



How to cite this article:

Mat Said, N. A., Bujang, S. M., Buang, N. A., Siraj, H. H., & Awang Besar, M. N. (2021). Conceptualizing a critical thinking learning transfer model: A qualitative approach. *Malaysian Journal of Learning and Instruction*, 18(1), 111-130. <https://doi.org/10.32890/mjli2021.18.1.5>

CONCEPTUALIZING A CRITICAL THINKING LEARNING TRANSFER MODEL: A QUALITATIVE APPROACH

**¹Noor Azura Mat Said, ²Siti Mariam Bujang, ³Nor Aishah Buang,
⁴Harlina Halizah Siraj @ Ramli & ⁵Mohd Nasri Awang Besar**

¹Faculty of Medicine & Health Sciences
Universiti Sains Islam Malaysia

^{1,2,4&5}Department of Medical Education, Faculty of Medicine
Universiti Kebangsaan Malaysia, Malaysia

³Faculty of Education, Universiti Kebangsaan Malaysia, Malaysia

²*Corresponding author: ct.mariam@ppukm.ukm.edu.my*

Received: 7/2/2020

Revised: 1/10/2020

Accepted: 5/10/2020

Published: 31/1/2021

ABSTRACT

Purpose – Although there is a growing interest in Critical Thinking Learning Transfer (CTLT), detailed information regarding the transfer seems to be lacking, particularly in the Malaysian context. In addition, past studies have not focused on medical education. This raises the question: How do Malaysian medical undergraduates transfer their critical thinking learning? Thus, this study sought to explore the CTLT process among medical undergraduates in Malaysia, synthesize the CTLT model and present the types of CTLT.

Methodology – A qualitative case study approach was adopted. Eight medical undergraduates were selected using purposive sampling, through two sampling strategies. Data was obtained via in-depth interviews and analysed using thematic analysis.

Findings – Three types of CTLT were found, namely near transfer, far transfer, and integrated transfer. Each type of transfer was specified into components. The participants’ conceptions of the CTLT process led to the development of a model that presented the types of CTLT and provided a better understanding of the extension of occurrence of CTLT among medical undergraduates.

Significance – The CTLT model adds value to the description of the CTLT process among students, especially in the context of the early clinical year medical programme. The model may also influence the future development of critical thinking pedagogies.

Keywords: Conceptualization, critical thinking, learning transfer, extension of occurrence, medical undergraduates, qualitative case study.

INTRODUCTION

Presently, most educators are keen on innovative pedagogies such as learning with drones or robots. However, before inventing such pedagogies, an educator must understand the basic concept of students’ learning process, so that learning is suited to the learners, whether they are older learners, or children who are not yet able to differentiate between a whale and a fish. In this regard, most learning theories present conceptualizations of students’ learning, which have become fundamental in pedagogical development and innovation (Badyal & Singh 2017; Goldie, 2016; Khalil & Elkhider 2016; Kolb et al., 1999). In this study, learners refer to adult medical students, who are different from child learners partly because they have had more life experiences and should be viewed as capable (Knowles et al., 2005).

In Malaysian medical schools, the learning of medical concepts in the past decade have occurred in separate medical blocks and specialties such as Medicine, Surgery, and Obstetrics/Gynaecology (Ghee, 2016), without integration of medical subjects. With the transformation of the medical curriculum, these individual subjects have been integrated into the learning of the human body system, which requires medical students to analyse all the systems to understand medical concepts. Such practice urges students to not only master subject matter knowledge but also to be proficient in the 21st century learning skills needed to empower their learning in terms of critical thinking. Many researchers believe in developing critical thinking as it is recognized as an essential competency for medical graduates, a prerequisite skill for working professionals, a fundamental goal of the educational outcome, and a criterion for the accreditation of medical schools (Abdul Hamid, 2015; Azizi-Fini et al., 2015; Huang et al., 2015; Kivunja, 2014; Turner & Wattanakul, 2016).

Learning is said to be successful when there is transferability of learned knowledge or skills from one learning context to other learning contexts, such as application towards the job, personal lives and daily situations. Transferability of learned knowledge or skill is the main reason for the focus on Critical Thinking Learning Transfer (CTLT) in this study. Transfer is derived from the word, *trans*, which means cross or over, while the word *ferre* means carrying over. There are various definitions in the literature relating to the concept of learning transfer and critical thinking transfer.

