

## Developing Understanding of Critical Thinking Definitions, Concepts and Characteristics in TVET Higher Education

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### Abstract

*This study aims to provide an understanding of critical thinking skills in TVET higher education context by investigating the definition, concept, and characteristics of critical thinking skills that is appropriate for the context. Therefore, a data collection is done through an interview involving ten lecturers from TVET higher education institutions purposely to gather their insight, perspectives, and real practice on critical thinking skills. The interview data are analysed using thematic analysis. It was discovered that the critical thinking concept for the TVET higher education context is a decision-making process. Critical thinking is defined as reflective and reasonable thinking, and critical thinking characteristics are the ability to adapt and analyse other alternatives. From the result of thematic analysis, this study developed a conceptual framework of critical thinking skills concept, definition and characteristics for TVET higher education setting. The findings could provide a reference for TVET higher education lectures to understand and apply critical thinking skills during teaching. In addition, other researchers can use the findings to develop fundamental knowledge in exploring and researching critical thinking skills.*

**Keywords:** *Critical Thinking Definition, Critical Thinking Concept, Critical Thinking Characteristics, TVET Higher Education.*

### Introduction

Critical thinking is a way of thinking that unleashes human potential as it enables people to draw informed decision making through the analysis and evaluation of information. As critical thinking develops human potential it becomes the essential thinking skills to infuse in the TVET higher educational system. As mentioned by Felipe et al. (2023), critical thinking skills plays an important role in TVET higher education to develop graduate who is skilled in problem solving, decision making, reasoning, analysing, and communicating argument. Meanwhile in the context of labour market, critical thinking skills are also highly prized by employers among TVET graduates to encounter working challenges and address problem in actual circumstances effectively (Ping et al., 2023). Therefore, equipping TVET graduates with vital competencies and skills required in the working arena via the implementation of critical thinking skills is an endeavour that TVET institutions may undertake to ensure graduates' preparedness for the labour market (Utami et al., 2023). However, even critical thinking is recognized as the most crucial working skills, learning skills and life skills, there is little intervention to enhance the understanding of critical thinking skills, especially among the lecturers, who are the main players for the implementation of critical thinking skills at the institutions. Fani (2020) asserted that lectures generally acknowledge the significance of critical thinking as a cognitive ability that institutions strive to cultivate in students, but there is a lack of encouragement to clarify the ambiguous understanding and definition of critical thinking skills. These issues lead to problems among lecturers in developing a comprehensive understanding toward critical thinking skills. When lecturers have difficulties understanding critical thinking, they feel implementing critical thinking is mentally demanding and emotionally daunting, resulting in undeveloped critical thinking skills among graduates (Yuan & Liao, 2023). Therefore, this study wants to address these issues by investigating how TVET lecturers perceive the critical thinking concepts, characteristics and definitions. In summary, it was found that TVET lecturers perceive critical thinking as reflectivity of mind to analyse, evaluate information, adapt skills and knowledge to make decision and solve problem. The findings are further explained in this paper, and hopefully it will help TVET lecturers grasp an understanding of critical thinking and enable them to

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incorporate pedagogical instruction that can encourage student critical thinking.

