor of CT skill. Aliakbari

and Sadeghdaghighi (2012) attempted to assess the extent to which Iranian students in Ilam University are critical thinkers. The effect of gender and field of study on CT ability was supported. Ilanlou and Malmir (2015) attempted to explore the relationship among Iranian EFL teachers'gender, critical thinking and their teaching styles. To fulfill this purpose, 238 Iranian EFL teachers teaching at different branches of Shokouh Language Institute across different cities and towns in Tehran and Alborz provinces were invited to fill out two questionnaires including the Critical Thinking Questionnaire and Teachers Teaching Style Inventory. The obtained data was fed into SPSS. Afterwards, the collected data was analyzed through Pearson Correlation statistical procedures, the results of which revealed that there was a statistically significant relationship between Iranian EFL teachers' gender, critical thinking and their teaching styles. Moreover, the application of the independent sample t-tests indicated that there was not any statistically significant difference between Iranian EFL male and female teachers' critical thinking and their gender. However, a statistically significant relationship was found between Iranian EFL teachers' teaching styles and their gender.

Hussain (2021) conducted a study to understand the influence of gender on the critical thinking abilities of teacher educators. The total number of teacher educators was 30 which were selected from three Teacher Education Institutions of Gandhinagar. Test on critical thinking ability, developed by the researchers was used to test the critical thinking ability of teacher educators. The findings of the study revealed that gender has no influence on critical thinking ability of teacher educators.

Khodashenas (2023) examined the relationship between critical thinking and gender in second language learning. To do this, thirty students who took part in a TOEFL preparation course at Shokouh English language institute, Mashhad, Iran, were chosen as the participants. Limbach, Waugh, and Duran's model of critical thinking were used as a guiding framework for teaching critical skills to the participants. To examine the development of critical thinking skills among the participants, a critical thinking questionnaire was designed. Results of the data analysis revealed a poor level of critical thinking among the learners, and indicated that males and females were not significantly different from each other in applying critical thinking skills.

In recent times, scholars from diverse fields, specifically special education and memory development, have exhibited a notable interest in exploring the relationship between metacognitive

abilities and critical thinking propensities (Magno, 2010; Semerci & Elaldı, 2014; Sadeghi et al., 2014; Tabrizi & Erfani, 2014; Buku et al., 2016). As of yet, there has been no exploration of the possible correlation between the critical thinking tendencies of teachers and their metacognitive abilities with respect to their teaching experience and gender. Thus, the present study aimed to investigate the potential correlation between critical thinking tendencies and metacognitive skills among male and female EFL teachers. To accomplish this goal, the study posed the following three research questions:

RQ1: Is there any significant correlation between metacognitive skills and critical thinking tendencies of university EFL teachers?

RQ2: Is there any significant correlation between the metacognitive skills of male and female university EFL teachers and their critical thinking tendencies?

RQ3: Is there any significant correlation between the metacognitive skills of novice and experienced university EFL teachers and their critical thinking tendencies?

Material and Methods

Design of the Study

A quantitative research design using a descriptive-analytical method was adopted in this study to examine the existence and the degree of correlation between two or more variables rather than creating cause-and-effect relationships (Karasar, 2013). Additionally, a correlational design was chosen to determine the correlation between metacognitive skills and critical thinking tendencies. The correlational study is non-experimental since it does not use analytical methods to modify variables to agree or disagree with a hypothesis. The following sections give the details of participants, instruments, data collection methods, and data analysis.

Participants

About 100 university EFL teachers teaching undergraduate students majoring in English were selected for this investigation. During the academic year of 2021-2022, 100 university EFL teachers (48 males and 52 females) from the English departments of Azad and Payame Noor universities in Isfahan and Ilam provinces were invited to participate in the examination. Convenience sampling, one of the non-probability sampling techniques, was used to determine the sample. All teachers were actively involved in teaching undergraduate programs. Doctoral degrees in English Language Teaching, English Translation, or English Literature were all held by them.