Traditionally, learning transfer is regarded as the ability to apply what has been learned to new and unfamiliar tasks or situations (Christie et al., 2016; Ennis, 2016; Haskell, 2016; Riesenmy et al., 2013; Sieck, 2013). New conceptions regarding learning transfer currently arise, such as learning transition and emphasizing on how learning has changed over time, or learning transformation in which students undergo a significant change in their understanding of a phenomenon as a result of particular learning experiences or activities (Njiro, 2014; Rhind et al., 2011). Also, some authors perceive learning transfer as learning across certain boundaries, such as transfer across domains and transfer across the curriculum (Ennis, 2016; Geertsen, 2013), while others have studied learning transfer in real-life application of knowledge and skills, known as “bringing theory into practice” (Makransky et al., 2016). Regardless, Haskell (2016) affirms that learning transfer requires learning new things. He also asserts that without learning something new, learning is regarded as a simple application. Roumell (2019) emphasizes the difference between learning transfer and transformative learning as follows: “Learning transfer entails practicing the application of knowledge, perspectives, and skills across contexts, while transformation would imply a fuller integration of the perspectives, knowledge, and skills into one’s world perspective” (p. 2). Some researchers also agree that transfer of learning occurs when learning in one context is refined, and improves the performance in a similar context or another unrelated context with similar characteristics (Perkins & Salomon, 1992; Peters et al., 2018; Tibebu et al., 2018). Similarly, Reece (2007) views transfer of learning as an ability to extract a particular skill from the original context so that it is applied in another context.

Critical thinking transfer, an extension to the concept of learning transfer, has been widely debated, as it is regarded as a recognition of cognitive skills or strategies in a particular context, the appropriateness of those skills in that context, and the extension of transfer of the skills and strategies to new contexts, which will increase the probability of desired outcomes (Atabaki et al., 2015; Halpern, 2014; Lai, 2011). For example, in Medicine, a doctor would try to find the best solution to patients’ problems.

Previous studies on CTLT have mainly emphasized theoretical definitions of learning transfer and critical thinking transfer (Atabaki et al., 2015; Dominguez et al., 2014; Fahim & Eslamdoost, 2014; Halpern, 2014; Huang et al., 2015; Kahlke, 2016; Papp et al., 2014; Pieterse et al., 2015; Sada et al. 2016). Therefore, the definition of CTLT in the current study, which will be discussed further below, has been conceptualised based on these studies.

In learning transfer, Perkins and Salomon (1992) and Reece (2007) have focused on learning in the original context, which coincides with a definition of critical thinking transfer that emphasizes on the recognition of cognitive skills or strategies in a particular context (Atabaki et al., 2015; Halpern, 2014). Additionally, researchers have stressed on the need to identify similar characteristics between the learning context and the application context before the transfer may take place (Perkins & Salomon, 1992; Peters et al., 2018; Tibebu et al., 2018). Atabaki et al. (2015) and Halpern (2014) have also emphasized on examining the appropriateness of cognitive skills in regards to application. Next, the recognition of cognitive learning skills, identification of similar characteristics, and examination of the appropriateness of those skills in application contexts may lead to the applicability of learning or transfer of learning (Christie et al., 2016; Ennis, 2016; Haskell, 2016). Subsequently, during the transfer of learning, the extension of skills transfer to application contexts (Atabaki et al., 2015; Halpern, 2014; Lai 2011). Consequently, the transfer of learning will impact on the outcomes of learning, wherein learners are able to adapt critical thinking learning by acquiring new critical thinking skills and refining their learnt skills (Haskell, 2016). Finally, learning performance and the probability of achieving desired outcomes will be increased (Atabaki et al., 2015; Halpern 2014; Peters et al., 2018; Tibebu et al., 2018). It is obvious that the concept of critical thinking transfer and learning transfer are unclear due to different conceptualizations among previous authors. These definitions lack detailed descriptions regarding CTLT, and especially in relation to the early clinical years of a medical programme in a Malaysian public university.

