External Factors and Endogenous Elements Fostering Critical Thinking of Tertiary EFL Learners in China: A Grounded Theory Study

Song Xinke [ID]

Faculty of Educational Studies, Universiti Putra Malaysia, Selangor, Malaysia; School of International Education, Henan University of Engineering, Zhengzhou, China

Abu Bakar Razali [ID] **and Tajularipin Sulaiman** [ID]

Faculty of Educational Studies, Universiti Putra Malaysia, Selangor, Malaysia

Abstract. The cultivation of critical thinking (CT) skills is a fundamental aim within the realm of higher education. It assumes particular significance within the domain of Teaching English as a Foreign Language (TEFL). This study directs its focus on the Chinese tertiary TEFL context and endeavours to explicate what the external factors are, as well as endogenous elements and ways to foster students' critical thinking. Methodologically, the study adopted grounded theory (GT) and drew upon qualitative data gathered through interviews with 36 participants, including both students and instructors recruited from prestigious universities, mid-tier colleges, and less developed college across China. The data analysis, utilizing NVivo12 software, encompasses a multilevel coding process, including open, axial, and selective coding, in accordance with the principles of GT. The outcome of this meticulous analysis results in the formulation of a comprehensive model revealing the interplay among external influences, endogenous elements, and ways to foster the development of CT skills among tertiary English as a Foreign Language (EFL) students. The implications of these findings extend pedagogically to multiple stakeholders within the tertiary TEFL context.

Keywords: external factors; endogenous elements; critical thinking; EFL learners; grounded theory

1. Introduction

The concept of critical thinking (CT) has been associated with education since ancient times. CT has emerged as a quintessential skill to acquire in the 21st century, with its importance underscored by its pivotal role in the knowledge explosion era (Marin & Halpern, 2011). Consequently, the cultivation of CT abilities within formal education systems has become a global educational

imperative. In the realm of English as a Second Language (ESL) and English as a Foreign Language (EFL) education, the development of CT skills has gained prominent attention, and needs to be included in language curricular objectives (Tehrani & Razali, 2018). This is because language proficiency encompasses not only linguistic elements but also cognitive components, such as analysis and reasoning, which are actively engaged in the language input and output processes (Zhang et al., 2020). These higher-order cognitive skills serve to facilitate higher-order learning, ultimately contributing to enhanced language fluency (Ghanizadeh et al., 2020).

In the context of ESL and EFL, CT assumes a pivotal role in the development of language proficiencies. Learners are necessitated to employ analytical, synthesizing, and evaluative skills during oral English communication. Furthermore, in the domains of reading and writing, learners must synthesize information (Jwa, 2019), analyze, evaluate, and rationalize various perspectives and data (Ferretti & Graham, 2019), subsequently formulating judgments and conclusions. However, a prevalent challenge among many ESL and EFL learners is their deficiencies in logic, evidence, and persuasion (Putri et al., 2021), often failing to employ CT skills effectively such as analysis, reasoning, and evaluation in their utilization of English as a second or foreign language. Previous research has largely focused on the theoretical aspects of CT or its integration into language learning curricula without fully exploring the practical and contextual factors that affect its development in EFL settings, particularly in the Chinese tertiary context. Moreover, there is limited qualitative insight into the specific external and endogenous factors influencing the development of CT skills among Chinese EFL learners.

This study aims to bridge this gap by adopting a GT approach to elucidate the external factors, endogenous elements, and teaching approaches that influence the development of CT among tertiary EFL learners in China. By doing so, the research intends to provide a comprehensive model that can inform pedagogical practices and contribute to the enhancement of critical thinking skills, ultimately improving language proficiency and academic success for EFL learners.

2. Literature Review
2.1 Critical Thinking and Its Role in TEFL
Critical thinking is a multifaceted concept with diverse definitions in literature. Generally, it is described as a combination of skills and dispositions (Ennis, 1991). John Dewey defined it as reflective thinking, characterized by active, persistent, and careful consideration of beliefs or hypothetical knowledge, taking into account supporting evidence and potential conclusions (Fisher, 2001). Glaser offered another perspective, defining it as an attitude that involves thoughtful problem analysis, logical knowledge, and the skill to apply this knowledge (Glaser, 1941), aligning with Dewey's principles but expressing them differently. Ennis introduced a concise and widely accepted definition, framing CT as reasonable reflective thinking primarily focused on decision-making regarding beliefs or actions (Ennis, 1989). He later expanded on this by outlining twelve dispositions and sixteen abilities that characterize an ideal critical thinker

(Ennis, 1989). In 1993, Paul et al. defined CT as a mode of thinking in which individuals enhance thinking quality by skillfully managing inherent thinking structures and applying intellectual standards (Paul et al., 1993) and later as the art of analyzing and evaluating thinking to improve it (Paul & Elder, 2019). From a cognitive psychology perspective, CT involves using cognitive skills or strategies to increase the likelihood of achieving desirable outcomes (Halpern, 1998). These varied definitions reflect different philosophical, psychological, and educational approaches to understanding critical thinking.

Within the context of TEFL in Chinese tertiary education, this research specifically focuses on Paul and Elder's definition of CT, which emphasizes analyzing and evaluating in thinking. This definition is especially pertinent to the challenges faced by Chinese EFL learners. CT is a particularly weak area for the EFL learners in China (Zhang & Wen, 2022). Scholars have been exploring the role of CT in Chinese EFL teaching because the cultivation of CT skills is intrinsically intertwined with and conducive to language proficiency. Language instruction often places an emphasis on nurturing CT abilities (Cook, 2016). This is underpinned by the recognition that higher-order thinking skills are beneficial to cultivating higher-order learning skills, ultimately facilitating high levels of language fluency (Ghanizadeh et al., 2020). In the domain of English Language Teaching (ELT), scholars advocate for the incorporation of cultivating CT skills within English classrooms to enhance students' English proficiency (Liaw, 2007; Masduqi, 2011). Moreover, it offers multifaceted advantages, including the refinement of ESL learners' reasoning abilities, the cultivation of their readiness to articulate their thoughts effectively, and the promotion of a receptive attitude toward diverse ideas and perspectives (Din, 2020).