Their ages ranged from 35 to 50. Their teaching experience was in the range of 3 to 10 years. Gender and teaching experiences of university EFL teachers were also taken into account. Four branches of Islamic Azad universities, including Najafabad, Shahreza, Khorasgan, and Ilam, and two branches of Payame Noor universities in Isfahan and Ilam provinces, were surveyed for EFL teachers.

Instruments

The following instruments were employed for data collection:

California Critical Thinking Disposition Inventory (CCTDI)

This assessment tool was initially proposed by Facione and Facione (1998) as a means of gauging the critical thinking tendencies exhibited by educators and probing their views regarding the import and relevance of critical thinking as well as its position and worth in the domain of language instruction. The present study examines the affective and attitudinal aspects associated with critical thinking ability, which are evaluated through a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The original inventory comprises 75 items which are divided into seven subscales, namely open-mindedness, analyticity, self-confidence, inquisitiveness, systematicity, truth-seeking, and cognitive maturity. The reliability of the test as a whole was determined to be 0. 90, as measured by Cronbach's alpha coefficient. Moreover, when examining the subscales of the test, it was found that their respective scores ranged between 0. 71 and 0.80. Empirical investigations employing the California Critical Thinking Disposition Inventory (Facione & Facione, 1996) have repeatedly portrayed the tool and its respective subscales as precise.

Metacognitive Skills Scale

The aforementioned five-point Likert scale, which spans from "strongly disagree" (1) to "strongly agree" (5), was formulated by Altındağ and Senemoğlu in 2013. The present scale consists of thirty one-dimensional items. The reliability of the scale was determined by calculating its Cronbach's alpha coefficient, which yielded a value of 0. 94. This high coefficient indicates that the inventory is a dependable and accurate instrument for measuring the targeted construct.

Procedure

The data collection was done by university EFL teachers teaching undergraduate students majoring in English in the academic year 2021 to 2022. Four branches of Islamic Azad universities,

including Najafabad, Shahreza, Khorasgan, and Ilam, and two branches of Payame Noor universities in Isfahan and Ilam provinces, were surveyed for EFL teachers. First, the deans of education faculties were formally consulted. The selection of participants was conducted by convenience sampling method. The gender and teaching experience of the participants were taken into consideration. Then, data were obtained using two inventories. The instruments were piloted prior to the analysis to make sure of their reliability for the purpose of the study. Google Forms were used to create the online surveys, which were then sent to the participants' email addresses. The researcher provided general information and instructions for scale use, and all scales were given to the teachers simultaneously. Respondents' anonymity was maintained, and they were told to fill out the questionnaires by choosing one of the options. The data collection process lasted approximately four weeks. Finally, the inventories were evaluated by statistical programs such as two-way ANOVA and independent samples t-test based on the normality test. The closed items in questionnaires were analyzed descriptively by using SPSS 24.0 software (Statistical Package for Social Sciences). The significance level of 0.05 was considered in data collection.

Data Analysis Procedure

The responses of university EFL teachers to two scales were analyzed by using a correlational design. To investigate the correlation between university EFL teachers' critical thinking tendencies and their metacognitive skills, the Pearson Product-Moment Correlation Coefficient (r) was run. In addition, multiple regression analysis was employed to determine if metacognitive skills, gender, and teaching experience of university EFL teachers explain their critical thinking tendencies. There were two phases for the data analysis. In the first phase, descriptive statistics were used to identify each participant's demographic responses. The second phase was conducted to find a significant difference in the responses based upon gender and teaching experience. Participants rated their agreement or disagreement with the statements in the surveys according to the six-point Likert scale.

Prior to the analysis, the assumptions of multiple regression analysis, namely linearity and multivariate normality, as well as multi-collinearity were tested. Data analysis was performed by using SPSS software version 24.0. Sub-dimension scores were determined in the analysis depending on the purpose of the study. The difference between the groups was examined through binary comparisons of t-test for independent samples.

Results

The following hypotheses were tested based on the objectives of the research:

H01: There is no significant correlation between metacognitive skills and critical thinking tendencies of university EFL teachers.

H02: There is no significant difference between metacognitive skills of male and female university EFL teachers and their critical thinking tendencies.

H03: There is no significant difference between metacognitive skills of novice and experienced university EFL teachers and their critical thinking tendencies.