Based on the existing definitions, the researchers conceptualized CTLT in this study as the ability of a learner to acquire meaningful knowledge, skills, or strategies that are specific to the original context, which is the learning context. In the learning context, the learners need to identify the common traits between the original context and the context of application. Common traits refer to similar characteristics or patterns found in the problems or situations presented in the context of learning and context of application. The learners also need to identify the cognitive skills or strategies that are best suited for the application context, such as on-the-job context, personal context, non-

learning context, and social context. Next is the adaptation of those skills or strategies to that application context, in which the learners refine their learning and learn new things. The adaptation may lead to critical thinking learning transfer. Besides, the learners also need to consider the extension of CTLT during the transfer. Finally, the learners may achieve the desired outcomes such as the ability to provide the best solution to a problem.

Based on this conceptualization, the research chose to focus on the process of CTLT among the medical undergraduates. Previous studies regarding CTLT were explored; however, in these studies, either in Malaysia or elsewhere, there have been a lack of focus on the process. Moreover, while there seemed to be a growing interest in learning transfer and critical thinking transfer (Kilbrink et al., 2018; Raaijmakers, et al., 2018; Wang et al., 2018), these studies have been influenced by the definitions presented above, and lacked detailed explanations on how far CTLT occurred among students. In some countries that have shown increasing interest in critical thinking transfer research, most studies have used quantitative approaches (Holland & Ulrich, 2016; Makransky et al., 2016; Raaijmakers et al., 2018; van Peppen et al., 2018; Wang et al., 2018). Among past qualitative studies (Kilbrink et al., 2018; Peters et al., 2018), there is also an absence of research on the CTLT process, especially among medical undergraduates. Similarly, in Malaysia, knowledge about CTLT has not advanced due to a lack of focus on such research (Baser et al., 2017; Jerome et al., 2017; Ludin, 2018; Zabit et al., 2016), especially in medical education (Lim et al., 2019; Sahoo & Mohammed, 2018).

In conclusion, previous studies have not been able to provide a single definition that can help readers understand the concept of CTLT. Additionally, the CTLT process has not been emphasized thus far, especially in the context of the early clinical years of the medical programme in a Malaysian public university. It is argued that without a clear explanation of the CTLT process, the extension of occurrence of CTLT among medical undergraduates could not be well understood and the future development of critical thinking pedagogies may be distorted.

Therefore, this study sought to explore the CTLT process among medical undergraduates in a Malaysian public university and to synthesize the CTLT model. This model would present the types of CTLT that occurred among medical undergraduates, and should help in understanding the extension of CTLT occurrence among them. In the next section, the research methodology is described, beginning with the qualitative case study approach. Then, the results are presented and discussed in terms of the three main themes, with examples from the data. The themes are explained in a way that gives added gain an in-depth understanding of the phenomena of the study.

Data Collection

This study used semi-structured in-depth interviews (see Appendix for interview questions) to obtain undergraduate medical students' perspective of the types of critical thinking learning transfer as it was more flexible (Creswell, 2014); interviews allowed the researchers to explore in-depth the emic (informative) rather than etic (researcher's) perspective (Merriam, 2009). Thus, researcher biasness can be reduced. This technique also helped the researchers to explore the data more deeply (Seidman, 2006) and the use of questions as the basis of the interviews ensured coverage of all the essential information that would help meet the research objectives (Seidman, 2006).

PROCEDURE

Permission

Ethics approval was obtained from the ethical body of the university where the study was conducted.

Selection Criteria

Creswell and Poth (2018) proposed that there is a need for a set of criteria in selecting the case. In this study, the first criterion was the selection of public medical schools established around the 1970s and above. This ensured better quality in the teaching and learning of critical thinking. Three public universities in Malaysia were predetermined based on this criterion. From the three universities, the researchers limited the scope to universities that offered formal training in critical thinking. Based on the second criterion, the medical programme in a public university was selected as a bound system. As the study was concerned about critical thinking learning transfer among medical undergraduates, the study explored a single case only, covering medical undergraduates who enrolled in the early clinical year at the university. This case was selected because the researchers wanted to gain an in-depth understanding of the students' critical thinking practice that emphasized on the types of CTLT.

