



Research article

Speaking accuracy and fluency among EFL learners: The role of creative thinking, emotional intelligence, and academic enthusiasm

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ABSTRACT

This study examines the associations between speaking accuracy and fluency among English as a Foreign Language (EFL) learners and emotional intelligence (EI), creative thinking (CT), and academic enthusiasm (AE). Quantitative data was used in a thorough analysis that was carried out utilizing a cross-sectional design. Three hundred and twenty EFL learners were chosen as a sample using a multi-stage cluster sampling technique. The creativity questionnaire by Abedi, the EI questionnaire by Schutte et al. and the AE questionnaire by Fredricks et al. were all completed by the participants. Quantitative data analysis was conducted using SPSS 25.0 and AMOS 24.0. The results showed a strong positive association between better speaking accuracy and fluency and greater levels of CT, EI, and AE. More precisely, learners with greater EI were able to control their emotions better, which improved their ability to speak clearly and fluently. Speaking performance was improved by those with higher CT because they showed improved problem-solving abilities and linguistic originality. High AE was also associated with better language practice and competence due to higher desire and involvement. These findings imply that encouraging CT, EI, and AE in language learning settings can greatly improve learners' speaking ability. To better understand the impact of other elements on speaking proficiency, future research should look into motivation, self-esteem, and learning methodologies.

1. Introduction

In today's globally associated world, characterized by the rapid movement of people across borders and the increasing importance of English as a lingua franca, proficiency in spoken English is paramount for English as a Foreign Language (EFL) learners. As individuals navigate diverse cultural and geographical landscapes for education, employment, and social interactions, the ability to communicate effectively in English becomes increasingly essential [1,2]. Fluency, defined as the ability to articulate ideas smoothly and coherently, utilizing all available linguistic resources with spontaneity and ease, is recognized as a cornerstone of effective communication [3]. Conversely, accuracy, as described by Ref. [4], pertains to the grammatical correctness of language production, ensuring adherence to the rules and structures of the target language. Both fluency and accuracy are fundamental components of

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speaking proficiency and have been extensively studied across diverse linguistic contexts [5–9]. In addition to fluency and accuracy, higher-order thinking skills such as CT have been recognized as crucial in language acquisition. CT, as defined by Ref. [10], involves problem-solving from various perspectives and the generation of innovative ideas based on existing knowledge and experiences. Similarly, EI and AE have emerged as influential factors in educational settings. EI, encompassing the ability to recognize and regulate one's own and others' emotions, and AE, reflecting learners' motivation and engagement in academic pursuits, significantly impact learning outcomes [11–15].

Growing evidence has been found in recent years that psychological factors have a major impact on language acquisition outcomes. Studies by Refs. [16,17] have emphasized the significance of incorporating positive psychology into the study and teaching of second language learning. They support a change to a loving pedagogy and the application of positive psychology ideas to improve language learning results and experiences.

Creative Thinking (CT) is the process of synthesizing past experiences and knowledge to produce novel concepts and solutions. To come up with original viewpoints and solutions to issues, one needs intelligence, adaptability, and flexibility. Fluency, flexibility, creativity, and elaboration are all included in CT, which emphasizes the creation of novel ideas and a range of possibilities [18,19].

Emotional Intelligence (EI) traces its origins to the concept of social intelligence proposed by Edward Thorndike in 1913 [20]. Further popularized EI, emphasizing its significance in personal and professional success. EI encompasses a range of skills and abilities related to understanding and managing emotions, influencing interpersonal interactions, and achieving success [21].

Based on social control theory, the idea of AE in foreign language instruction represents a strong interest in and dedication to learning. A variety of factors are included in AE, such as trying to acquire new material, engaging in social interactions with classmates and adults, and actively participating in academic activities [22]. Several characteristics, including emotional, behavioral, cognitive, and psychological components, have been proposed for AE by psychologists and theorists. All things considered, through encouraging motivation, engagement, and a sense of belonging in the learning environment, AE plays a critical role in improving academic achievement and generating enjoyable educational experiences.

There is still a dearth of research examining the precise effects of these psychological notions on speaking ability, especially among EFL learners, despite their acknowledged significance in language learning. The “unknown” in our present knowledge of language acquisition processes is represented by this research gap. To guide EFL education and curriculum creation, it is crucial to comprehend the complex relationships that exist between CT, EI, AE, correctness, and fluency. There is a notable gap in the literature as not many studies have thoroughly investigated these interrelationships. To add to the “known” components of language learning, the main goal of this study is to look at any associations between CT, EI, AE, and speaking performance in EFL learners. Our goal in filling this research void is to offer insightful advice and recommendations for the creation of focused interventions and instructional techniques meant to improve learners' spoken language abilities. In a novel way, our study examines the associations between speaking fluency and accuracy among EFL learners as well as the psychological constructs of academic enthusiasm (AE), emotional intelligence (EI), and creative thinking (CT). Our study thoroughly examines the relationships between these variables within the particular context of EFL speaking proficiency, in contrast to earlier research that concentrated on these variables separately or in different language learning situations.

2. Literature review

The relationship between psychological factors and language learning outcomes has been an area of interest for researchers in the field of second language acquisition. This literature review aims to explore existing research on the relationship between CT, EI, AE, and the accuracy and fluency of speaking among EFL learners.

2.1. Fluency and accuracy of speaking

According to Ref. [23] fluency in a language is achieved when an individual can effectively employ the language's structure, prioritizing content over form, and utilizing units and structures naturally at conversational speed when necessary [24]. Define fluency as the ability to use pausing, intonation, stress, speech speed, and speech interruptions in a native-like manner. In the realm of second language (SL) learning, accuracy has been approached through various methods, with applied linguistics perspectives receiving considerable attention from researchers and practitioners. Accuracy, as characterized by Ref. [25] pertains to the extent to which the target language (TL) adheres to its regulatory structure.