2.2 External Factors Influencing the Development of Critical Thinking

External factors contributing to the cultivation of CT include familial, educational and social factors that shape the development of learners' critical thinking abilities. Family factors impact students' development of CT. Different parenting styles yielding distinct effects on children's cognitive growth. Studies by Huang et al. (2015) and Yongmei (2021) demonstrated that parental styles characterized by emotional warmth and understanding positively predicted a CT disposition in Chinese medical students. Similarly, Wang et al.'s (2020) study in Japan identified a strong link between excellent bonding parental raising and heightened CT dispositions. To enhance students' CT abilities in EFL teaching, fostering a collaborative partnership between parents and schools, involving parents in providing feedback on their children's critical thinking development, is advocated (Al-Kindi & Al-Mekhlafi, 2017).

Educational factors play a pivotal role in fostering personal cognitive growth. Mahapoonyanont's meta-analysis (2012) highlighted teaching methods as the most influential educational factor in CT development. In the Chinese context, factors such as inadequate teaching resources, insufficient teacher preparation for teaching CT, crowded teaching schedules, and large class sizes influence students' CT development (Mahapoonyanont, 2012). Various teaching methods and models, such as the "TERRIFIC" model proposed by Sun (2019) and the

Production-Oriented Approach (POA) proposed by Wen (2015) were applied in EFL writing by Li (2021) to enhance students' CT abilities. Among these approaches, teaching general CT skills in the EFL classroom empirically emerges as a promising strategy (El Soufi & See, 2019).

Sociocultural factors also exert significant influence on students' CT development in EFL contexts. Teaching and learning CT in EFL and ESL settings are intricate processes with cultural complexities (Atkinson, 1997). Institutional and cultural traditions shape EFL CT teaching (Bağ & Gürsoy, 2021; Yuan et al., 2022). In addition, shared sociocultural patterns within learner groups impact their perceptions and utilization of social factors in their CT development (Du & Zhang, 2022). Indah and Kusuma's empirical research (2016) involving Asian students in the UK has revealed that cultural factors influence learners' performance in CT tasks, particularly in arguments and debates.

2.3 Endogenous Elements Influencing Development of Critical Thinking
Endogenous thoughts are those that we generate internally in a top-down manner or without any specific external stimulation (Tillas, 2017). Endogenous elements of CT are developed from within an individual's thinking faculty in order to influence or facilitate one's CT. Moreover, CT is characterized as a self-directed, self-disciplined, self-monitored, and self-corrective form of cognition (Facione, 2011; Paul & Elder, 2020). Therefore, there are several endogenous elements that may function within CT. These elements reside within the individual's cognitive framework and exert substantial influence over CT. They provide learners with an inherent thinking foundation and the possibility of developing their CT abilities.

Reflective thinking, proposed by Dewey in 1910, is considered one of the endogenous elements of critical thinking. Dewey characterized reflection as an active, comprehensive, and detailed inquiry encompassing concepts, hypotheses, reasoning, and actions (Dewey, 1910). This theory underscores the significance of reflection in teaching (Day, 2000; Lee & Loughran, 2000), and it is regarded as the beginning of CT research. Reflective thinking has been identified as a fundamental component of CT by influential scholars (Ennis, 1991; Facione, 1989; Glaser, 1941). Within the context of ESL or EFL education, the utilization of reflective journals emerges as a valuable tool for nurturing CT skills in students. Empirical findings support the use of reflective journals in EFL classrooms to enhance students' CT abilities (Nguyễn et al. , 2020).

Self-regulation constitutes a crucial internal facet of CT, characterized as purposeful, self-regulatory judgment encompassing interpretation, analysis, evaluation, and inference (Facione, 1989). It represents a self-disciplined, self-supervised, self-directed, and self-correcting cognitive modality (Siegel, 2013). In the realm of ESL or EFL education, self-regulation plays a pivotal role in advancing CT skills by enabling students to engage in purposeful, self-directed, and reflective language learning practices. Empirical evidence reveals the strong correlation between self-regulation and the CT abilities of EFL learners (Ghanizadeh & Mizaee, 2012).

Self-efficacy, functioning as a motivational mechanism, assumes a pivotal role in the cultivation of CT. Numerous studies have explored the connection between self-efficacy, learning performance, and CT. The self-efficacious gratitude improves learning performance (Bandura & Locke, 2003). Moreover, the motivation instilled through self-efficacy can contribute to the improvement of CT skills. Self-efficacy was proved to be a robust predictor of CT abilities (Sang, 2010; Wang & Wu, 2008). Within the context of TEFL, research conducted by Rashtchi (2021) has revealed a significant correlation between self-efficacy and CT among both experienced and novice EFL teachers.

2.4 Instructional Approaches of Critical Thinking
Although it is widely acknowledged that CT is a significant skill in education, there is not unanimous consensus regarding the most effective approach for its instruction (El Soufi & See, 2019; Halpern, 1998). Four distinct approaches to teaching CT have been proposed: the general approach, infusion approach, immersion approach, and mixed approach (Ennis, 1986). The general approach seeks to teach CT explicitly and independently of subject matter, presenting them as separate instructional units. Conversely, the infusion approach entails the integration of CT instruction within subject matter instruction, with a focus on making general CT principles explicit. The immersion approach involves immersive subject-matter instruction, but without explicit instruction of general CT principles. Finally, the mixed approach combines the general approach with either the infusion or immersion approaches. In EFL and ESL context, El Soufi and See's (2019) systematic review of experimental studies from 1990 to 2018 revealed that explicit instruction in general critical thinking abilities was the most empirically effective approach in English language teaching.

While prior conceptual and quantitative research has examined the external factors of CT and the links between reflection, self-monitoring, self-efficacy, CT, and language proficiency (Colley et al., 2012; Ghanizadeh, 2017b; Moslemi & Habibi, 2019), a significant gap exists in the qualitative exploration of these relationships in the context of EFL education. This gap is particularly evident in the limited qualitative insights into the perspectives of both EFL learners and teachers regarding the roles of these factors and elements. Moreover, incorporating the voices of EFL teachers in qualitative explorations can provide valuable insights into their pedagogical viewpoints and strategies for fostering CT in students. Therefore, this research aims to explore how the external factors, endogenous elements and teaching approaches play roles in the development of EFL students' CT from the perspective of Chinese college EFL teachers' and students' perceptions.

Research Questions:
To achieve this purpose, the following research questions are put forward:
Q1. What are the external factors influencing the fostering of Chinese college EFL learners' skills?
Q2. What are the endogenous elements affecting the fostering of Chinese college EFL learners' CT skills?
Q3. What are the suitable instructional approaches to CT for Chinese TEFL context?