In this study, the initial null hypothesis was assessed via the implementation of the Pearson product-moment correlation method in order to determine the presence of a noteworthy correlation between the metacognitive abilities and critical thinking orientations of EFL instructors who are affiliated with a university. In order to achieve the intended objective, it is imperative for four fundamental assumptions to be satisfied, namely, the presence of interval data, normal distribution, linearity, and homogeneity of variance. Due to the employment of an interval scale, the initial assumption is deemed valid. Skewness and kurtosis serve as tools for assessing the normality of data, thereby constituting the second requisite assumption.

Prior to examining the outcomes of the Pearson product-moment correlation analysis, an analysis of descriptive statistics was performed on the scores obtained for metacognitive skills and critical thinking tendencies (as presented in Table 1). Table 1 displays the statistical results for the mean value and standard deviation of MS (M = 114. 67, SD = 9. 14) and critical thinking tendencies (M = 260. 73, SD = 27. 19). Moreover, as illustrated in Table 1, it can be observed that the data distribution pertaining to MS and critical thinking tendencies was in the normal range, as indicated by the kurtosis ratios (-1. 685 for MS and -1. 576 for CTT) and skewness ratios (-. 546 for MS and -. 439 for CTT) both falling within the -1. 96 and +1.96 As such, the veracity of the second supposition concerning normality is confirmed.

Table 1. Descriptive Statistics for Metacognitive Skills and Critical Thinking Tendencies Scores (N = 100)

Variable	Mean	SD	Skewness	Std. Error	Skewness Ratio	Kurtosis	Std. Error	Kurtosis Ratio
Metacognitive Skills	114.67	9.141	-.132	.241	-.546	-.806	.478	-1.685
Critical Thinking Tendencies	260.73	27.19	-.106	.241	-.439	-.754	.478	-1.576

In order to assess the linear relationship between metacognitive skills and critical thinking tendencies scores, the third assumption of linearity was evaluated by means of a scatter plot analysis (see Figure 1). The linear equation passing through the central cluster of points provides evidence supporting the assumption of linearity for the two pairs engaged in the Pearson product-moment correlation. The scatter plot can be employed as an analytical tool to investigate whether the relationship between the two variables under consideration exhibits a positive or negative correlation. As depicted in Figure 1, the slope of the line in the scatter plot, running from left to right, assumes a positive direction. This observation suggests a positive correlation between the two variables, where elevated values of X, denoting metacognitive skills, are linked with increased scores on Y, representing critical thinking tendencies.