2.2. Critical thinking

CT has a crucial function in language learning, interactions, and communications. It entails the capacity to generate new explanations for challenging issues suitably or acceptably [26]. State that learners with higher levels of CT exhibit stronger linguistic adaptability, problem-solving abilities, and inventive language use. CT fosters the production of original ideas and encourages approaching language tasks from diverse viewpoints, thereby improving speaking accuracy and fluency [27]. Additionally, CT has been associated with enhanced motivation and engagement in language learning, contributing to overall language competency [28].

2.3. Emotional intelligence

EI is another crucial element in language learning and proficiency [29]. Describe EI as a key factor in emotional adjustment,

personal well-being, success in life, and social relationships across various domains. EI encompasses self-awareness, understanding, and management of emotions, and the ability to empathize with others. Research suggests that higher EI is associated with more engagement in successful interactions, demonstrating superior interpersonal skills, and adapting their language use to different social contexts [30]. EI contributes to the development of speaking abilities by facilitating effective communication, recognizing nonverbal cues, and managing communication anxiety, ultimately improving both accuracy and fluency [31].

2.4. Academic enthusiasm

AE has garnered increased interest in recent years. It refers to learners' intrinsic motivation, interest, and involvement in the learning process. AE encompasses a sense of belonging and active participation in classroom activities, leading to positive academic outcomes [32]. AE involves self-initiated and thoughtful engagement in academic activities, demonstrating consistent psychological investment that facilitates learning and promotes positive emotional states. Several studies have shown a correlation between AE and improved language learning outcomes [33]. Enthusiastic learners are more likely to invest effort, persevere in language learning tasks, and actively engage in speaking activities. AE contributes to enhanced speaking accuracy and fluency by creating a positive learning environment, increasing learners' self-efficacy, and encouraging language practice and inquiry [34].

Critical insights into how CT, EI, and AE relate to EFL learners' speaking accuracy and fluency are highlighted in the literature that already exists on the relationship between psychological components and language learning outcomes. Even though these characteristics have been the subject of many studies, there is a noticeable lack of research that examines how these factors work together to affect speaking abilities in EFL learners. To thoroughly investigate the associations between these three psychological dimensions and speaking accuracy and fluency, this study sets itself apart by integrating Critical Thinking (CT), Academic Enthusiasm (AE), and Emotional Intelligence (EI). This research attempts to offer a more nuanced view of how these characteristics collectively relate to the spoken language ability of EFL learners by utilizing a cross-sectional design. This method not only closes a big gap in the literature now in use, but it also provides useful insights that might guide the development of more potent instructional strategies for second language learners.

Although individual studies have looked into the results of CT, EI, and AE on learning a language outcome, few have specifically focused on the accuracy and fluency of speaking among EFL learners. This research attempts to address this lack of knowledge and add to the existing state of literature investigating the associations between these psychological concepts and spoken language ability. The findings from existing research indicate that CT, EI, and AE all play important roles in EFL learners' speaking accuracy and fluency, with higher degrees of these psychological concepts associated with better speaking abilities. However, additional study is required to have a thorough knowledge of the particular associations between CT, EI, and AE with the accuracy and fluency of speaking among EFL learners. The goal of the current investigation is to add to this knowledge by examining these associations and informing instructional techniques in the area of learning using a cross-sectional design.

2.4.1. Hypotheses

1. There is no significant relationship between EFL learners' CT and fluency.
2. There is no significant relationship between EFL learners' EI and fluency.
3. There is no significant relationship between EFL learners' AE and fluency.
4. There is no significant relationship between EFL learners' CT and accuracy.
5. There is no significant relationship between EFL learners' EI and accuracy.
6. There is no significant relationship between EFL learners' AE and accuracy.

3. Materials and methods

3.1. Design of the study

The present research employs a cross-sectional design and focuses on quantitative methods. Data were collected using questionnaires, which formed the basis of the quantitative analysis.

3.2. Participants

This study included a sample of 5673 EFL learners from Zanjan, Iran, to investigate the relationship between CT, EI, and AE with speaking accuracy and fluency. To guarantee a representative sample, the sampling procedure employed a multi-stage cluster sampling technique. Initially, District Two was chosen from the two districts of Zanjan, Iran, using a straightforward randomized approach. Out of a total of 25 institutions in District Two of Zanjan, 13 were female institutions, and 8 of them had advanced-level education, and all advanced EFL learners of these eight institutions, which included 320 people, were studied based on [35] Table of a random selection of sample size. This choice was made using a randomized and statistically valid sample, as guaranteed by a table from Morgan for calculating sample size in population studies. The PET (Preliminary English Test) was used to make sure that the participants' language skill levels were uniform [36]. 320 persons satisfied the requirements to participate in the study based on the test results. The participants were all non-native English speakers, ranging in age from 18 to less than 45. All individuals gave their informed consent before participation. The study only included participants who fulfilled the inclusion criteria, which included being female learners of

advanced EFL and completing the PET proficiency exam. The analysis did not include participants who declined to participate or did not finish the surveys. There were no ethical conflicts or conflicts of interest because the work complied with ethical guidelines and was authorized by the research ethics committees of the university.

3.3. Instruments

3.3.1. Preliminary English Test (PET)

To ensure the participants' homogeneity of language proficiency levels, the researchers utilized PET. PET, which stands for Preliminary English Test, is a proficiency test developed by Cambridge University to assess proficiency in EFL. This test consists of three sections: a) a combined reading and writing section (90 min), b) a listening section (30 min), and c) a speaking section that includes an oral presentation (interaction) (10 min).

A sample of the PET from the Preliminary English Test 5 issued by Cambridge ESOL Examinations in 2008 was used for this investigation [36].