Selection of Case

Prior to the study, the researchers set participant selection criteria, namely those who would be able to provide the desired information, give rich information and cooperate in the study. Based on the recommendations of Yin (2014), the

researchers contacted the Head of the Year Three Medical Programme of the university, who assisted in identifying suitable participants. Information about the participants was later obtained from the ethical body of the university for easy identification. The selection was then made using the sampling technique mentioned earlier. All the participants were given a letter which contained an invitation to participate as well as the purpose of the study. Those who agreed to participate signed a form as proof of their official consent.

Preparing for the Interview

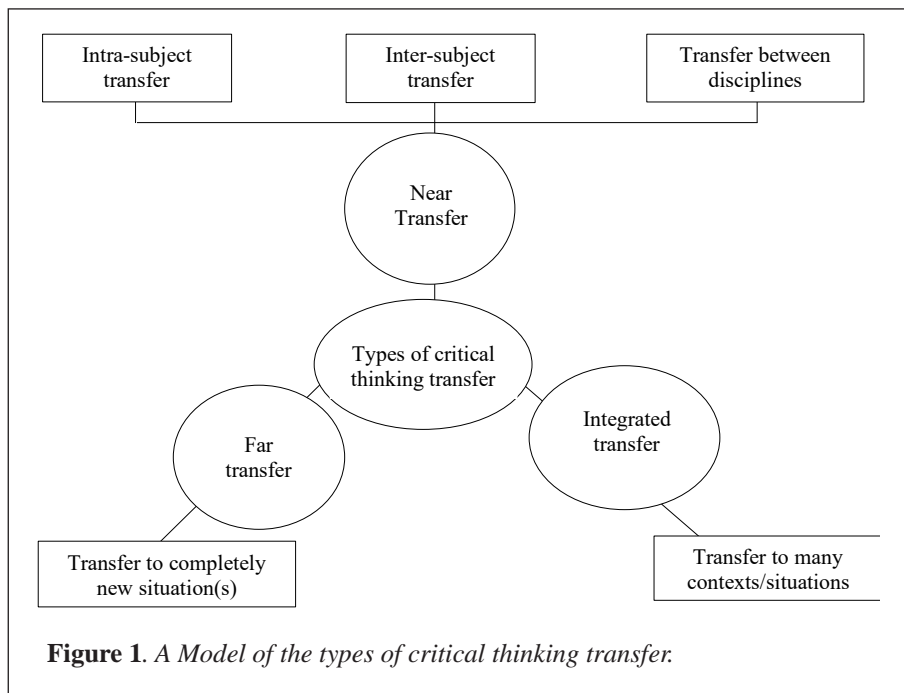
Preparation for the interviews included determining a suitable location, obtaining a quality voice recorder, building and validating the interview questions, and creating a diary to record any non-verbal cues and participants' body language.

Data Analysis

The data collection process and data analysis were carried out concurrently. After the first phase interview of participant 1, the researchers continued with the analysis once the transcription of the interview data was completed. Thematic analysis using the constant comparative technique was conducted to produce the categories and themes. At the beginning of the analysis, the researchers performed open-coding by placing any meaningful codes on the participants' answers. Further, these codes were compared to the table containing themes gathered from the literature about CTLT. The table provided these codes a more significant meaning based on the literature review. The codes were compiled under specific categories and themes. The comparison between the findings in the first phase and the findings from literature allowed the researchers to determine the gaps that were not explored during the first interview.

RESULTS

Based on the exploration of the CTLT process, the researchers synthesized a CTLT model, as shown in Figure 1. This model aided in understanding the extension of CTLT occurrence among the participants, which is presented as the types of CTLT, namely (1) near transfer, (2) far transfer, and (3) integrated transfer. The types of transfer are described in detail based on the context of these medical undergraduates.



Type 1: Near Transfer

The first type of CTLT is near transfer. This type of transfer occurs from one learning context to another learning context. Near transfer is represented by three components: intra-subject transfer, inter-subject transfer, and inter-discipline transfer.