Q4. How should EFL learners' CT be fostered in the Chinese TEFL context?

3. Research Methodology

3.1 Research Design

As the purpose of the study was to explore how the external factors, endogenous elements and teaching approaches play roles in the development of EFL students' CT, a grounded theory (GT) methodology was adopted. Because there is no corresponding theory concerning the mentioned question so far, GT, which develops or uncovers a theory or framework of a phenomenon, based on the experiences and perceptions of the participants in a specific situation (Creswell, 2002) suits the situation of this study. Among the three approaches of GT methodology (the classic GT, the evolved GT, and the constructivist GT), the evolved approach which has detailed, rigorous procedures and emphasis on using existing literature and theory to guide data analysis (Corbin & Strauss, 2014) was adopted in this study. There are three coding steps in this approach: open coding, axial coding, and selective coding (Walker & Myrick, 2006). To achieve triangulation, both college teachers and students were recruited as respondents through exploring their perceptions of similar questions.

3.2 Sampling

The study used purposeful sampling to select students and teachers as participants. The criterion used in choosing participants and sites was whether they are "information rich" (Patton, 1990). Male and female EFL students, majoring in liberal arts or science, had been in college for more than one year and had the experience of exposure to CT in study were the population for sampling. As the data analysis proceeded, additional students were admitted into the sample group until saturation reached. Ultimately, 30 students were sampled. Among these 15 were liberal arts students and 15 science students, with 12 males and 18 females, and most of them were aged between 20 to 22. Six EFL teachers were also chosen as samples. They had all been teaching English as a foreign language for more than 10 years. They had been trying to cultivate the critical thinking of their students consciously in their EFL courses, such as English reading and writing, English writing, English translation or Comprehensive English. To maximize the variations of the participants so as to obtain a deeper and broader understanding of the phenomenon, the researcher selected samples from key, middle, and less-developed universities in the city where he lives and works.

3.3 Data Collection

Data were collected through interviews with college EFL students and teachers. As the analysis of data proceeded, new samples were recruited and interviewed until the point when no more new themes and categories emerged which indicated the saturation point had been reached. Eventually, the number of student interviewees reached 30 while teachers numbered six. As the research adopted purposeful sampling, 30 student participants came from three kinds of university: eight from University A (a public 211 Key University in China), 15 from University B (a middle-level public provincial university) and seven from University C (a newly established and less developed college). As for teacher participants, two were from University A, two from University B, and two from

University C.

An interview protocol was prepared prior to the interview. It includes nine open-ended questions in total, with each question being divided into questions for students and questions for teachers (see Appendix). The participants were first targeted by means of snowball sampling through the interviewers' acquaintances in the three types of universities. They were then identified as to whether they had had exposure to or experience of courses which involved CT skills and whether they were willing to be interviewed. Face-to-face semi-structured interviews were conducted and audio-taped at the respondent's university. Ultimately, it took almost one year to gather and analyze data in an iterative process.

3.4 Ethical Measures
During the sampling period, potential participants were first informed in detail about the research purpose, methods, and interviews. They were assured of anonymity and required parental and tutor consent. Participants could freely ask questions before deciding to join, and those who agreed signed informed consent forms. Withdrawal was allowed before the interview day. On the interview day, the interviewer ensured convenience for participants regarding time and place. Clean, comfortable settings were arranged, and participants were reminded of their rights (e.g., expressing themselves freely, asking questions). Linguistic barriers were addressed, allowing questions without being corrected. Furthermore, interview data remained confidential and accessible only to researchers via password-protected computers and encrypted folders. Transcription occurred in a private room using earphones to prevent information leaks.

3.5 Data Analysis
Each interview was audio-taped by the researcher's recording pen. After the first interview, the recording was transcribed, saved in Microsoft Word format and imported into NVivo 12.0 for thematic analysis. After the second interview had been transcribed and saved in Microsoft Word format, it was added to NVivo12.0 to determine whether new themes were emerging so that new respondents were theoretically sampled. Themes derived from the early analysis directed the gathering of further data to explain the emerging theoretical categories and fill conceptual gaps with theoretical sampling (Corbin, 2016). The analysis was conducted in three stages: open coding, axial coding, and selective coding, each contributing to the development of the final theoretical model.

3.5.1 Open Coding
Open coding was the initial stage where the data were broken down into discrete parts, closely examined, and compared for similarities and differences. This process involved coding the text line-by-line to identify significant concepts. Each interview transcript was reviewed, and relevant segments of the data were labelled with codes that represented key ideas or themes. In this study, 97 initial codes were developed during the open coding phase. These codes captured a wide range of factors affecting CT in EFL learners, including

external influences, personal attributes, and instructional strategies.

3.5.2 Axial Coding

The second stage, axial coding, involved reassembling the data in new ways by exploring the relationships among the open codes. This stage aimed to identify which codes were central and how they related to other codes. Axial coding helped to organize the codes into coherent categories by connecting subcategories to a main category through relationships such as context, conditions, interactions, and consequences. During this phase, the initial 97 codes were grouped into 14 subcategories. These subcategories were refined through constant comparison and iterative analysis to ensure they accurately represented the data.

3.5.3 Selective Coding

The final stage was selective coding, where the researcher identified the core category that represented the central phenomenon of the study. This core category integrated all the other categories and subcategories, providing a comprehensive understanding of the data. In this study, three main categories emerged through selective coding: external factors affecting CT, endogenous elements related to CT, and teaching strategies to foster CT. These main categories formed the basis of the theoretical model proposed in the research.

To enhance the rigour of the coding process, an expert in qualitative research was invited to review the coding system. This step ensured the reliability and validity of the coding decisions and minimized potential biases. The expert, who holds a Ph.D. in Education Science, provided valuable feedback that was incorporated into the final coding framework. The iterative process of coding, categorizing, and refining the data continued until no new themes emerged, indicating that theoretical saturation had been achieved. This comprehensive approach ensured that the final model was grounded in the data and accurately reflected the participants' experiences and perceptions.

4. Results and Discussions

The codes which were exacted in the opening coding (97 codes) and the axial coding (14 codes) were classified into three main categories: external factors affecting CT, endogenous elements related to CT, and teaching strategies to foster CT.

4.1 Category 1: External Factors Affecting EFL Learners' Critical Thinking

In this research, it was found that family factors, teaching strategy, learning evaluation system, and field of discipline are the external factors affecting the CT of EFL learners.