3.4. Abedi's creativity questionnaire

The 60 multiple-choice items on the creativity questionnaire used in this study were divided into four categories: Fluency (22 items), Originality (16 items), Flexibility (11 items), and Elaboration (11 items). A scale of 0–2 is used to grade each item, with 0 signifying the least innovative response and 2 the most creative.

The scoring options for each item are as follows: Option (a): A score of 0 - indicates a lack of ability to perform the activity. Option (b): A score of 1 - represents a limited ability to perform the activity. Option (c): A score of 2 - indicates the full ability to perform the activity, demonstrating creativity [37].

The scores from each item were accumulated for the four elements: fluency, originality, flexibility, and elaboration. Four scores were obtained, one for each component, and by summing the aforementioned scores a total creative score was generated. The overall creativity score ranged from 0 to 120. Based on the total score, creativity levels were categorized as follows: below 50 (very low creativity), 50–75 (low creativity), 75–85 (medium creativity), 85–100 (high creativity), and 100–120 (very high creativity).

The reliability of this questionnaire was investigated by Ref. [38] utilizing Cronbach's alpha coefficient. The coefficients of reliability for the fluency, elaboration, originality, and flexibility subscales were found to be 0.67, 0.48, 0.68, and 0.55, respectively. These coefficients indicate acceptable reliability, supporting the questionnaire's validity.

3.5. Schutte et al.'s EI questionnaire

The 33-item Schutte Self-Report EI Test (SSEIT) is a self-report tool for assessing EI. Four subscales of EI are measured by the test: emotional understanding, handling emotions of own, emotional controlling of others as well, and emotional usage [39]. The following are the items that match each subscale:

Emotional understanding: Items 5, 9, 15, 18, 19, 22, 25, 29, 32, 33,
 Handling emotions of own: Items 2,3, 10, 12, 14, 21, 23,28, 31,
 Emotional controlling of others: Items 1, 4, 11, 13,16,24, 26, 30
 Emotional usage: Items 6, 7, 8, 17, 20, 27

Participants assess themselves on each item utilizing a five-point scale. The overall scores range from 33 to 165, with higher scores suggesting a greater degree of EI.

Employing Cronbach's alpha, the questionnaire's reliability was evaluated, resulting in a reliability coefficient of 0.85. This indicates good internal consistency of the test items. The questionnaire's validity was checked and authorized by Ref. [40], establishing its validity as a tool to assess EI.

3.6. Fredricks et al.'s AE questionnaire

The questionnaire used in this study comprised 15 items, and participants rated their answers based on a Likert scale of one to five. The questionnaire includes three subscales: behavioral desire, emotional desire, and cognitive desire [41]. The items corresponding to each subscale are as follows:

Behavioral desire subscale: Items 1, 2, 3, and 4
 Emotional desire subscale: Items 5, 6, 7, 8, 9, and 10
 Cognitive desire subscale: Items 11, 12, 13, 14, and 15

[41] investigated the questionnaire's reliability and reported a standard reliability coefficient of 0.86. This indicates good internal consistency of the instrument.

Problem-solving Assignment of the ESL Group; Called "Shipwrecked".

For this research, an assignment was selected from the set of integrated skills in Language Teaching tasks. EFL learners were

instructed to form groups of four, and the assignment was explained to them. The purpose of the assignment was to solve a problem by deciding which person should not be allowed to enter a lifeboat. To make sure that participants had adequate knowledge of the assignment, the characters of the passengers were introduced to the EFL learners. These characters included a famous musician, a good teacher, a famous businessman, and a famous surgeon.

To ensure a random selection of the passengers' characters, the names of the passengers were written on cards, and each person chose one card. Based on the character they chose; the participants engaged in discussions and provided their reasons for choosing a particular person to be removed from the lifeboat. The oral presentations were fully recorded, and the duration of each conversation was approximately 1 min.

The recorded voices were then analyzed to assess the fluency and accuracy of each participant's speech. To evaluate fluency, two independent graders used the criteria provided by the International English Language Testing System (IELTS) organization. They assigned a fluency score ranging from 1 to 9 for each learner's speech. The two graders had a high degree of agreement based on their inter-rater reliability, which was 0.88.

To examine accuracy, the learners' speech was transcribed into written form, and the number of errors was recorded.

3.7. Procedure

To provide answers to the research questions and gather the necessary data to test the study's null hypotheses, the following steps were undertaken during the research process.

A pilot study was conducted with 30 advanced EFL learners who shared similar characteristics to the target sample. The pilot study involved administering the PET (Preliminary English Test), and the researchers calculated item discrimination (ID), item facility (IF), and test reliability. Fortunately, no items malfunctioned, and therefore, none were discarded. It is significant to remember that two raters evaluated the participants' performance in the speaking section of the PET, and inter-rater reliability was calculated. Due to practical constraints, the second rater could not be present during all speaking exam sessions. As a result, the researchers recorded the sessions, and the second rater listened to the recordings later and rated them using the established rating scales.

Subsequently, the PET language proficiency test was employed to make sure of homogeneity in the use of language among the participants. Based on the participants' performance on the PET, 320 individuals met the research requirements and were included in the study.

Participants received assurances that their answers would be kept private and anonymous, hence there was no need for them to provide their names on the questionnaires. The creative questionnaire had to be completed first, then the EI questionnaire, and finally the AE questionnaire. The study's importance was emphasized to the participants, emphasizing how their cooperation would contribute to the progress of English learning in Iran. They were encouraged to provide accurate responses to obtain more reliable and valid results. Participants were also encouraged to seek clarification for any ambiguities. Each questionnaire yielded scores that were collected from all three questionnaires.