Intra-subject transfer

In intra-subject transfer, the transfer of critical thinking learning occurs from one clinical component to another in a medical subject. Such transfer involves concept relationship skill, the skill of relating between two or more medical concepts. For example, the concept relationship that is applied to determine an anatomical structure A can be used in other anatomical structure in an Anatomy subject. Intra-subject transfer was commonly expressed by participants 3, 5, and 8, as indicated in the following quotes:

- “...we relate concepts within-subject.” (Participant 3)
- “Yes, because anatomy is not only about the organ, but nerve, blood muscle... so [they are] related. For example, [the] heart may affect [the] brain. So, if the blood supply does not reach [the] brain, it causes stroke; if [it does] not supply the lower limb, [you] can get intermittent claudication.” (Participant 5)

- “...goes back to its function, such as nerve function. [The] function will affect which part of the body? For example, one vessel may supply this part, another vessel may supply another part. Seem like 3D. So, relating the concepts and the structure.” (Participant 8)

Based on the CTLT conceptualization, the researchers assert that learners need to identify the common traits between the original context and the context of application. Common traits represent similar traits or existing patterns in both the learning context and the application context. The participants described two similar characteristics of both contexts that helped the intra-subject transfer. The first characteristic was the origin of the disease. Participants acknowledged that analysis skills used in confirming cancerous cells located in a patient’s lung might be similar to the skills in analysing a neighbouring organ such as the heart, due to the similarity in the origin of cancer. For instance, participant 7 said, “*I think... like cancer, how it spreads ... Somehow, some that [are] closer... maybe they share the same lineage.*”

Besides that, the similarity in the structure and function of human organs also led to the CTLT in a medical subject. The second characteristic was described by participants 2, 5, 6 and 8. For example, participant 2 asserted that the similarity of the structure and function of the human body, such as blood supply, allowed the transference of analysing a particular human organ or human body system: “*Yes, they share the same blood vessels, same nerve supply...the concept, we can apply the same*”

Inter-subject Transfer

The second component of near transfer was an inter-subject transfer, which occurred from one medical subject to another medical subject. This component was found in all participants’ descriptions. For instance, one of the participants explained that clinical data interpreting skills such as interpretation of the level of haemoglobin that they had learned in Biochemistry can be transferred to another medical subject such as Pathology. Participant 5 pointed out that all the subjects were integrated, and the skills used in one medical subject were also used in another medical subject: “*All subjects are interlinked. If we know Anatomy, we also know Physiology.*”

Other participants remarked:

- “*Maybe pathology can [be transferred]. Pathology is a disease. So, we need to see the disease, then we know [whether] it is correlated to anatomical structure or not.*” (Participant 2)
- “*To me, I think it’s related. Anatomy is its structure, then Physiology... how the structure functions. Then, pathology is... if there is injury, then it becomes disease. So, it’s like in the circle ...*” (Participant 3)

Inter-discipline Transfer

The final component of near transfer was inter-discipline transfer. This component was represented by the transfer of critical thinking between clinical disciplines such as Community Health posting, Surgery posting, Internal Medicine posting, Obstetrics and Gynaecology posting, and Orthopaedics posting. For participant 5, the critical thinking skills that he learned in his Community Health posting helped in his Internal Medicine posting. Inter-discipline transfers also occurred between different academic years. This type of transfer was evident in the following quotes:

- “...posting JKM, we see ‘kampung people’ in which we applied knowledge in PPD, and also a bit of Internal Medicine knowledge.” (Participant 3)
- “So, knowledge from JKM (Jabatan Kesihatan Masyarakat) can be applied to IM (Internal Medicine), and knowledge from IM can be applied to surgery.” (Participant 5)
- “From preclinical to clinical...[a] really big transfer.” (Participant 6)

Moreover, in the conceptualization of CTLT, the researchers stressed on the acquisition of meaningful cognitive skills by the learners that are specific to the learning context. In this study, cognitive skills referred to critical thinking skills. All of the components of near transfer involved critical thinking skills specific to a particular medical subject, as found in the following participants’ descriptions:

- “Anatomy and Physiology, although they are related, they [are] not a similar group of knowledge. So, they require probably a different set of critical thinking.” (Participant 4)
- “Not [so]...because anatomy is more like you understand the structure, you need to know the structure...but Physiology understands how the body works. Pathology, we have to understand the disease, the causes. They [are] slightly different from one another.” (Participant 6)