### *The Roles of Critical Thinking*

Understanding critical thinking is very important. Through an immersive understanding, people able to use critical thinking effectively in any situation. As mentioned by Pirzada et al. (2021), understanding toward critical thinking is essential for enabling comprehend understanding toward situations and constraints and allowing people to find solutions to problems that are relevant to current needs. Meanwhile in the context of critical thinking implementation in TVET higher education, the lecturers need to understand what critical thinking is so they can prepare their delivery strategies, teaching activities and assessments that can enhance student critical thinking skills. This is supported by (Naomi, 2022) that mentioned lecturers who possess comprehensive knowledge of critical thinking do not have issues in selecting appropriate teaching strategies and assessments to enhance students' critical thinking in line with the learning topic requirements. Thus, the lecturer's knowledge on critical thinking skills has a significant impact on the quality of critical thinking implementation. Therefore, lecturer should seek opportunity to understand critical thinking by investigating it concepts, definition and characteristics (Eze et al., 2022). Similarly, Felipe et al. (2023) mentioned that critical thinking is difficult to develop in TVET higher education, but these issues can be overcome by putting and effort to understand the definition of critical thinking. However, when it comes to defining critical thinking, there seems to be a lack of consensus on a clear and operational definition, as it varies widely (Diao & Hu, 2022). But this issue can be addressed by considering the context of application of that definition. For example, to understand the definition of critical thinking in the context of TVET higher education, the definition should highlight and represent skills or component in TVET teaching and learning practice (Han et al., 2024). As TVET higher education emphasis on the development of graduate thinking skill for preparation toward labour market, the defined of critical thinking by Ennis, "reasonable and reflective thinking that is focused on deciding what to believe or do" are appropriate to be refer (Black, 2007; Kori et al., 2014) This is because, the role of Ennis definition on critical thinking emphasizes that in decision-making, people need to be reflective in synthesising the sources of information gathered through observation, research studies, or experiences to develop judgment and reasoning (Ennis, 1991). This definition is very relevant for explaining TVET higher education expectation on graduates skill mastery in posing the competence to make practical decisions, be skilled in analysing information, and provide justification and reasoning for any actions taken (Ismail et al., 2021).

However, there are also studies regarding critical thinking and TVET that use the terminology of definitions from Facione to define critical thinking as its emphasis the roles of cognitive skills. According to Facione (2020), critical thinking is as a set of sub-skills, namely interpretation, analysis, evaluation, inference, explanation, and self-regulation that is used to make reflective judgment in framing belief and action. The definition emphasis on critical thinking subskills that is important during decision making which is also appropriate to explaining the characteristics of critical thinking. This perspectives is supported by the findings of Barta et al. (2022), who discovered critical thinking characteristics as analysis and evaluation and interpretation. These critical subskills align well with the expectations of critical thinking characteristics that TVET graduate must master. This is because TVET graduates are always trained to produce superficial solutions that require them to first understand a problem (interpretation and analysis) and assessing solutions (evaluation). Then they also have to predict consequences (inference) and communicate this process as a whole (explanation) before reflecting on the process and results (self-regulation) (Haryanti, 2020). In conclusion, Facione's definition is appropriate to refer in understanding the characteristics of critical thinking in TVET as its emphasis the action to be a critical thinker. Meanwhile, the concept and definition of critical thinking in TVET should focused on the thinker making decisions and judgments about what to believe and how to act. This is to highlight the necessity for TVET graduates to master critical thinking not just for knowledge growth, but also to develop the ability to think, feel, and act critically, ethically, and responsibly (Hassan et al., 2022). Similarly, Dzia-uddin and Minghat (2024) note that TVET graduates are expected to go beyond mastering content knowledge where they need to practice ethics, integrity, and consider other perspectives in making decisions. Therefore, critical thinking in TVET higher education context should emphasis more on the process of decision making. This is purposely to align the quality of critical thinkers that the industry expects, which is workers who can make effective decisions and

able to assess the consequences and implications of an action (Paullet et al., 2020).. Nevertheless, lecturer also can develop an understanding on critical thinking that is appropriate to TVET higher education context by understanding the connection between critical thinking and the aims of TVET regarding student character development outcomes. By understanding the outcomes that are intended to be formed and achieved, lecturers will be inclined to choose the appropriate terminology to understand critical thinking (Kumara et al., 2022).

## Methodology

This study aims to investigate how TVET lecturers perceives critical thinking concepts, definitions, and characteristics. Thus, basic interpretive qualitative research design is used where an interview session is conducted with ten TVET higher education lectures in Malaysia. The participants for the interview have been chosen based on their experience implementing critical thinking in teaching and experience of teaching in TVET education system. Before the interviews are conducted with participants, ethical procedure has been considered. The permission to conduct research and data collection are granted from the Ministry of Higher Education and the Department of Polytechnic and Community College, researcher faculty and participant's agreement for obtaining data through a consent letter.