4.1.1 Family Factors

From the investigation of perceptions of students and teachers, family financial situation, parents' education level, and family education style are the three main factors influencing the development of CT in children. While financial situation may indirectly impact CT by providing a conducive learning environment, the direct influence is exerted through parental education level and the family's

education style. Parents with higher education and a broader perspective tend to raise and educate their children with greater emphasis on CT skills, intentionally or unintentionally shaping their child's CT abilities.

For instance, Wang (a pseudonym, hereinafter referred to as such.) said that "*the improvement of financial condition will enable children to live and study on better environment or platform and have broader vision, these will facilitate their development of critical thinking.*" Cao (a teacher) also mentioned that "*Financial level may affect CT indirectly by offer the good family learning environment and good support to students' school learning.*" Another teacher, Li, said "*If a student's parents have a higher education and a broad perspective, they will affect the student in their lives, and the student's critical thinking level will be high.*" Therefore, the influence of a family's financial situation on CT is probably indirect. Parents' education level, and family education style together have an effect on children's CT as indicated by Cao, "*Say, if the parents are both Ph.D. in science, they will educate and rear their child more critically and intentionally or unintentionally with their knowledge and way of thinking. These will affect their child's CT greatly.*"

This finding reveals that family factors, such as financial situation, parental education level, and family education style, have a significant influence on the development of CT of EFL learners. It is consistent with previous research that has highlighted the role of family background and parental involvement in fostering learners' CT skills (Pikhart & Botezat, 2021; Wirth et al., 2020). Similarly, Mohammadi et al. (2022) pointed out that parental education level and family education style have a direct impact on EFL learners' CT ability, while a family's economic situation has an indirect impact on learners' learning environment, which in turn affects CT.

The value of this finding lies in the fact that it not only explores the impact of family factors on CT from the perspectives of students and teachers, but also provides some specific suggestions, such as encouraging parents to participate actively in their children's language learning process, and emphasizing the importance of CT in language acquisition. These suggestions help to improve the quality and effectiveness of language teaching, as well as cultivating children's self-learning ability and creativity.

4.1.2 Teaching Strategy
This study found that the teaching strategies employed by teachers have an impact on the development of students' CT skills. Teachers' understanding of CT and the teaching strategy for fostering it serves as a foundational element, enabling teachers to integrate critical thinking principles consciously into their teaching aims, teaching content, and overall instructional strategy. By implementing teaching strategies that encourage activities such as group cooperation, material collection, synthesis, analysis, comparison, evaluation, and problem-solving, teachers can enhance students' CT abilities. This finding suggests that teaching strategies, when aligned with a solid grasp of CT principles, can play a pivotal role in fostering CT skills among EFL students. For instance, Jin (a teacher), said "*Emm, of course, their teachers teaching method and strategy also affect their critical thinking.*"

This finding is consistent with previous research that has highlighted the importance of instructional strategy for developing CT in various contexts (Wang & Seepho, 2017; Zhao et al., 2016). These studies have suggested that teaching strategies such as explicit instruction, teacher questioning, and cooperative learning can foster CT skills by engaging learners in activities that require analysis, evaluation, synthesis, and problem-solving. However, the current study also reveals some specific challenges and opportunities for implementing such strategies in the Chinese EFL context, such as the need to overcome the examination-oriented culture, and the lack of teacher training and resources.

This finding contributes to how CT can be taught in EFL classrooms, especially in a context where CT is not traditionally emphasized or practised. It also offers implications for teacher education and curriculum design as it suggests the need to raise teachers' levels of awareness and competence in teaching CT, and to provide learners with more opportunities and support to practise CT in authentic and meaningful tasks.

4.1.3 Learning Evaluation System

This study found that the learning evaluation system plays a crucial role in influencing the development of CT skills among students. The design and content of the learning evaluation system in educational institutions impact the development of CT skills among students. When assessments primarily focus on memorization and recall of facts, with limited emphasis on applied and reasoning questions, it can hinder the cultivation of CT abilities. On the other hand, a well-structured evaluation system that includes applied and reasoning questions is essential for nurturing CT skills in students. For instance, when asked what the interviewee usually did in his free time, a science student, Zhang, answered that "*I registered for training class to learn English and other knowledge to prepare for CET-4 and exams for certificates. You know the exams and certificates always matter. They will pave our way in future.*" Li (a teacher) said, "*There is also an issue in our college learning evaluation system. There are too many memorized contents in tests and few applied and reasoning questions to answer.*"

This study's finding that the learning evaluation system influences the development of CT skills among EFL learners is consistent with previous research. For example, Hirai et al. (2022) developed and validated an English test that measures the consistency, analysis, and inference skills of EFL learners' CT. They argued that such a test can improve learners' CT abilities. On the other hand, the current study also reveals some limitations of the existing learning evaluation system in the Chinese EFL context, such as the overemphasis on memorization and recall of facts, which may hinder the cultivation of CT abilities. This issue has been widely discussed and criticized by many researchers, who have pointed out the negative effects of the examination-oriented and rote-learning culture on the development of EFL learners' CT skills (Gong, 2020; Wu, 2023; Zhang et al., 2020).

This finding implies that the traditional assessment methods that focus on memorization and recall of facts are not sufficient for fostering CT skills in EFL learners. Instead, EFL educators should adopt more innovative and interactive

assessment approaches that require EFL learners to apply, analyze, and evaluate the information they learn. By doing so, EFL educators can help EFL learners develop CT skills that are essential for their academic and professional success in the global society.

4.1.4 Field of Discipline

Subject field refers to the main division of discipline: liberal arts and science. Half of the 30 student samples in this study comprise liberal arts undergraduates while the remaining half are science undergraduates. Their understandings of CT from their learning experience reveal that the field or discipline of study influences the development of CT skills. Students in science-related disciplines tend to exhibit stronger CT skills, characterized by logical reasoning, rationality, and objectivity. In contrast, students in liberal arts disciplines often face a greater emphasis on memorization and may have different learning priorities.

For example, Sun (a female student in liberal arts) said, "*Science students have stronger critical thinking skills. Many subjects need to be memorized in the learning process of liberal arts, while science students need more calculation and reasoning.*" Meng (a male student in liberal arts) said, "*Science. Because I think that science students have better logical thinking ability, and the way of analyzing problems is more objective.*" Their comments on science students are unsurprising because the science field is strongly associated with CT through problem-solving, analyzing, logic reasoning. These CT practices are usually described as their learning goal for a science degree (Jones, 2015).