Following the questionnaire completion, the participants were given instructions for the specific assignment they were about to perform. They had no prior exposure to the assignment. From a list of ISL tasks, this particular assignment was selected. EFL learners were asked to form groups of four and were then given the assignment, which involved determining which person should not be allowed on a lifeboat to solve a given problem. The characters representing the passengers (a great musician, a good teacher, a renowned businessman, and a prominent surgeon) were introduced to the EFL learners to provide sufficient background information for the assignment. Each participant was given 1 min to explain why they believed one of the named individuals should be excluded. They were free to choose the appropriate words and structure their reasoning as they saw fit. The names of the passengers were written on cards, and each participant randomly selected one card to ensure the character was chosen at random. Participants proceeded to explain their reasoning based on the character they had selected.

The entire oral presentation was recorded, capturing approximately 1 min of dialogue. The recorded voices were then analyzed to ensure accuracy and fluency in each participant's speech. Two graders independently assessed the fluency of each learner's speech according to the standards set by the IELTS organization, assigning a score between 1 and 9. The calculated reliability between raters was 0.88. Additionally, the learners' speech was transcribed into written form, allowing the researchers to record the number of errors and evaluate accuracy. Similar to fluency, two graders separately evaluated the accuracy of each learner's speech based on the IELTS organization's standards, assigning a score between 1 and 9 (Majid Nematı & Geshti, 2018).

3.8. Data collection

For data collection, three sets of questionnaires were utilized: Abedi's creativity questionnaire, Schutte et al.'s EI questionnaire, and Fredricks et al.'s AE questionnaire. Before receiving each paper-based questionnaire, the participants attended a 15-min introductory session. During this session, they familiarized themselves with the questionnaire completion procedure. The researchers provided a clear explanation of the tasks and instructions for filling out the forms, and they addressed any questions raised by the participants. The aim was to ensure that all questions were comprehensible and that participants could respond to the questionnaires with minimal errors. A total of 70 min was allocated for completing the questionnaires. Questionnaires and oral presentations were used to gather data. Collecting data from many sources led to a more thorough comprehension as well as a more precise depiction of the data evidence that was found.

Three questionnaires were used in this study to gather data. Firstly, Abedi's creativity questionnaire was utilized to measure CT. The questionnaire consists of 60 questions with multiple choices that measure four characteristics: fluency (22 questions), originality

(16 questions), flexibility (11 questions), and elaboration (11 questions). Each question presents three possible answers, representing varying levels of inventiveness, with a potential score ranging from 0 to 2.

Secondly, Schutte et al.'s EI questionnaire was administered to gauge the EI of EFL learners. The questionnaire used was the 33-item Schutte Self-Report EI Test (SSEIT), which assesses EI through self-report. The SSEIT consists of four subscales: emotional understanding, handling emotions of own, emotional controlling of others as well, and emotional usage.

Lastly, Fredricks et al.'s AE questionnaire was employed to measure the AE of EFL learners. This questionnaire comprises 15 items and adopts a Likert scale, allowing respondents to give each item a score between 1 and 5. The questionnaire encompasses three subscales: emotional desire (items 5, 6, 7, 8, and 10), cognitive desire (items 11, 12, 13, and 14), and behavioral desire (items 1, 2, and 3).

Oral presentations: An oral presentation was conducted to evaluate the accuracy and fluency of speaking among EFL learners. Each participant was given 1 min to provide a justification for their selection of a person to be removed from the list. The oral presentations were recorded in their entirety, capturing approximately 1 min of conversation. The recorded voices were subsequently analyzed to ensure the accuracy and fluency of each participant's speech. Two independent graders assessed the fluency of each learner's speech, assigning scores between 1 and 9 based on the standards set by the IELTS organization. Furthermore, the two graders individually evaluated the accuracy of each learner's speech, providing scores between 1 and 9 to determine accuracy following the IELTS organization's standards [42].

3.9. Data analysis

To evaluate the study's null hypotheses, the following statistical analyses were conducted. The raw data was imported into SPSS version 25 to examine the correlation between the independent and dependent variables of the research question. Descriptive statistics, such as frequency tables, charts, and measures of dispersion and central tendency, were generated. Additionally, inferential statistics were performed using the structural equation method in Amos version 24. The research variables' normality was assessed using the Kolmogorov-Smirnov normality test. Furthermore, Pearson's test was employed to assess the correlation among the research variables. The association between CT, EI, and AE among EFL learners was examined using the path analysis method, which was carried out using the Amos 24 software.

4. Results

4.1. Descriptive findings

Descriptive statistics and inferential statistics are applied to investigate the analytical data in two sections using SPSS 25 and Amos 24 software. The central indicators and dispersion of the study's variables were first reported in the descriptive statistics section.

The demographic statistics of the variables are presented in Table 1:

Table 1 revealed that the group of 26 to less than 30 years has the highest frequency, while the group of more than 45 years has the lowest. Furthermore, the number of singles was 0.45, while the number of married persons was 0.55, with married people being the most frequent.

Table 2's descriptive statistics findings demonstrate:

The mean \pm standard deviation of fluency of speaking variables was 2.180 ± 4.638 , the accuracy of speaking was 2.136 ± 4.669 , EI was 11.628 ± 94.175 , CT was 103.371 ± 8.836 , and AE was 41.184 ± 13.579 . Also, the range for skewness and kurtosis values were (-2 and 2), demonstrating that the distribution of data was almost normal.

4.2. Inferential statistics

To assess the normality of the research variables, the Kolmogorov-Smirnov normality test was utilized. The subsequent section presented the obtained results in a specified sequence.

Based on the findings presented in Table 3, it can be observed that the obtained P-value exceeds the significance level of 0.05, indicating that the data conforms to the assumption of normality.

To investigate the association between the research variables, Pearson's correlation test was employed, yielding the subsequent

Table 1
Participants' frequency distribution and age percentage.