In analysing the data, thematic analysis process is used to find coding and themes. This paper refers to the step proposed by Braun & Clarke to conduct thematic analysis. At first, the audio recording is transcribed into text, and familiarisation of participants' ideas is performed. Then, the textual data that consists of meaning to achieve the research objective is broken into initial codes, resulting in open coding. To achieve this, keywords that have meaning in describing critical thinking concepts, definitions, and characteristics are coded into one category each and have been organised by applying colour code to the segment of the transcription. Next, in developing the axial coding and identifying the reoccurring themes of the data, the word cloud and word frequency are used. The word cloud and word frequency are performed by listing all the open coding into a file and attaching it to the wordle generator. The result of the word cloud should offer ideas for the development of axial coding by identifying the relationship of the most frequent words that appear in the data (Naeem et al., 2023). Subsequently, the coding with the same concepts and categories is grouped, and a representative axial coding is assigned to each group. The final process of the thematic analysis is to generate selective coding. It is like generating axial coding but more abstract, focusing on finding the core concept of the phenomena being studied (Lochmiller, 2021). In generating the selective coding, open and axial coding results are constantly compared with the transcription until a code that can represent the research construct and objective are discovered. The process of refining coding is conducted iteratively and validation of coding accuracy from the members of the project is gain. The entire process outlines how the scientific approach in research provides a framework that enables the researcher to break down the project into distinct, manageable tasks (Salleh, Sulaiman & Gloeckner, 2023).

## Results and Discussions

The aim of this study is to investigate TVET lecturer understanding on critical thinking concepts, definitions and characteristics. Therefore, to see the overview of ideas when lecturer perceiving critical thinking concept, definition and characteristics a world cloud is generated.

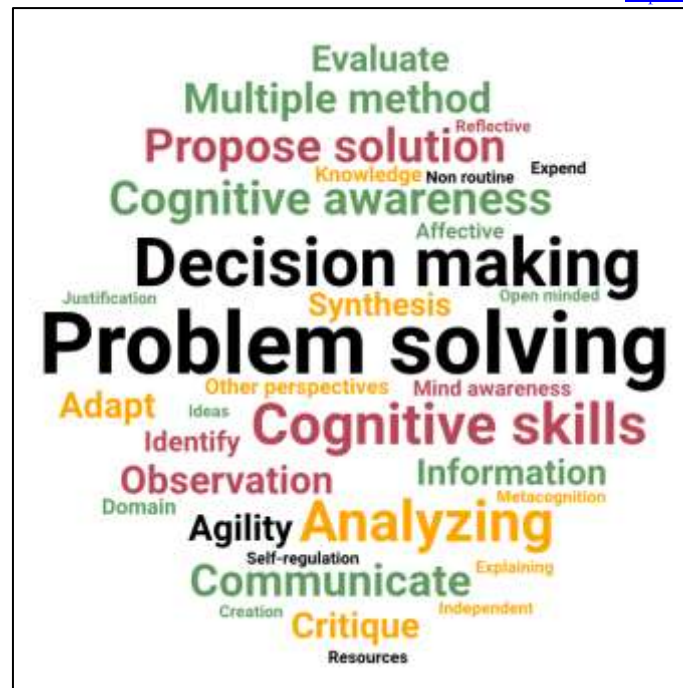


Figure 2: Critical thinking definition, characteristics and concept word cloud

The illustration in Figure 2 is the image of a word cloud for the critical thinking concept, definition, and characteristics generated from the open coding. Table 1 summarises the exact frequency by the number of how many times the item appears in the open coding. The frequency indicates the most frequent word participant used when discussing about critical thinking.