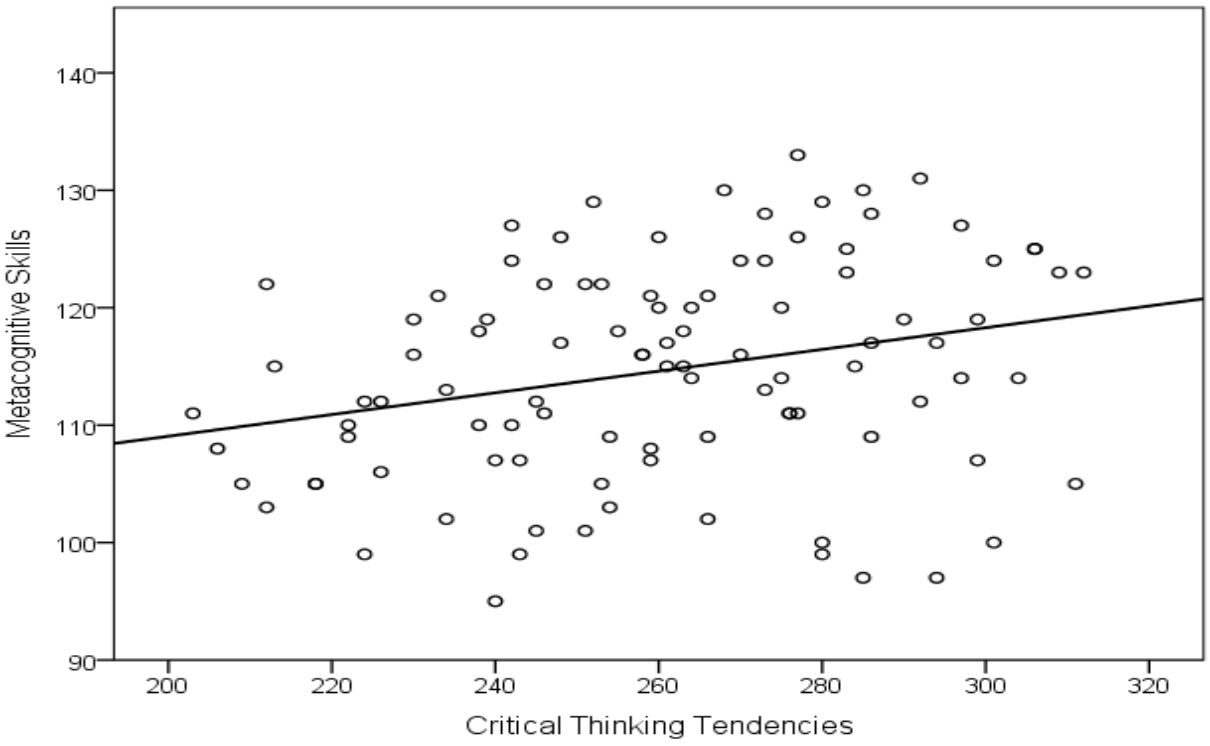

Figure 1. Plot of Relationship between Metacognitive Skills and Critical Thinking Tendencies

Moreover, in order to ensure the proper justification for utilizing the parametric technique, it was necessary to satisfy the homoscedasticity assumption. In pursuit of this objective, the residual plots were scrutinized as presented in Figure 2. According to the findings illustrated in Figure 2, the data cloud exhibits a random distribution across all the plots.

Regarding the fourth assumption, namely homoscedasticity, an evaluation was conducted of the residual plots depicted in Figure 2. The distribution of the data cloud in each plot indicates random distribution, thereby substantiating homogeneity of variance for every variable. Hence, the homogeneity of variances assumption was found to be upheld.

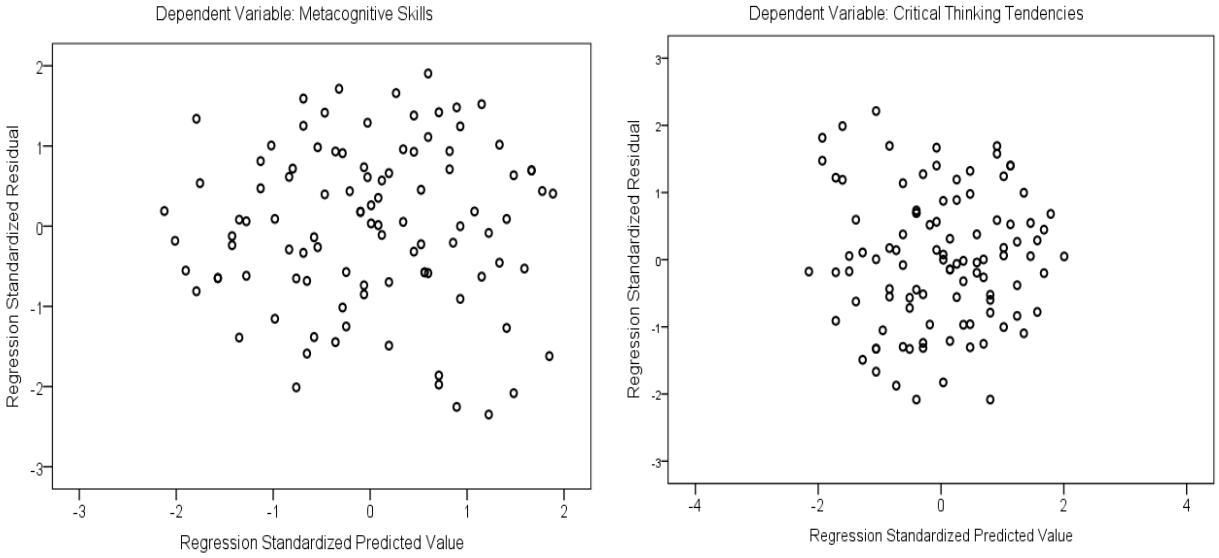

Figure 2. Plot of Standardized Residuals for Metacognitive Skills and Critical Thinking Tendencies

Upon establishing the aforementioned four prescriptive assumptions, namely possessing interval data, normality, linear correlation, and homoscedasticity, the Pearson product-moment correlation method can be utilized to determine the extent of the connection between the two variables. Table 2 presents the results of the aforementioned analysis.