	Category	Frequency	Percent
Age	Less than 25 years	50	15.6
	26 to less than 30 years	215	67.2
	31 to less than 35 years	17	5.3
	36 to less than 40 years	26	8.1
	41 to less than 45 years	9	2.8
	More than 45 years	3	0.9
Marital status	Single	144	45.0
	Married	176	55.0

Table 2
Research variables' Central Indicators and Dispersion.

	N	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Fluency of Speaking	320	4.638	2.180	1	9	0.181	-1.143
Accuracy of Speaking	320	4.669	2.136	1	9	0.201	-1.126
EI	320	94.175	11.628	64	121	0.057	-0.425
CT	320	103.371	8.836	69	131	-0.179	1.094
AE	320	41.184	13.579	16	67	0.297	-1.206

outcomes.

According to Table 4, the correlation coefficients between fluency of speaking and accuracy of speaking were 0.583, EI was 0.421, CT was 0.654, and AE was 0.526. Additionally, the correlation between the accuracy of speaking and EI was 0.429, CT was 0.659, and AE was 0.546. The correlation between EI and CT is 0.421, EI and AE is 0.456, and AE and CT was 0.304, all of which were significant at the 0.01 level.

4.3. Research hypotheses

This section analyzes the association between study variables using the path analysis method and Amos24 software. The research model was shown below (Figs. 1 and 2):

Amos 24 software was used to configure the model. The following are the results:

Considering the software's output, the value of the chi-square statistic (χ^2) compared to its degree of freedom, which in this case is 2, is equal to 911/2. This value is less than 3, exhibiting a slight discrepancy between the conceptual model and the study findings that have been observed. A low chi-square statistic indicates that the model and the data fit each other well.

Moreover, the Root Mean Square Error of Approximation (RMSEA) was reported to be 0.071, which was less than the threshold of 0.08. This showed that the model fits the data well, as indicated by the lower RMSEA value.

Furthermore, several fit indices are provided: The Goodness-of-Fit Index (GFI), the Normed Fit Index (NFI), the Incremental Fit Index (IFI), the Relative Fit Index (RFI), and the Comparative Fit Index (CFI). The respective values of these indices are reported as 0.985, 0.984, 0.985, 0.943, and 0.956. The conceptual model and these values seem to fit each other well and the observed data. Generally, values above 0.9 indicate a good fit for these fit indices.

In summary, the statistical indices suggest that the model fits well with the observed data, as indicated by the low chi-square value, the RMSEA value below 0.08, and the high values of the GFI, NFI, IFI, RFI, and CFI indices. These results confirm that the conceptual model and the data gathered throughout the research are in alignment.

To assess convergent and discriminant validity in this study, the PLS3 software was used. Since the researchers employed path analysis, the convergent validity for all variables was equal to 1. However, the discriminant validity was obtained through the HTMT method as follows.

	Academic enthusiasm	Creative Thinking	Emotional Intelligence	Speaking accuracy	Speaking fluency
Academic enthusiasm					
Creative Thinking	0.304				
Emotional Intelligence	0.756	0.721			
Speaking accuracy	0.546	0.659	0.729		
Speaking fluency	0.526	0.654	0.721	0.783	

The results of the Heterotrait-Monotrait Ratio (HTMT) test showed that all values were less than 0.9, confirming discriminant validity.

The research hypotheses will be investigated in the following.

Hypothesis No. 1. CT has a positive and significant relationship with fluency in speaking.

Hypothesis No. 2. EI has a positive and significant relationship with fluency in speaking.

Hypothesis No. 3. AE has a positive and significant relationship with fluency in speaking.

Table 3
The normality of the variables was examined using the Kolmogorov-smirnov test.

	Test statistic (K-S)	P-value	Result
Fluency of Speaking	0.032	0.200	Normal
Accuracy of Speaking	0.037	0.200	Normal
EI	0.028	0.200	normal
CT	0.041	0.158	Normal
AE	0.039	0.189	Normal

Table 4
Analysis of the correlation between study variables.

	Fluency of Speaking	Accuracy of Speaking	EI	CT	AE
Fluency of Speaking (P_value)	1.000–				
Accuracy of Speaking (P_value)	0.583 ^a (0.001)	1.000–			
EI (P_value)	0.421 ^a (0.001)	0.429 ^a (0.001)	1.000–		
CT (P_value)	0.654 ^a (0.001)	0.659 ^a (0.001)	0.421 ^a (0.001)	1.000–	
AE (P_value)	0.526 ^a (0.001)	0.546 ^a (0.001)	0.456 ^a (0.001)	0.304 ^a (0.001)	1.000–

^a Correlation is P-value and significant at the 0.01 level (2-tailed).

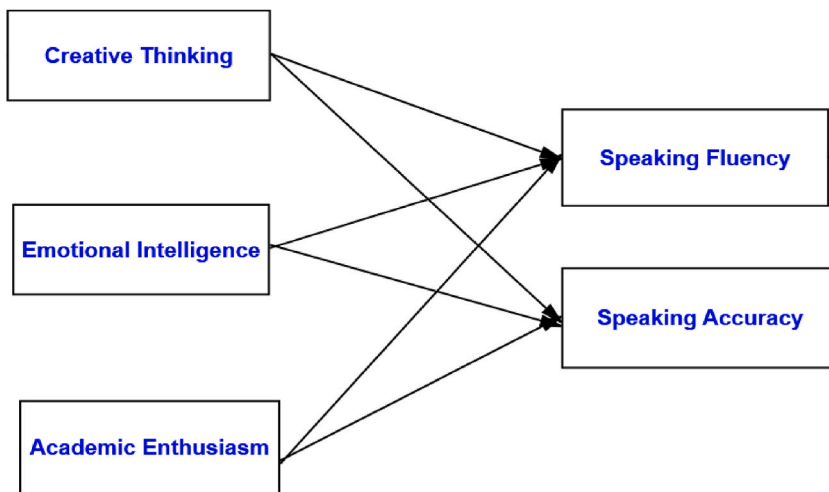


Fig. 1. Research model.