Table 1: Critical thinking definition, characteristics and concept word frequency

Item	Frequency
Problem solving	30
Decision making	19
Analyzing	12
Cognitive skill	12
Cognitive awareness	7
Proposing solution	7
Multiple method	6
Observation	5
Criticize	4
Evaluate	4

From the result of the word frequency, the item 'problem solving' has recorded the highest frequency with  $f = 30$ . The second highest item frequency is 'decision making' with  $f = 19$ , and the third highest belongs to items 'analysing' and 'cognitive skill' with  $f = 12$ . The frequency indicates the most frequent word participant used when discussing about critical thinking.

In addressing understanding toward critical thinking, participants perceive critical thinking development takes place within the context of problem-solving. This is because, in the realm of higher education, TVET places significant emphasis on problem-solving to expose students with real-world challenges (Yusoff et al., 2022). Thus, through the exposure to actual problem-solving critical thinking skills are developed as it exposes students to the process of analysing the underlying causes of problems and proposed solutions, assessing the effectiveness of problem-solving methods, and using reasoning to justify the selection of

problem-solving approaches (Amanda et al., 2024). In solving problem, adaptations of skills and knowledge is also required. Therefore, participants indicate that critical thinking is developed via the process of adapting skills and knowledge to effectively address situations and problem. This is because, when adapting prior knowledge to solve problems, critical thinking skills is used to transform personal experiences, observations, thoughts, and assumptions to align with the current situation (Makhzoum & Komayha, 2020). Otherwise, without utilization of critical thinking, it leads on proposing ineffective solutions for untended purpose. In the context of employment, Ling et al. (2020) asserted that facing unpredictable and unstructured problems is a common scenario. Therefore, graduates who want to enter the workforce in future are expected capable in adapting their educational experiences to real-world scenarios and solve problem practically.

In solving problems, the ultimate point of success in the resolution of the issues is depending on the decision-making. Ubaidillah et al. (2023) said that practical problem-solving depends on a person's ability to make decisions, based on the evaluation of impact toward proposed solution. As shown in the results, the word "decision making" is the second most frequently mentioned by participants when discussing their understanding of critical thinking. This is because, from the participants' perspectives, decisions are often made within the confines of an issue, and critical thinking is used to evaluate which solutions are best suited to that context. This is supported by Ennis (1991), who described the concept of critical thinking as the decision-making process that generally exists in the context of some problem. This means that critical thinking in the world of TVET is used to make decisions related to problem-solving, whether to determine the best solutions, assess consequences and negative impacts, and future planning (Azid et al., 2023). In overall, the use of critical thinking in decision making and problem-solving is something that goes hand in hand and has continuity, where in performing effective problems solving, the utilization of critical thinking skill such analysing, and evaluation is used to make decisions on appropriate alternatives to be apply for the current situation.

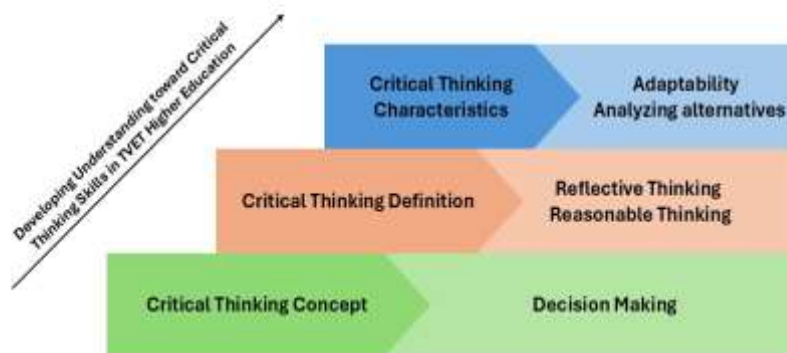
Next, in discussing the understanding of critical thinking, the participant also mentioned about analysis ( $f = 12$ ). This is due to the fact that analysing skill are extensively use in the decision making and problem-solving processes. Adeoye and Jimoh (2023) said that analysis is a characteristic of critical thinking skills that is widely used in learning, working, and life to make decisions and solve problems. Analysis also is an important process and skill in the world of TVET. Mutohhari et al. (2021) asserted that analysis in TVET is crucial to uncover the root cause of a problem, predict outcomes, identify needs, and examine significant information from various sources and fields. Nevertheless, analysis is not a purely mechanical or simplistic process. Therefore, it requires the use of critical thinking to interpret, evaluate, and engage with the data in a reasonable, creative, and ethical manner. Similarly, Barta et al. (2022) also said that to performance a quality information analysis, there a needs to apply critical thinking skills to identify and evaluate facts that are relevant to a particular context. After that, critical thinking is used again in the analysis process to determine the validity of the information before it is discussed to others. Therefore, as analysis process emphasizes the rigorous step of obtaining information it became relevant to the learning needs of the TVET program that required student to digest important information form reading and observation to answer learning questions and reduce the knowledge gap (Dzia-uddin & Minghat, 2024).