The present study, as evidenced by the findings presented in Table 2, revealed a modest positive correlation between the scores of metacognitive skills and critical thinking tendencies among EFL teachers affiliated with universities. Specifically, the Pearson correlation coefficient (r =. 27, n = 100) indicated that higher levels of metacognitive skills were associated with higher levels of critical thinking tendencies. Furthermore, the obtained results reached statistical significance at the

level of α =. 006. Therefore, the current investigation demonstrated that an increase in metacognitive skills may contribute to an enhancement of critical thinking tendencies among EFL teachers. The calculated correlation coefficient (r = 0. 27) exhibited a higher magnitude than the Pearson correlation's critical values (r = 0. 16, n = 100). As a result, the initial null hypothesis positing an absence of a significant correlation between the metacognitive skills and critical thinking tendencies of EFL instructors at the university level has been deemed unacceptable. Thus, the initial inquiry is affirmatively addressed, indicating that a positive correlation exists between the metacognitive abilities and critical thinking tendencies of EFL instructors at the university level.

Table 2. Pearson Correlation between Metacognitive Skills and Critical Thinking Tendencies

		Critical Thinking Tendencies
Metacognitive Skills	Pearson Correlation	.275*
	Sig. (2-tailed)	.006
	N	100
*Correlation is significant at the .05 level (2-tailed).		

The primary objective of the second null hypothesis in the present study was to investigate potential correlations between the levels of MS (i.e., metacognitive skills) exhibited by EFL (i.e., English as a foreign language) professors in universities and their tendencies towards critical thinking concerning their gender. A PPMC was conducted for teachers of both genders. Table 3 presents the results of the Pearson correlation analysis, which indicates a weak positive correlation between the metacognitive skills and critical thinking tendencies scores of male (r (48) = 0. 26, n = 48, p = 0. 04) and female (r (52) = 0. 29, n = 52, p = 0. 02) university EFL educators. Specifically, it was found that higher levels of metacognitive skills were associated with higher levels of critical thinking tendencies. Therefore, the second null hypothesis that posits the absence of a significant correlation between the critical thinking tendencies of university EFL teachers and their MS, as stratified by gender, has been invalidated. Hence, a positive response is provided to the second query. It is conceivable to assert that there exists a positive correlation between the metacognitive skills and critical thinking dispositions of male and female EFL instructors within the context of higher education.

Table 3. Pearson Correlation between Metacognitive Skills and Critical Thinking Tendencies of Male and Female Teachers

		Critical Thinking Tendencies (Males)	Critical Thinking Tendencies (Females)
Metacognitive Skills	Pearson Correlation	.264*	.292*
	Sig. (2-tailed)	.043	.025
	N	48	52
* Correlation is significant at the .05 level (2-tailed)			

The weak positive correlation between metacognitive skills and critical thinking tendencies of female and male teachers is represented in Figure 3.