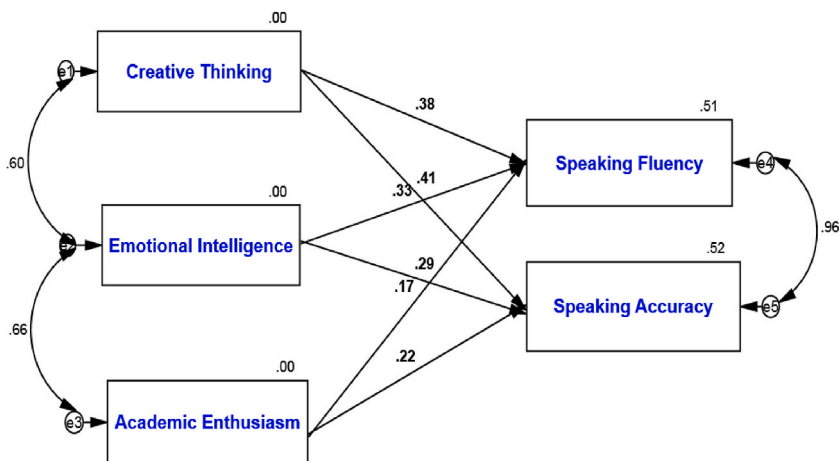


Fig. 2. Model fit in standard estimation mode.

Table 5
Investigating the impact of CT, EI, and AE on the fluency of speaking.

	Path coefficients in standard estimation mode	t-value	P-value	Condition
CT → Fluency in Speaking	0.382	5.686	0.001 ^a	Accept
EI → Fluency in Speaking	0.329	3.752	0.001 ^a	Accept
AE → Fluency in Speaking	0.168	2.358	0.018*	Accept

** CT and EI significant at the 0.01 level (p < 0.01).

** AE significant at the 0.05 level (p < 0.05).

The path analysis results presented in Fig. 2 and Table 5 indicated the standard coefficients between CT, EI, AE, and fluency of speaking. The standard coefficients are reported as 0.382, 0.329, and 0.168, respectively.

To assess the significance of these coefficients, *t*-test statistics were used. The absolute values of the *t*-test statistics were provided as 5.686, 3.752, and 2.358. These coefficients were statistically significant since they were greater than the critical value of 1.96.

Based on the significant coefficients, it can be concluded with 99 % confidence (*p*-value = 0.001, 0.018) that CT, EI, and AE have a positive and significant effect on fluency speaking. That is to say, for every unit increase in CT, EI, and AE, the fluency of speaking is expected to increase by 0.382, 0.329, and 0.168 units, respectively.

These findings suggest that CT, EI, and AE have an important role in influencing the fluency of speaking among learners.

Hypothesis No. 4. CT has a positive and significant relationship with accuracy in speaking.

Hypothesis No. 5. EI has a positive and significant relationship with accuracy in speaking.

Hypothesis No. 6. AE has a positive and significant relationship with accuracy in speaking.

The path analysis results presented in Fig. 2 and Table 6 indicate the standard coefficients between CT, EI, AE, and accuracy of speaking. The standard coefficients were reported as 0.406, 0.289, and 0.217, respectively.

To assess the significance of these coefficients, *t*-test statistics were used. The absolute values of the *t*-test statistics were provided as 6.142, 3.347, and 3.093. These coefficients were statistically significant since they were greater than the critical value of 1.96.

Based on the significant coefficients, it can be concluded with 99 % confidence (*p*-value = 0.001, 0.002) that CT, EI, and AE have a positive and significant effect on the accuracy of speaking. That is to say, for every unit increase in CT, EI, and AE, the accuracy of speaking is expected to increase by 0.406, 0.289, and 0.217 units, respectively.

5. Discussion

This study's goal was to explore the association between CT, EI, and AE with the accuracy and fluency of speaking among EFL learners. The **first hypothesis** proposed a strong association between CT and speaking fluency. The findings of the study support this hypothesis, indicating a substantial association between CT and speaking fluency among EFL learners.

Regarding the **first hypothesis**: CT, dealing with learning a language, involves the ability to generate and apply new concepts, explore alternative explanations, view events from different perspectives, and make associations that lead to positive outcomes. Speaking fluency refers to the ease and effortless expression of ideas in a second or foreign language. Previous studies have shown interest in investigating the correlation between CT and speaking fluency [43–45]. The findings of this research align with the existing literature, as they suggest a significant correlation between speaking fluency and CT among EFL learners. Learners who demonstrated higher levels of CT also tended to exhibit greater fluency in their spoken language. These findings are consistent with studies conducted by Ref. [9]. Additionally, the study by Ref. [42] supported the notion that creativity can predict speaking fluency.

However, it is worth noting that there are contrasting views in the literature [5]. [5] postulated a detrimental association between the capacity for convergent thinking and critical inner speech, suggesting that individuals who engage in condensed and critical/evaluative inner speaking may have lower levels of convergent thinking [46]. [46] found an inverse relationship between the rate of spontaneous speech pauses and verbal fluency measurements. Further investigation into the complex interactions between CT, EI, and AE and the accuracy and fluency of speaking among EFL learners is warranted based on the current topic. Although this study successfully shows a strong association between speaking fluency and CT, more research is required to determine the underlying mechanisms causing this association. Furthermore, considering the possible interactions between speaking ability, AE, and EI can offer a thorough grasp of language acquisition procedures. Furthermore, analyzing contextual elements like learning environments and cultural background can provide insightful information about how these categories interact and influence language proficiency outcomes. Therefore, extending this conversation will not only improve the current study's conclusions but also provide significant new information to the larger domains of applied linguistics and language education.