In can be summarized that participants have communicated their understanding of critical thinking based on the need to make practical decisions and solve problems. This is because participants see that the implementation of critical thinking exists when there are problems to solve, where analysing and evaluating skills are fully utilized to seek information and alternative for the issues. Then, when it comes to the stage to decide which problem-solving alternatives to used, the process of interpreting observations, providing justifications, and critiques is used to ensure that the decisions made are practical and consider various aspects (Plummer et al., 2022). This process of making effective decisions was also discussed by participants in explaining their understanding of critical thinking. It is because one of the traits of critical thinking is the ability to perform effective communication in providing justification, reasons, and to convince ideas to others, which is also an important skill to cultivate among TVET graduates. This argument was supported by Bassah and Noor (2023), who indicated that TVET graduates need to use their critical thinking skills to perform effective communication when dealing with work that requires them to convince others of their

ideas. In conclusion, the open coding that has been wordle provides an initial overview of TVET lecturers' understanding of critical thinking and how it relates to the need of TVET teaching practice and skills that graduates are expected to master. The open coding also has been used as a guide and reference for developing subcategories, categories, and themes related to critical thinking in the context of TVET higher education.

As a result of thematic analysis and literature review, a conceptual framework is developed, as displayed in Figure 3. This conceptual framework differs from the existing conceptual framework for critical thinking as it proposes elaborations on critical thinking in the scope of TVET higher education contexts. It illustrates the relationship between three crucial components in understanding critical thinking skills: concept, definition, and characteristic. This is because a concept is important to understand the main ideas of the topic, definition is important to understand the substances involved in the context and characteristics is important to understand the attributes, qualities, and traits that have been discussed. Prior to this conceptual framework being developed, a few existing critical thinking conceptual frameworks were analysed to determine their appropriateness in providing an understanding of critical thinking skills for TVET higher education lecturers. Results from the analyses show that the existing conceptual frameworks provide generally guidelines for people to understand critical thinking where specification to TVET higher education content has been neglected. Therefore, through the development of this conceptual framework, hopefully certain issues that produce gaps for TVET lecturers to understand what critical thinking would cover.

As suggested in this conceptual framework; to understand critical thinking, lecturers need to know the concept of critical thinking in TVET. This is because the clarification of the critical thinking concept will help to generate logic and connection in understanding definitions and characteristics of critical thinking (Bellaera, 2021). Concepts should be understood as fundamental ideas that elaborate on the relationship among the substances, structures of attributes, and comparative characteristics of the topic, which should reach the understanding of all (Burge, 1993). Thus, the concept of critical thinking should provide an understanding of the main idea of how critical thinking works and its specifications and characters.