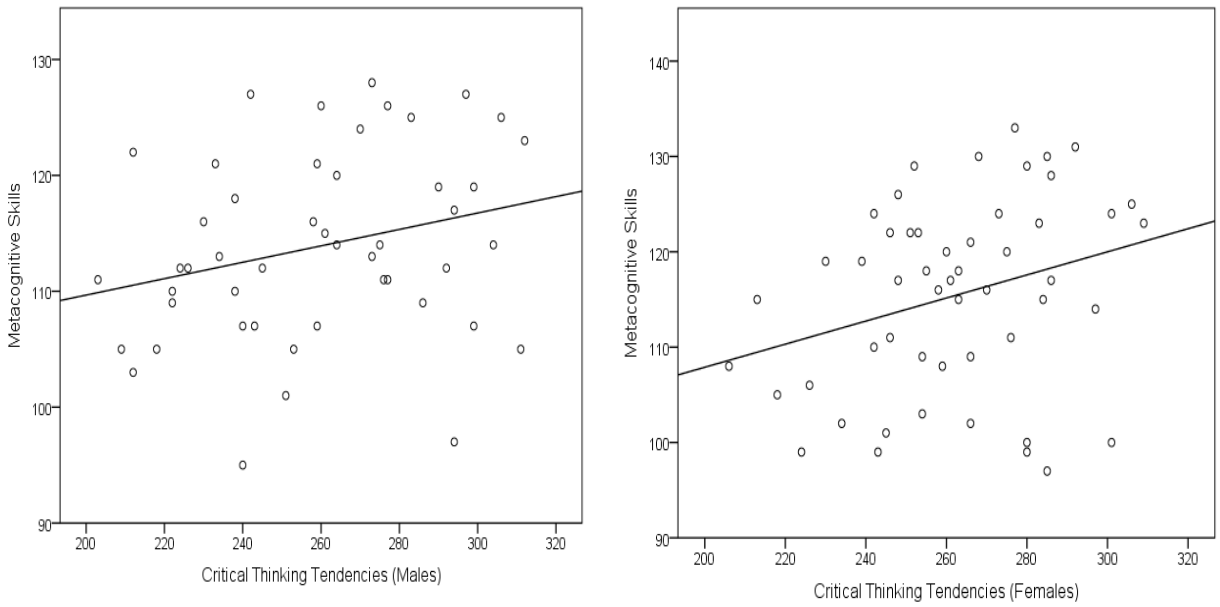

Figure 3. Plot of Relationship between Metacognitive Skills and Critical Thinking Tendencies of Male and Female Teachers

The third null hypothesis of this research study pertained to the presence of a noteworthy correlation between the metacognitive abilities of EFL professors within universities and their propensity for critical thinking, taking into account their teaching experience. In order to assess the validity of the null hypothesis, a Pearson correlation analysis was conducted for both experienced and novice educators, as documented in Table 4.

The outcome depicted in Table 4 reveals that the Pearson correlation analysis did not yield statistically significant results pertaining to a correlation between metacognitive skills and critical

thinking tendencies scores among university EFL educators belonging to the novice group (r (53) = 0. 14, n = 55, p = 0. 29). However, a moderate and positive correlation was established for the experienced teachers (r (45) = 0. 33, n = 45, p = 0. 02) who demonstrated a positive association between high levels of metacognitive skills and high levels of critical thinking tendencies. Consequently, the third null hypothesis positing the absence of a noteworthy correlation between the metacognitive skills of EFL instructors at the university level and their critical thinking tendencies in conjunction with their teaching experience is upheld. Hence, the third inquiry yields an unfavorable response. It can be posited that a significant correlation between the metacognitive skills and critical thinking tendencies of university instructors in the English as a Foreign Language domain, with respect to their teaching experience, cannot be established.

Table 4. Pearson Correlation between Metacognitive Skills and Critical Thinking Tendencies of Novice and Experienced Teachers

		Critical Thinking Tendencies (Novices)	Critical Thinking Tendencies (Experienced)
Metacognitive Skills	Pearson Correlation	.144	.335*
	Sig. (2-tailed)	.287	.025
	N	55	45
* Correlation is significant at the .05 level (2-tailed)			

Figure 4 depicts the correlation between metacognitive skills and critical thinking tendencies of novice and experienced teachers.