Type 2: Far Transfer

The second type of CTLT is known as far transfer. This type of transfer is the transfer from a learning context to an application context, which involves two components. The first component comprises the transfer of critical thinking from a learning situation to an entirely new situation such as personal life, professional situations, and non-clinical events. Most participants acknowledged this component. For example, participant 3 noted that in his

case, the transfer of critical thinking skills relating to a disease studied in the clinical year took place, in that it was applied to a personal situation to assess the control of factors that caused him to be obese. Participant 5 admitted that the ability to analyse the risks of a job while studying in a clinical year, such as hazard identification and risk factors, enabled him to apply the same skills in a non-clinical situation.

This type of near transfer also involved the transfer of critical thinking from a learning situation to a real-life situation, as reported by participant 3 and 9:

- *“For example, knowledge gained from the clinical year ...I apply and advice my family.”* (Participant 3)
- *“In problem-based learning, it is necessary to discuss the accurate diagnosis. Then from the diagnosis, we need to create appropriate clinical investigations as well as assess the findings. Then all of these help in synthesizing a patient management plan. This can be applied in the clinical year”.* (Participant 9)

Another example of far transfer can be seen in the following quotes:

- *“Clinical to daily situation can be transferred.”* (Participant 8)
- *“Based on [what] we have learnt in medical, we can do the physical examination on our mom.”* (Participant 9)

Type 3: Integrated Transfer

Type 3, the final type of CTLT, is integrated transfer. Type 3 involves the transfer of critical thinking from one context to all contexts of situation, regardless of whether the transfer occurs from a learning situation to a learning situation, or from a learning situation to an application situation. Most participants reported this type of transfer. For example, participant 5 stated that critical thinking was crucial in making decisions on all matters. Besides, this type of transfer also involves general critical thinking skills that apply to different situations, as confirmed by participants 3, 4, and 7. For example, participant 4 explained, *“...we have a set of general skills that can [be] used for different situations.”* Other participants also pointed to integrated transfer:

- *“Critical thinking is important in making decision for all things”* (Participant 5)
- *“I think it can apply to many things because [of] the way we think critically in different situation; it has to depend on situations”* (Participant 6)

DISCUSSION

Past literature has merely presented definitions of learning transfer and critical thinking transfer (Atabaki et al., 2015; Christie et al., 2016; Ennis, 2016; Halpern, 2014; Haskell, 2016; Peters et al., 2018; Perkins & Salomon, 1992; Reece, 2007; Tibebu et al., 2018). Besides, the definitions have also been presented separately. Thus, in this study, the researchers argued for a conceptualization of Critical Thinking Learning Transfer, based on the definitions of learning transfer and critical thinking transfer. This conceptualization made the researchers look into previous studies relating to CTLT. However, there seemed to be a lack of studies focusing on CTLT. Hence, the researchers argued for an overall understanding of the CTLT process, and examined this process using a qualitative approach, so that it could be explored in more contexts among medical undergraduates in Malaysia. The exploration resulted in the synthesis of the CTLT model. Based on the model, the results of the study supported the researchers' claim regarding the conceptualization of CTLT. Drawing upon the views of Atabaki et al. (2015), Halpern (2014), Perkins and Salomon (1992), and Reece (2007), the researchers conceptualized CTLT as the acquisition of meaningful critical thinking skills that are specific to the learning context. The results of the study were consistent with this conceptualization in that the components of Type 1 Transfer were evident in the participants' descriptions of critical thinking skills as being specific to the learning of a particular medical subject. Moreover, the researchers' view regarding the adaptation of critical thinking skills or strategies to the application context were also supported by the study findings. In Type 2 Transfer, data showed that the critical thinking skill had been adapted to entirely new situations, such as personal life, professional situations, and non-clinical situations. In addition, the findings in regards to Type 3 Transfer were also consistent with the conceptualization, where the critical thinking skills were found to have been adapted to any situation. Haskell (2016) also stressed on adaptation in terms of the ability to learn new things and refine learning.