**Figure 3: A conceptual framework of developing understanding on critical thinking definition, characteristics, and concept in the context of TVET Higher Education**

First of all, the critical thinking concept for TVET education should be understood as a decision-making process because it describes the important processes in thinking and the qualities of a critical thinker that aligns with the expectation of a TVET graduate attributes. As asserted by Bassah and Noor (2023), TVET

aims to produce graduates who can make an evaluation of the information in finding suitable alternatives for the problem using through analysis, evaluation and reasoning process. Basically, decision making involves 3 main component that support the development of critical thinking skill which is analysing and evaluation, reasoning and consideration of other perspective in making decision. The first component is analysing. Analysing required a meticulous process of identifying a segment of information and how it relates to one another. Thus, analysis process develops deeper understanding that enable the formation of accurate conclusion (Hariyanto et al., 2022). Therefore, analysis is crucial in TVET teaching and learning process to decide the problem troubleshooting method, improve workflow and assessing safety risk. The analysis would further improve when applying an evaluation. It because evaluation will help to weighed the evidence, remove biases and validate arguments that are collected from the analysis process which resulting to the informed decision making (Plummer et al., 2022). The process of decision making that required analysis and evaluation are accurate align with TVET practice which aim to produce employer that has high degree of precision and accuracy in proposing solution and making decision (Nugraha et al., 2020).

Next components of decision-making are reasoning. In decision making reasoning is important to defend choice and justification. Apart of its importance in decision making, reasoning develop critical thinking skills through the process of examining credibility of evidence and critical evaluation of personal assumption (Bellaera, 2021). Therefore, reasoning skills also is constantly practice in TVET to enhance student skills in justifying reason using evidence (Jamil, 2023). Last component of decision-making is consideration toward other perspectives, which means in making decision all the need of others, conditional situation and challenges is taken into account. In considering other perspectives, critical thinking skill is required to decide what need to be prioritize and how the decision gives effect to others (Ubaidillah et al., 2023). These ways of thinking and making decision are align with TVET practice especially when proposing solution and deciding which are the appropriate solution to use, where all the requirement, practically and significant effect to others need to be considers (Aziz & Subramaniam, 2023). Therefore, the concept, component and process involved in decision making are relatable in enhancing understanding of critical thinking in TVET higher education as its emphasis the utilization of rigour procedure in resolving problem.

On the other hand, to develop lecturer understanding on critical thinking definition in the context of TVET higher education, this conceptual framework suggests that lecturer to understand critical thinking as reflective and reasonable thinking in making decision. This is because in TVET, critical thinking is frequently applied during problem solving and decision making where reflective and reasonable thinking is needed to evaluate the effectiveness of the propose solution before applying it to resolve problem (Akpur 2020; Rosly et al., 2019). The perspective is further supported by Bassah and Noor (2022) who noted learning in TVET required careful consideration and judgment toward ideas, perspective and assumption to enable informed decision making. Its emphasis the action on being particular to own action and knowledge which resulting the development of ability to adapt changes, performing informed decision and ethics in working. On the other hand, reasonable thinking is complementary to reflective thinking. Heard et al. (2020) noted that reasonable thinking helps to improve the quality of thinking to the next level as it implies to the discern of validating argument, theories, proof and statement. Reasonable thinking is developed through the application of logic, identification of assumption and justification of arguments where critical thinking is needed to apply this criteria of reasoning (Facione, 2020). Similarly as elaborated further by Paulsen (2022) that note in applying reasoning critical thinking skill is requires to evaluate inferences, conclusion, claims and validate the judgment and ensure it is from credible resources. This will be resulting to the development of confident in convincing ideas or claims to others. Relatable to TVET, communicating and convince others about ideas or finding is part of important trait graduate need to have, therefore it is compulsory to use critical thinking skill in preparing reasons to justify ideas that are defendable with evidence (Lyimo et al., 2023). In conclusions, lecturer should understand that the process of reflective and reasonable thinking develops critical thinking skills in TVET as it integrates analytical and evaluative element in achieving goal and making decision.

The process of being reflective and reasonable in making decisions creates the ability and character of critical thinking. Chen et al. (2022) noted that reflective and reasonable thinkers develop the ability to reason and argue as they always clarify their assumptions and examine reasons for a choice. Therefore, reasoning

become important critical thinking skill in TVET higher education. This is because the outcomes of learning proses in TVET usually emphasis on product development, innovation and tools improvement (Tuenpusa et al., 2021). Thus, reasoning is important to assist the process of validating claims, proof and finding to ensure it can be disseminated and commercialize for others reference and use. Reasoning supports the validity of an outcomes with rigour process of development of idea trough the evaluation of existing theories, hypothesis testing and observation of data analysis (Bellaera, 2021). Thus, the utilization of reasoning in thinking process differentiates the value of outcomes of normal thinker with critical thinker that should be seen as important trait to impart in TVET graduate skills development.