This finding that EFL learners' field of discipline influences CT skills is consistent with research on CT and disciplines. For example, Wang and Seepho (2017) revealed that science and technology EFL learners improved their CT skills after receiving explicit instruction on critical thinking strategies than the arts and humanities EFL learners. Similarly, a study by Hirai et al. (2022) found that science and engineering EFL learners performed better in their test than humanities and social sciences EFL learners. Thus, the current study also adds to the existing literature by examining the perceptions and experiences of EFL learners from different fields of discipline regarding CT in the Chinese EFL context.

The value of this study's finding is that it highlights the need for EFL educators to consider the discipline-specific characteristics and needs of their students when designing and implementing critical thinking instruction. EFL educators should be aware of the discipline-specific needs and expectations of their students. Understanding the differences in CT requirements can inform their teaching approaches. Additionally, EFL teachers should recognize that students in different fields may have varying priorities in their learning. While liberal arts students may need to memorize more, educators can still incorporate CT exercises into language learning to build well-rounded skills.

4.2 Category 2: Endogenous Elements Related to EFL Learners' Critical Thinking

In this research, it was found that learning style, reflective thinking, self-monitoring, self-efficacy, and metacognitive ability emerged as the endogenous elements related to CT.

4.2.1 Learning Styles

Learning styles refer to the way a person assimilates and processes the information received, or the way the person learns something (Costa et al., 2020). The learning styles adopted by ESL and EFL students play a significant role in shaping their level of critical thinking. Different learning styles, such as visual, auditory, verbal, and logical learning styles, can influence the development of CT skills. Many Chinese EFL learners tend to be visual-auditory-verbal learners, which can impact their CT abilities, especially in the context of spoken or written language output. Rote memorization without a focus on comprehension and inference may hinder the development of high-level CT skills. Therefore, Li (a teacher) stated that "*If students only learn by rote memorization, without paying attention to understanding and inferences, the level of critical thinking will not be high.*"

This finding, namely that learning styles play an important role in shaping the CT level of EFL learners, is consistent with previous studies. For example, Mahmood and Othman (2020) found that there was a moderate positive correlation between learning styles and CT among high school students in Malaysia. On the other hand, Rini et al. (2020) found that students' CT ability on the ecosystem topic could be improved through project-based learning, motivation, and visual-auditory-kinesthetic learning styles, where visual-auditory-kinesthetic learning styles had a significant positive impact on the enhancement of CT ability. However, this study also revealed some specific characteristics and challenges of Chinese EFL learners, who tend to be visual-auditory-verbal learners, and how their learning styles affect their CT ability, especially in oral or written language output situations.

The value of this finding lies in its contribution to the understanding of how learning styles can influence the development of CT skills among EFL learners, especially in the Chinese EFL context. By examining the perceptions and experiences of EFL learners and teachers regarding learning styles and CT, the study provides insights into the factors that facilitate or hinder the cultivation of CT abilities, as well as the strategies that can be adopted to enhance CT instruction and learning. ESL and EFL teachers should recognize that students may have varying learning styles and preferences. Understanding these styles can help teachers adapt their teaching methods to better suit student needs.

4.2.2 Reflective Thinking

Reflective thinking is an intrinsic and fundamental element of CT. It involves regular self-assessment and self-critique of one's actions, decisions, and thought processes. Through reflection, learners ask critical questions about their performance, such as the clarity of their ideas, the logical coherence of their arguments, the quality of evidence presented, and the relevance of conclusions to supporting evidence. This reflective practice enhances CT skills, allowing

learners to make continuous progress in learning. The students interviewed asserted that reflection after writing English help improve their level of English writing, while continuous reflections promote their critical thinking and learning efficiency. One student majoring in liberal arts stated that "*I reflect regularly in my study. For example, after I finish a writing assignment, I will reflect on the aspects such as: Did I fully understand the meaning of the directions? Did I express my ideas clearly logically*?" Another science student said: "*I think there is a direct connection between reflection and critical thinking in learning. Continuous reflection will improve our critical thinking level and allow us to make continuous progress in learning*."

The finding that reflective thinking significantly contributes to CT aligns with existing research. Scholars have consistently emphasized the importance of metacognition, self-awareness, and self-assessment in fostering CT skills (Ghanizadeh, 2017; Heydarnejad et al., 2018; Zhao et al., 2016). Convergently, there are studies regarding the role of reflection in CT and the relevance of reflective practices across various educational domains. For instance, research by Ghanizadeh (2017) showed that reflection predicted CT positively and significantly. However, divergence arises concerning the relationship between reflective thinking and CT. For example, a study by Heydarnejad et al. (2018) indicated that all of the CT components have a significant predictive power on reflective thinking.

These findings extend implications for both educators and learners. For educators, they can enhance their teaching practices by incorporating reflective activities, such as journaling and discussions, to foster their metacognitive awareness. For learners, reflective thinking facilitates active engagement in their learning journey, empowering them to assess their growth and adapt their learning strategies continuously. This not only enhances language proficiency but also cultivates lifelong learning skills, making reflective thinkers adaptable and resilient in various contexts.

4.2.3 Self-Monitoring
Self-monitoring is a subscale of self-regulation which refers to the utilization of self-assessment techniques (Ghanizadeh, 2017). In this study, researchers found that self-monitoring is a crucial endogenous element that is closely linked to the development of CT. Self-monitoring is the process of self-correction in behaviour or thinking; during this process, learners engage in critical thinking to assess situations and make informed decisions. Self-monitoring aims to establish a presence and an active consciousness within the learner. For instance, a teacher named Li, said "*There should be a positive correlation between self-monitoring and critical thinking. Because self-monitoring is a process of self-correction on one's behavior or thinking, in this process one needs to think critically to assess situations and make decisions*." Another teacher, Cao, elaborated that self-monitoring is a thinking habit fostering CT, "*Primarily, it is to hope that self-monitoring can form a presence, an existence. If there is no such existence, you have to monitor such a state, and then make it exist, but in the subsequent critical thinking process*."