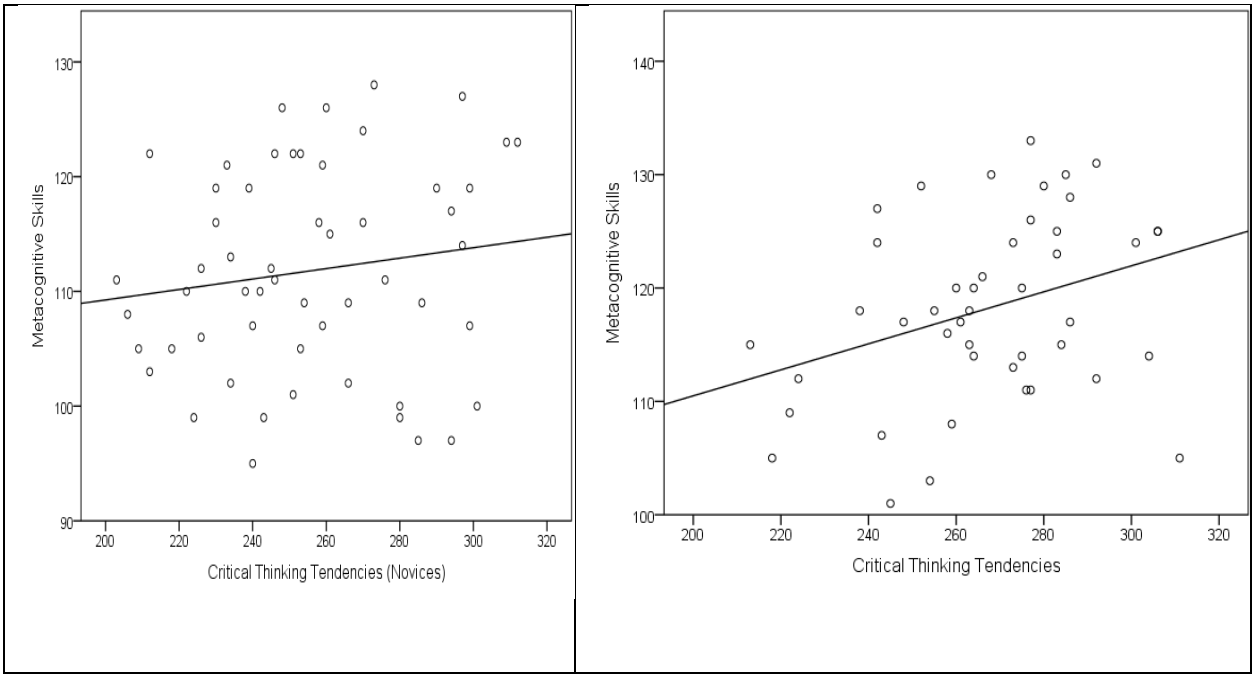

Figure 4. Plot of Relationship between Metacognitive Skills and Critical Thinking Tendencies of Novice and Experienced Teachers

Discussion

Several academics have established a correlation between critical thinking and various 21st-century abilities, such as metacognition and creative thinking (Lai, 2011), as per the definition of critical thinking. Within the field of education, a plethora of reports has been published highlighting metacognition as a pivotal term. An analysis was conducted by Safari and Meskini (2016) to investigate the effect of metacognition on various skills. According to the research conducted by Lai in 2011, it is evident that metacognition serves as a beneficial tool in promoting critical thinking as higher-order thinking skills aid in the regulation and management of cognitive processes. Magno's (2010) research investigated the impact of metacognition on critical thinking and revealed that metacognition represents a significant predictor of critical thinking.

The present study endeavors to examine the relationship between critical thinking propensities exhibited by EFL instructors at the university level and their respective levels of metacognitive proficiency. Additionally, the potential impact of gender and length of teaching experience were evaluated in relation to this matter. The data accumulated during the research indicates that there exists no noteworthy correlation between the metacognitive skills of EFL instructors in universities

and their tendencies for critical thinking. Furthermore, a lack of substantial discrepancy was observed between the genders in relation to the association between tendencies toward critical thinking and metacognitive proficiency. The study revealed a weak positive correlation between metacognitive skills and critical thinking tendencies, which did not attain statistical significance. Consequently, the initial null hypothesis was validated. Stated differently, the absence of a noteworthy correlation was observed between metacognitive abilities of EFL instructors in academic institutions and their inclination towards critical thinking.