Other than that, being reflective in making decisions developed the ability to seek for alternatives. (Jamil, 2023) asserted that when reflective thinking is frequently practised, it creates the ability to see other options for solving problems, where people will adapt their knowledge and skills to find other solutions. In the working skill context, being able to analyse other alternatives is a skill required by employers and industries nowadays (Tun et al., 2021). It is because industry nowadays facing challenge in coping with automation system and interoperability issues, therefore, they demand for graduate ability in brainstorming an idea and propose a practical solution to solve the issues through the analyzation of alternatives (Tuenpusa et al., 2021). Therefore, the ability to analyse for alternative is an essential critical thinking attribute to develop among TVET higher education graduates who will become future workforce who are going to deal with problematic situations, demands, and thoughtful tasks in workplace. Therefore, lecturer need to understand the critical thinking characteristics in TVET and develop learning activities that can encourage the development of skill such reasoning and analysing to facilitate graduate in facing learning challenges.

Another critical thinking characteristics that significant in TVET higher education is adaptability. Adaptability means the ability to adjust skills, knowledge and attitude into new condition by shifting approaches, welcoming ideas and apply new skill with positive attitudes (Thant Sin, 2022). Thus, adaptability skills are an important skill TVET graduate need to have to face the working dynamics that requires worker to be flexible in teamwork, understand and shift roles effectively and adjust existing knowledge to overcome unexpected challenges. Supported by Mat Nashir et al. (2022) who highlighted that adaptability is an essential critical thinking ability that TVET graduates need to have due to the complexity of TVET programmes and industry demands requires adjustment of planning and theory in meeting the demands of real situation problems. In additional, to achieved this level of adaptability, graduates also should prepare their emotion and attitudes to cope with the stressful and uncertain situation (Dishon & Gilead, 2021). Therefore, it is necessary to develop TVET graduates that are adaptable in any situation by preparing their thinking to be open minded, resilience and resourceful. In conclusion critical thinking characteristics that appropriate to TVET higher education setting is more toward preparing graduate to become a workforce that able to make informed decision making, solve problem effectively, and independent in thinking,

In overall, there is a need to understand that critical thinking has been a matter of research since the early decades (Iyer, 2020). Therefore, numerous findings about critical thinking might be a vary according to the context of the study. Specifically, this paper suggests the use of this conceptual framework to develop critical thinking understanding on critical thinking skill with TVET higher education context by looking into the component derived for concept, definition and characteristics. However, more components of critical thinking might be discovered compared to what has been suggested by this paper conceptual framework when the literature review is conducted toward a substantial number of documents.

## Conclusions

In conclusion, understanding critical thinking skills has a significant point toward the knowledge of TVET higher institution lectures in applying critical thinking skills to their lesson. Furthermore, understanding the definition of critical thinking can aid the lecturer in exploring the critical thinking component prior to using context. Meanwhile, understanding the concept of critical thinking will enable the lecturer to apply critical thinking skills to various situations and circumferences appropriately. Moreover, lecturers will also be able to conduct a learning process that can develop students' critical thinking skills when they can establish a relationship between the characteristics of critical thinking and TVET practice. Furthermore, by



understanding those components of critical thinking, lecturers will be able to adjust and apply their existing knowledge and experience to fill in the TVET higher education curriculum and program structure. Thus, it is crucial for lecturers to have fundamental knowledge about critical thinking as it helps develop lecturer competency in teaching and researching. Accordingly, lecturers need to take the opportunity to explore critical thinking skills to enable self-development and discovery of new knowledge.

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