The study's **second hypothesis** states that there is a strong association between speaking fluency and EI in EFL learners. This section addresses the results in light of existing research and explores their implications. EI, an important component of interpersonal communication, entails being able to identify, comprehend, and control one's feelings while also managing those of others. Speaking fluency, on the other side, refers to the capability to convey ideas effortlessly and smoothly in a second or FL. Previous research in language learning has investigated the association between EI and speaking fluency. The findings of this investigation supply support to the hypothesis, indicating a strong association between speaking fluency and EI in EFL learners. Fluency in speaking was more highly associated with higher EI scores. These findings are consistent with studies conducted by Refs. [47–49] which also found a positive association between EI and fluency speaking. Nevertheless, it is important to note that there are contrasting views in the

Table 6
Investigating the impact of CT, EI, and AE on the accuracy of speaking.

	Path coefficients in standard estimation mode	t-value	P-value	Condition
CT → Accuracy of Speaking	0.406	6.142	0.001 ^a	Accept
EI → Accuracy of Speaking	0.289	3.347	0.001 ^a	Accept
AE → Accuracy of Speaking	0.217	3.093	0.002 [*]	Accept

^a Significant at the 0.01 level (*p* < 0.01).

literature [50], argued for a negative correlation between speaking fluency and EI. Additionally [51], found no significant relationship between learners' speaking fluency and EI.

Although there is a strong association between speaking fluency and emotional intelligence (EI) according to this study, a more thorough investigation is required to determine the underlying mechanisms. Divergent opinions in the literature also emphasize how important it is to do in-depth research. Furthermore, taking into account elements like cultural variances or unique learner traits may improve our comprehension. Therefore, extending this conversation would improve not only the results of the current study but also offer insightful information on applied linguistics and language teaching. In conclusion, this study supports the idea that there is a significant association between speaking fluency and EI in EFL learners. The findings highlight the importance of fostering EI skills in language teaching to enhance fluency. By promoting self-awareness, empathy, and effective communication, teachers can help learners communicate more fluently. Additionally, activities that focus on listening comprehension, perspective-taking, and emotional understanding can further support the development of EI and its impact on fluency.

According to the study's **third hypothesis**, there is a strong association between speaking fluency and affective engagement (AE) among EFL learners. This section discusses the results that have been achieved concerning existing research and explores their implications. AE is recognized as a significant factor influencing language learning outcomes, encompassing learners' inherent motivation, interest, and participation in the educational process. Speaking fluency, on the flip side, refers to the capacity to express ideas smoothly and effortlessly in a second or FL. Previous research in language learning has examined the association between AE and speaking fluency. The findings of this investigation supply support to the hypothesis, indicating a significant correlation between speaking fluency and AE among EFL learners. Speaking more fluently was associated with greater degrees of AE. These findings align with studies conducted by Refs. [14,52,53] which also found a positive correlation between AE and speaking fluency.

However, it is worth noting that there are divergent findings in the literature [54], concluded that there was a negative association between learners' enthusiasm for academic achievement and their level of assessment anxiety. Additionally [55], discovered no association between the academic performance of EFL learners and their self-regulatory enthusiasm level to improve their speaking skills in English as an FL. To foster AE, teachers can incorporate activities that tap into learners' interests, encourage self-reflection, and provide opportunities for collaboration and interaction. Offering meaningful and purposeful language tasks, such as real-life communication scenarios or project-based learning, can also enhance AE. Moreover, providing constructive feedback and recognizing learners' efforts can further encourage their engagement in the learning process.

Although AE and speaking fluency are found to be significantly associated in this study, a more thorough examination is necessary to identify the underlying mechanisms. Divergent conclusions in the literature highlight the importance of a thorough investigation. Furthermore, taking into account contextual elements like cultural influences or unique learner traits may offer insightful information. Consequently, expanding this conversation would improve the study's results and further applied linguistics and language teaching.

Regarding the **fourth hypothesis**: The results of the research reinforce the hypothesis that there is a strong association between speaking accuracy and CT among EFL learners. The results indicate that learners who demonstrated higher levels of CT also tended to speak more accurately. This finding is consistent with previous studies conducted by Refs. [42,56]. However, it is worth noting that there are divergent findings in the literature. Some studies, such as [57,58] reported a negative correlation between CT and speaking accuracy, suggesting that learners' anxiety may negatively impact their speaking accuracy. Consistent with other research, the study's findings show a beneficial association between increased CT levels and enhanced speaking accuracy. Nevertheless, contradictory research results in the literature point to a negative association that can be impacted by learner fear. This emphasizes how crucial it is to incorporate CT-promoting activities into language instruction to improve speaking accuracy in addition to creating a safe space that encourages learners to take risks with language and build their confidence.

Regarding the **fifth hypothesis**: The results of the research support the hypothesis that there is a significant correlation between speaking accuracy and EI among EFL learners. According to the findings, learners with greater levels of EI tend to talk more accurately. This finding is consistent with earlier research carried out by Refs. [13,59,60]. However, it is important to note that there are contrasting findings in the literature [61], reported an adverse association between EI and language ability, suggesting that higher levels of EI may negatively impact language accuracy. Additionally, Karomatul's study found no significant association between learners' speaking accuracy and EI. Although previous research supports this correlation, inconsistent findings in certain studies point to a negative relationship between EI and language proficiency. Furthermore, several research show no association at all between speaking accuracy and emotional intelligence (EI). These contradictory results highlight the need for additional research. Speaking accuracy can be improved in language instruction by including EI-focused activities in the curriculum. These activities can help learners become more self-aware, empathetic, and proficient communicators. Activities such as role-plays, emotional reflection, and active listening are recommended to foster EI and positively impact language proficiency.