To encapsulate, the acquisition of various proficiencies may be leveraged to attain advanced cognitive capacities, as posited by Magno (2010). In the present study, the findings indicated that the metacognitive abilities of EFL educators at the university level did not substantially account for the total variance and were unable to predict the critical thinking tendencies of EFL instructors. The present findings constitute a significant and unforeseen outcome that highlights a constructive association between the metacognitive competencies of EFL educators working in university settings and their inclination toward critical thinking. Ultimately, regarding the exposition of critical thinking tendencies among university EFL instructors, metacognitive skills does not appear to constitute a salient factor.

The study provides a theoretical foundation for establishing a linkage between critical thinking tendencies and perceptions pertaining to metacognitive skills, thus contributing to the existing body of knowledge in this field. The aforementioned framework posits that the attainment of critical thinking relies heavily on the utilization of particular higher-order cognitive processes or thinking skills, which are predominantly comprised of metacognitive abilities acting as an effective facilitator. The capacity of university EFL instructors to effectively regulate their cognitive processes will be a key determinant of their ability to engage in critical thinking when confronted with intricate challenges. Furthermore, the implementation of longitudinal research studies is needed to examine the impact of perceptions regarding metacognitive skills on propensities toward critical thinking.

The present investigation entails various limitations. The present study has a narrow focus, as it encompasses a sample of solely 100 university EFL instructors. These instructors were drawn from Azad and Payame Noor universities, which are situated in the provinces of Isfahan and Ilam, respectively. Moreover, the subjects of instruction for these teachers were undergraduate students pursuing a degree in English. Therefore, this study is constrained to the aforementioned two

delineations of knowledge and geographic regions, thereby necessitating cautious generalizability of the findings. The second constraint pertains to the inadequacy of the data collection instruments employed. Several of these instruments are not readily available within our current context. The present study, however, did not examine the impact of all influential factors on the tendency toward critical thinking among EFL instructors in academic institutions. The study exclusively involved EFL instructors who were affiliated with a university and taught at the undergraduate level. Consequently, additional inquiries are imperative to generalize the outcomes to alternative circumstances, encompassing individuals engaged in varying academic disciplines, mature participants, or educators instructing courses from disparate fields of study. As a corollary, it is highly advisable that novel investigations be undertaken targeting individuals and collectives belonging to the diacritic strata of the society. It is recommended to conduct and compare experimental studies on different samples in diverse age groups in order to determine cause-and-effect relationships and cognitive abilities. A similar method can also be used for other data sources (observation, interview, etc.) or a different population. In addition, longitudinal studies can be carried out to investigate the effect of metacognitive skills on critical thinking tendencies.

Due to the fact that language learning is a multidimensional phenomenon, not only language teachers, but also language learners need to play their role appropriately to facilitate and optimize this complex process. Therefore, results of the current study have implications for language learners to operate autonomously and make appropriate choices. Therefore, the first step to promote critical thinking in the class is to encourage students to be actively involved in class activities (Bedir, 2013). Using learning logs, as one of the learning procedures, can help students understand the purpose of learning and the essential steps to be taken. In addition, improving critical thinking in a learning context can help learners to be equipped with strategies designed to maintain positive attitudes toward learning and themselves. To sum up, teachers are assumed to realize their role as a contributor to improvement of their learners' evolution of critical thinking by exposing them to different global, problem-solving issues on the one hand, and by providing a way to progress gradually to be more active and responsible for their own learning on the other hand.

This study is important to teachers as it provides insights into the teacher's thinking and perception of critical thinking in the classroom. The results of this study contribute to the notion that a higher

level of knowledge monitoring is provided by presenting multiple opportunities for metacognitive practice and problem-solving. According to these results, classroom teachers can improve students' knowledge monitoring and thereby improve their academic performance. Syllabus designers as providers of a great portion of the language learning setting, have a fundamental role to make the process easier. They are required to know that incorporation of activities related to critical thinking in their courses can result in intellectual, active teachers that through using strategies can overcome their teaching difficulties. Following Bedir (2013), students can improve their critical thinking if teachers employ proper instructional methods and curriculum materials. Thus, teacher training programs should also be supported to raise awareness of critical thinking in EFL teachers through teacher training (Şeker & Kömür, 2008). As a result, there is a need for further training for teachers who want to incorporate critical thinking strategies into their instruction and improve their students' critical thinking abilities.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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