This finding echoes with existing research in the field of TEFL. Scholars have

emphasized the importance of self-monitoring, and self-assessment in fostering CT skills (Deng et al., 2022; Ghanizadeh, 2017a). For example, Ghanizadeh's study (2017) showed that self-monitoring exerts a positive and significant influence on CT, indirectly exerting a positive impact on academic achievement via understanding and reflection. Deng et al.'s study (2022) showed that self-monitoring enables individuals to recognize the strengths and weaknesses in their educational endeavours, thereby boosting their self-efficacy and learning engagement. The significance of this finding extends to both teachers and learners. ESL and EFL teachers should actively promote self-monitoring skills among their students. For learners, self-monitoring empowers them to engage actively in their learning journey by identifying errors, seeking feedback, and making necessary adjustments.

4.2.4 Self-Efficacy

This research reveals that there is not necessarily a positive correlation between high levels of self-efficacy and CT; only when learners with high levels of self-efficacy have a rich knowledge reserve, an open mind, an attitude of exploring new knowledge, and know some methods of learning and exploring truth, will they have higher level CT skills; otherwise, it may lead to narrow-mindedness and being biased. The interviewees' views varied on the relation between self-efficacy and CT. Gao (a teacher) said "*A student with strong reflective ability, high sense of self-efficacy, and good self-monitoring is likely to have a high level of critical thinking.*" However, another teacher, Li, deemed it an unnecessarily direct relationship between them two: "*That is to say, high self-efficacy does not necessarily mean high critical thinking ability. Some people are self-righteous or rigid, but this situation can easily lead to narrow thinking and biased opinions.*"

While self-efficacy is often deemed crucial for learners' success, this study's finding underscores the nuanced relationship between self-efficacy and CT. This finding is convergent with recent literature emphasizing self-efficacy's impact on learning outcomes, with high levels of self-efficacy linked to confidence and persistence (Unal & Tasar, 2021). However, the current study advocates for a holistic approach to CT, recognizing that self-efficacy alone may not suffice, and other factors such as knowledge acquisition and an open-minded attitude are essential.

This finding is significant for both teachers and learners. ESL and EFL teachers should adopt a holistic approach to developing critical thinking skills. Simply boosting self-efficacy without addressing other CT prerequisites may not yield the desired results. It is important to consider factors such as knowledge acquisition, an open-minded attitude, and effective learning strategies in conjunction with self-efficacy. Learners will benefit by understanding that self-efficacy is not a standalone predictor of CT, empowering them to address biases, seek challenges, or develop a growth mindset.

4.2.5 Metacognitive Ability

Metacognitive ability is also an endogenous element found in this study that affects learners' CT. Metacognition plays a vital role as an endogenous element

in shaping the CT ability of college students. It involves the awareness and understanding of their own thinking processes, which is essential for effective CT. By cultivating metacognitive skills, students can better analyze, evaluate, and improve their thought processes, ultimately enhancing their CVT capabilities. Metacognition is connected to other cognitive elements and plays a central role in fostering effective CT skills. As Cao (a teacher) said, "*If he wants to improve from himself, he must focus on these aspects: the first is to focus on metacognition, the second is knowledge, the third is language, and the fourth is to understand logic related things.*"

The finding that metacognitive ability significantly influences CT aligns with existing research. Previous studies consistently emphasize the relationship between metacognition and CT. Metacognitive skills enable learners to monitor, regulate, and adapt their cognitive processes, leading to more effective problem-solving and decision-making (Magno, 2010). More specifically, research delves into how specific metacognitive strategies, for instance, self-monitoring, planning, and evaluating, contribute differently to CT development (Parrott & Rubinstein, 2015).

This finding holds significant value for both educators and learners. Educators should integrate metacognitive instruction into their curriculum, fostering a culture of reflective thinking and self-awareness. They can also design targeted interventions. On the other hand, metacognitive ability empowers learners to take control of their learning processes. It enables them to identify cognitive biases, adjust strategies, and optimize their thinking.

4.3 Category 3: Teaching Strategies to Foster EFL learners' Critical Thinking
Regarding the core category of how to foster CT for Chinese college EFL learners, a number of proposals have been merged into the following aspects: appropriate instructional approaches of CT, cultivating awareness of CT, broadening scope and reserve of knowledge and experience, focusing on skills and attitude, and using strategies of teaching CT.

4.3.1 Appropriate Instructional Approaches of CT
Critical thinking is teachable; there are four approaches to teaching it (Ennis, 1989). As the infusion approach (named Approach A in the interviews) and the general approach (named Approach B in the interviews) have been verified to be effective (Dong, 2017; El Soufi & See, 2019), the researcher investigated the views of teachers on their choice of the two approaches. It was found that the approach to teaching CT should be flexible and context dependent, considering factors such as the teacher's expertise, the students' readiness, and the stage of education. Additionally, two primary approaches can be used either independently or in combination. Three respondents choose the Approach A. Li (a male teacher) said that: "*Critical thinking must be combined with the content of the course. Approach B may result in a departure from the content of the student's learning. With Approach A, the teacher can analyze the content of the textbook and combine the cultivation of critical thinking with conventional teaching.*"

One respondent chose Approach B. Cheng (a female teacher) said: "*I would choose B. Online resources can be used to allow students to learn and improve their*

critical thinking skills. In this way, students have more freedom to complete critical thinking learning." The remaining two teachers chose the mixed A and B option, which is a unique approach. Cao (a female teacher) said:

"*I will choose B first, and then choose A. That's it. It is a popular thing you have to master. Then use this general knowledge in one's own special field, the professional field, to improve the student's ability, so I will first B and then A instead of just choosing one.*"

4.3.2 Cultivating Awareness of Critical Thinking

From the analysis of the data, cultivating awareness of CT was found to be essential for both students and teachers. Students benefit from being aware of the uncertainty of answers and the need for CT, while teachers can consciously incorporate CT into their teaching aims, content, and evaluation. Active questioning in the classroom is a valuable method for enhancing students' awareness of CT, which, in turn, contributes to the effective teaching and learning of English language skills in the context of ESL and EFL education.

For instance, "*It is necessary to cultivate students' awareness of the uncertainty of the answers to questions, which is conducive to the development of critical thinking skills,*" said a teacher (Li). Gao also mentioned the problem in students: "*Most of them lack the automatic thoughts of critical thinking or awareness of critical thinking.*" To cultivate students' awareness of CT, questioning in class is suggested as a good way as proposed by Cao: "*I feel that if there are more questions in a classroom, it will help improve the students' critical thinking awareness.*"

Educators play a crucial role in fostering students' awareness of CT processes. By intentionally incorporating CT into teaching aims, content, and evaluation, teachers empower students to engage more effectively with complex information (Lai, 2011). Additionally, the current study highlights active questioning as a valuable method because it encourages students to explore assumptions, analyze language structures, and engage in deeper understanding (Nappi, 2017).