Regarding the **sixth hypothesis**: The findings of the research confirm the hypothesis that there is a strong association between speaking accuracy and AE among EFL learners. The findings demonstrate that learners who exhibited higher levels of AE showed better-spoken language accuracy. These findings are consistent with similar studies conducted by Refs. [15,62]. However, it is important to note that there are differing perspectives in the existing research [63], argued that strong Foreign Language Enjoyment (FLE) can act as a barrier to declining enthusiasm and can subsequently become an intrinsic motivator for language learning. Additionally, found that feelings of excitement, boredom, anxiety, and despair were not significantly associated with face-to-face enthusiasm for participation and achievement. Different viewpoints, however, indicate that emotions have different effects on the motivation to learn a language. To improve speaking accuracy, it is critical in language instruction to foster AE through techniques such as establishing encouraging surroundings and stimulating activities.

These results have important implications for language instruction. Teachers should think about including exercises in the EFL curriculum that support CT, EI, and AE abilities. Giving learners the chance to practice these abilities through interesting and

worthwhile assignments might help them communicate more accurately and fluently. It is crucial to provide a welcoming and encouraging learning atmosphere where learners are inspired and passionate about learning languages. Language teachers can effectively assist learners on their path to becoming fluent English speakers by considering these elements.

In conclusion, while the study supports the strong association between speaking accuracy and AE, it is essential to consider the varying perspectives and findings in the existing literature. Language teachers should take a comprehensive approach, considering individual learner differences and exploring different aspects of AE to optimize language learning outcomes.

6. Conclusion

This study concludes by highlighting the important associations between speaking accuracy and fluency among EFL learners and CT, EI, and AE. Important conclusions consist: Since CT and speaking fluency are closely related, developing CT abilities is crucial to improving language fluency. Speaking fluency is significantly influenced by emotional intelligence (EI), which suggests that developing learners' EI skills is essential to enhancing spoken language competency. The strong correlation between AE and speaking accuracy emphasizes how crucial it is to foster learners' interest and engagement in language learning to facilitate accurate language production. Moreover, there are strong relationships between speaking accuracy and both CT and EI, which emphasizes the need to encourage both abilities in language instruction to improve speaking accuracy. Overall, these results highlight how crucial it is to incorporate CT, EI, and AE skill-focused activities into EFL curricula to enhance speaking accuracy and fluency. Language instructors can effectively assist learners in gaining spoken English competency by attending to these criteria.

7. Limitations

In considering the limitations of this study, it is important to acknowledge the impact of the small sample size and the specific characteristics of the participants on the generalizability of the findings to a larger population of EFL learners. Future studies could address this limitation by employing larger and more diverse samples that encompass a wider range of demographics, including variations in age, linguistic proficiency, and cultural backgrounds. By capturing a broader spectrum of learners, researchers can enhance the external validity of their findings and better understand how different variables may influence speaking accuracy and fluency among EFL learners.

Additionally, the study did not account for external factors such as curriculum, extracurricular activities, and classroom instruction, which could have influenced language acquisition outcomes. To mitigate this limitation, future studies could incorporate measures to control for or analyze the effects of these external variables. Implementing structured observations of classroom instruction, collecting data on participants' engagement in extracurricular language activities, and examining the influence of specific curriculum components on speaking proficiency could provide valuable insights into the complexities of language learning.

Future research could benefit from employing a variety of assessment methods, including realistic communicative tasks, spontaneous interactions, and performance-based assessments, to provide a more comprehensive evaluation of learners' speaking proficiency. By diversifying the assessment approach, researchers can enhance the ecological validity of their findings and gain a more nuanced understanding of the relationships between CT, EI, AE, and speaking accuracy and fluency.

8. Implications

The findings of the study emphasize how crucial it is to include real-world circumstances and personal interests in authentic learning experiences. Incorporating techniques like project-based learning, debates, real-world communication activities, and content-based education allows teachers to foster learners' critical thinking, emotional intelligence, and academic zeal. These methods are essential for developing learners' motivation, curiosity, and intrinsic drive in addition to improving speaking fluency and accuracy. For the implications to be relevant and applicable in educational contexts, they must be in line with the study's contributions and findings.

9. Suggestions

To enhance language learning outcomes, language teachers should incorporate assignments that promote CT in their classes. This can be achieved by encouraging learners to engage in brainstorming sessions, problem-solving activities, and exercises that foster divergent thinking. Creating opportunities for open-ended conversations where learners can freely express their ideas and opinions is also beneficial. Moreover, explicit instruction and practice of EI skills should be integrated into language instruction. Teachers can provide activities such as role-playing, reflection exercises, and discussions that help learners develop self-awareness, self-control, empathy, and effective interaction. These activities enable learners to recognize and manage their emotions in various communicative contexts.

Furthermore, creating a stimulating and enjoyable learning environment that nurtures learners' AE is essential. Teachers can achieve this by incorporating authentic and relevant content, practical assignments, and engaging learning exercises. Allowing learners the freedom to explore topics that personally interest them and providing opportunities to associate their language learning with their academic goals and future aspirations can greatly enhance their motivation and engagement.

By implementing these strategies, language teachers can effectively foster CT, EI, and AE, ultimately leading to improved language proficiency and speaking accuracy among learners.

Availability of data and materials

The data will be available upon request from the corresponding author.

Informed consent

Written informed consent was obtained from all subjects before the study. There is no ethical or conflict of interest in this research. All the participants filled out consent forms.

Ethics approval

Ethics approval: Approval ID: Research Ethics Committees of Islamic Azad University-Zanjan Branch: IR. IAU.Z.REC.1402.077.

CRedit authorship contribution statement

Wenli Wang: Writing – review & editing, Validation, Methodology, Formal analysis. **Yasaman Mohammad Rezaei:** Writing – review & editing, Writing – original draft, Investigation, Data curation, Conceptualization. **Siros Izadpanah:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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