Therefore, ESL and EFL teachers should emphasize the importance of CT in language learning. Also, they can explicitly discuss CT concepts and strategies with students, highlighting its role in understanding and using English effectively. Furthermore, they may adopt active questioning techniques in ESL and EFL classrooms to stimulate CT, and encourage students to ask questions, challenge assumptions, and analyze language structures or texts critically.

4.3.3 Broadening Scope and Reserve of Knowledge and Experience

The development of CT is not solely reliant on subject-specific knowledge but is significantly enriched by exposure to non-subject knowledge and diverse life experiences. The breadth and depth of CT skills depend on the input of external knowledge acquired through reading and experience. Engaging in extracurricular reading and exploring works in different disciplines contribute to the development of CT. Additionally, the application of knowledge through real-life experiences is essential to validate and expand the scope of students' CT abilities. Gao (a teacher) said, "*The input of external knowledge depends on reading and experience. Without a lot of extracurricular reading, classic reading, and reading in the field of philosophy, politics and history, it is difficult to form the breadth and depth of*

thinking." Therefore, ESL and EFL teachers should encourage students to read a variety of books beyond language textbooks, exposing themselves to diverse subjects to enrich language proficiency and CT abilities.

Knowledge and principles of CT refer to the general knowledge of CT and its main principles. Integrating these principles into the teaching and learning process enhances the natural formation of CT abilities. For example, Jin (a teacher) said, "*When the rules and principles of critical thinking are integrated into subjects learning, students will naturally form critical thinking skills.*" ESL and EFL teachers should introduce CT concepts and principles in language lessons.

4.3.4 Focusing on Thinking Skills and Attitude

In cultivating CT, it is essential to emphasize both the development of specific thinking skills and the nurturing of an attitude conducive to CT. The effective teaching and learning of CT in the context of ESL and EFL should address both the acquisition of these skills and the cultivation of the associated attitudes. Two science students, Yuan and Li, voiced the same opinion: when asked how they understand CT, they replied: "*It is reasonable and reflective thinking, which is both a thinking skill and a thinking tendency.*" Also, Li (a male teacher) said: "*In my opinion, critical thinking is a process of looking at problems and phenomena with a truth-seeking and impartial attitude towards problems or phenomena.*" Du (a science student) commented: "*Science students have stronger logical analysis skills, stronger divergent thinking, and more rational ways of dealing with problems.*" Practically, ESL and EFL teachers should teach and practise CT skills explicitly in the context of language learning, and encourage learners to explore diverse viewpoints, cultures, and linguistic variations to form open-mindedness in CT.

4.3.5 Using Strategies of Teaching Critical Thinking

The strategies mentioned by the interviewees include logical thinking practice, reflection practice, thinking tendency cultivation, seeking help from critical thinking experts, thinking independently, thinking clearly, thinking divergently, externalizing thinking, thinking academic context, thinking openly, thinking systemically, learning CT modes, and conducting thinking research. As these strategies are scattered in the respondents' answers, rather than concentrated in one question, they will not be explicated in detail here.

Figure 1. Proposed Model of Context, Factors, Elements, and Fostering of Critical Thinking
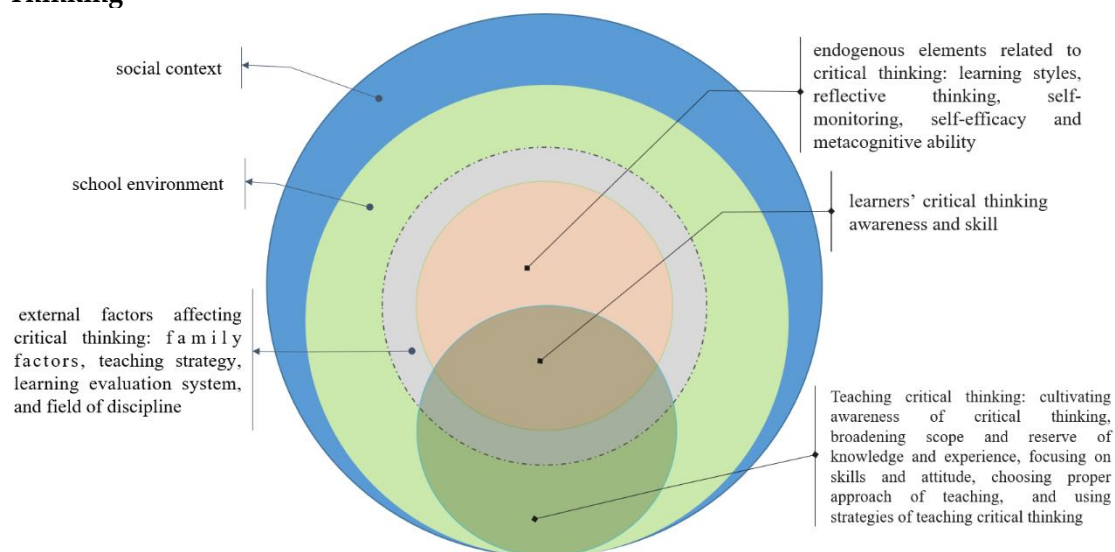
4.4 The Model of Context, Factors, Elements, and Fostering of Critical Thinking

Based on the results of this study, a model has been proposed relating to the background, external factors and endogenous elements of the development of CT, and how to cultivate it (Figure 1). The proposed model depicts a multifaceted approach to nurturing CT among EFL learners. It encapsulates a delicate interrelation between diverse external factors and endogenous elements which influence the development of CT. It posits the external factors—ranging from familial influences, pedagogical strategies, assessment methodologies, to disciplinary specializations—intersecting with endogenous elements of CT, including learners' learning styles, reflective thinking, self-monitoring, self-efficacy and metacognitive abilities. This model advocates for a proactive cultivation of CT awareness, expanding learners' horizons of knowledge and experiential learning, while concurrently cultivating critical skills and attitudes through the wise selection of pedagogical methods and instructional strategies. It underscores a pedagogical paradigm shift towards a more individualized and context-sensitive instructional approach, aiming to develop learners' CT consciousness and proficiency within the specific environment of educational and sociocultural environments. This comprehensive framework advocates a dynamic and adaptable teaching philosophy geared towards effectively fostering CT competencies in EFL learners, thereby preparing them to navigate the complexities of global communication and understanding.

5. Conclusion

The purpose of the research is to explore the roles played by the external factors, endogenous elements and teaching approaches in the development of EFL students' CT from the perspective of Chinese college EFL teachers' and students' perceptions. Employing the evolved approach of GT, the study proposed a model consisting of three core categories: external factors affecting CT, endogenous elements related to CT and strategies to foster CT.

The external factors affecting CT in the findings of this research include family factors, teaching strategy, learning evaluation system, and field of discipline. The endogenous elements related to CT include learning styles, reflective thinking, self-monitoring, self-efficacy and metacognitive ability which emerged from the data analysis. In addition, five aspects of strategies on how to foster students' CT skills are categorized as cultivating awareness of CT, broadening scope and reserve of knowledge and experience, focusing on thinking skills and attitude, choosing an appropriate approach to teaching, and using strategies of teaching CT.

The findings of this research have some pedagogical implications for EFL learners, teachers, course designers, and instruction policy makers. The external factors affecting CT are the environment and the context of learners. Therefore, teachers need to understand the context in which the students have grown up and the external factors shaping their characteristics and mode of thinking. This is essential to help students develop C T skills in accordance with their unique aptitudes. The endogenous elements related to critical thinking are internal elements which can actually facilitate the enhancement of students' CT levels. The five aspects of strategies to foster critical thinking are practical and feasible for teachers in terms of being CT practitioners in a classroom context. Moreover, course designers need to integrate CT into teaching objectives, teaching procedures, and teaching evaluation to achieve a mesoscopic approach to implementing CT teaching. Finally, instruction policy makers need to make teachers, parents, learners and society aware of the significance of CT and its cultivation to build the superstructure of CT teaching.

This study has several limitations that should be acknowledged. Firstly, the reliance on semi-structured interviews as the sole data collection method may introduce biases, as participants may provide socially desirable responses or may not fully articulate their experiences and perceptions. Additionally, the selection of participants through purposeful sampling may limit the generalizability of the findings, as the sample may not be representative of all Chinese EFL learners. The data analysis process, while rigorous, is also subject to the researcher's interpretations, which may introduce subjective biases. Furthermore, the study did not incorporate other potentially valuable data sources such as course syllabi, lecture notes, course outlines, class recordings, or educational material provided by the government. Including these additional data sources in future research could provide a more comprehensive understanding of the factors influencing CT development.

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Acknowledgements

Appendix

Interview Protocol

An Interview on EFL Learners' and Teachers' Understanding of Critical Thinking

Introduction:
Thank you for participating in this interview. This interview is part of a study aimed at exploring the understanding of critical thinking among English as a Foreign Language (EFL) learners and teachers. Your insights and experiences are very valuable in this study.

Purpose of the Study:
The primary objective of this research is to gain a comprehensive understanding of how critical thinking is perceived and taught within the context of EFL education, and what the external and internal factors are that influence the development of critical thinking.

Confidentiality and Anonymity:
Please be assured that all information you provide during this interview will be kept confidential. Your names will be anonymized, and no personal information will be identified in the future possible publication of the study results. Your participation is entirely voluntary, and you may withdraw from the interview at any time without any negative consequences.

Interviewer Information:
I am a college English teacher and a Ph. D student. I have no personal interest or stake in the outcomes of this study, and my primary goal is to collect accurate and insightful information from you.

Informed Consent:
Before we proceed, please provide your informed consent to participate in this interview. By continuing with the interview, you are indicating that you understand the purpose of this study and agree to participate voluntarily.

Recording:
This interview will be recorded for the purpose of data analysis. However, the recording will be kept confidential, and only authorized research personnel will be allowed to access to it. If you are uncomfortable with audio recording, please inform me and we will try another way of capturing the interview.

Your right for Clarifications:
If you have any questions or require clarifications at any point during the interview, please feel free to ask. Your comfort and wellbeing are a priority.

Duration:

The interview is expected to last approximately 30-40 minutes.

Thank you once again for your participation in this study.

Demographic Information of Interviewees:

For Student Interviewees	
Name	
Gender	
Major	
Grade	
For Teacher Interviewees	
Name	
Gender	
Major	
Grade of your Students	
Course you are teaching	

Time of Interview: _____

Place of Interview: _____

Interview Questions:

1. Let's begin with your life in college. What do you usually do in your spare time? In your opinion, what is critical thinking? (for both students and teachers)

2. From your experience and observation, who have higher critical thinking skills: College boys and girls? Why? (for students)/ What do you think of your critical thinking level? (for teachers)

3. Who do you think has stronger critical thinking skills? Students majoring in liberal arts or students in science? Why? (for students)/What do you think is the critical thinking ability of college students now? (for teachers)

4. In your opinion, what is the relationship between parents' educational background, family financial situation and critical thinking? (for students)/What factors affect the critical thinking ability of college students? (for teachers)

5. What is the relationship between reflection and critical thinking in learning? (for students)/How do you see the relationship between reflection, self-efficacy (the degree of confidence in achieving tasks), self-monitoring, and critical thinking? (for teachers)

6. Self-efficacy refers to the degree of self-confidence or anticipation of a person in completing a certain task. In your opinion, what is the relationship between self-efficacy on the one hand and critical thinking and academic performance? (for students)/What is the relationship between English language proficiency and critical thinking? (for

teachers)

7. There are narratives, descriptive essays, expository essays and argumentative essays in English writing. What do you consider the relationship to be between these types of writing and critical thinking? (for students)/How do you improve students' critical thinking skills in English teaching? (for teachers)

8. Please describe how you react to seeing an English topic in writing tasks? (for students)/If there are two ways:

A. Teachers explain critical thinking knowledge in English teaching and practise critical thinking skills in combination with course content or topics. (The premise is that the teacher needs to master critical thinking knowledge and improve skills through training, self-study, etc.)

B. While teaching English classes, students are additionally allowed to choose ready-made online courses on critical thinking to learn and improve their critical thinking skills. (It is assumed that the online course is offered by a critical thinking expert, and the content is the general knowledge and skills of critical thinking.)

Which one would you choose? Why? (for teachers)

9. If there are two learning methods:

A. The teacher explains the knowledge of critical thinking in the English class, and combines the course content or topics to practise critical thinking skills. (The teacher may not be professional enough in critical thinking)

B. Choose ready-made online courses on critical thinking while studying English classes to improve your critical thinking skills. (The teacher may be more professional)

Which one would you choose? Why? (for students)