The current CTLT model has expanded on earlier concepts presented in the literature that addressed the process of CTLT (e.g., Atabaki et al., 2015; Christie, et al., 2016; Ennis, 2016; Halpern, 2014; Perkins & Salomon, 1992; Haskell, 2016). The process emphasized on the extension of CTLT occurrence among medical undergraduates, and presented the types of CTLT that were particularly relevant in the context of early clinical years of the medical programme in a Malaysian public university. Type 1 transfer, classified as near transfer of critical thinking, occurs from one learning situation to another learning situation. For example, critical thinking skills used in learning

anatomical structure can be transferred for learning the pathogenesis of disease.

Three components represented near transfer: intra-subject transfer, inter-subject transfer, and inter-discipline transfer. In intra-subject transfer, the transfer of critical thinking occurred from one clinical component to another clinical component in a medical subject. For example, learning the subject of Anatomy allowed students to apply the skill of analysing the features of blood vessels in organ A to other anatomical structures. Based on the findings, there were two requirements for the occurrence of intra-subject transfer. First, the researchers believed that the application of the prerequisite skill towards critical thinking was needed before intra-subject transfer occurred. This belief was supported by the participants' assertion regarding the requirement of concept relationship skills for the occurrence of intra-subject transfer, as well as by previous studies regarding the concept relationship skills presented in a concept map or mind map. This skill has been widely studied and has been proven to help in critical thinking cognitive skills and critical thinking dispositions (Abd El-Hay et al., 2018; Yue et al., 2017; Zvauya, et al., 2017).

Besides the concept relationship skill, participants affirmed that the occurrence of intra-subject transfer required similarity in terms of characteristics between the original context (learning context) and the application context. In the conceptualization of CTLT, the researchers also claimed that the medical undergraduates should identify a similar trait or pattern that exists between the learning context and the application context. The claim was consistent with Perkins and Salomon's (1992) definition of transfer of learning. Other authors (Peters et al., 2018; Tibebu et al., 2018) also support the need for identification of similar characteristics between the learning context and the application context before the transfer takes place. In this study, the participants indicated that a similar origin of disease would determine the occurrence of intra-subject transfer. For example, the analysis skill used for confirming cancer in organ A was used in confirming cancer in another organ, due to the similar origin of cancerous cells. Besides that, the data also revealed that the similarity in anatomical structure and physiological function of human organs led to the occurrence of transfer of critical thinking in a medical subject.

The second component was inter-subject transfer, which occurred from one medical subject to another medical subject. This notion was consistent in all participants' descriptions. For instance, one of the participants asserted that clinical data interpreting skills such as interpretation of the level of haemoglobin learned in Biochemistry can be transferred to another medical subject such as Pathology. Another participant also pointed out that all subjects

were integrated in the sense that the skills used in one medical subject were also used in another medical subject such as Physiology.

The final component of near transfer was inter-discipline transfer. The participants in this study needed to apply critical thinking skills learned in the clinical year to the community, where they needed to advise people regarding their health status. This type of transfer was quite challenging for the students in terms of gaining trust from people. The situation required them to think critically in order to persuade people to check their health status using the medical service handled by the students. The participants expressed that the critical thinking skills that they learned in one clinical posting was transferred to another clinical posting. It was revealed that inter-discipline transfer also occurred between different academic years. For example, the skill of analysing patients' information that these students learned in the Problem-Based Learning module during the preclinical year could be used in patients' engagement in the clinical year.

The findings also showed that all components of near transfer involved critical thinking skills specific to a particular medical subject, that is, subject-specific critical thinking skill. The transfer of subject-specific critical thinking skills is parallel with McPeck's (1990) view that thinking depends upon subject matter. Brell (1990) also claims that critical thinking is "a body of diverse sets of skills, each peculiar to an academic subject" (p.1), while Billing (2007), Glaser (1984) and Halpern (1998) agree that critical thinking is knowledge-driven. In contrast, others have argued that knowledge in a field of study is not sufficient for people to think critically (Christie et al., 2016; Lai, 2011). Besides, most people who are knowledgeable in a particular area of study can make errors in their thinking due to the tendency of interpreting a specific situation and ignoring transfer (Makransky et al., 2016). Nonetheless, this study found that the near transfer that occurred among participants involved critical thinking skill specific to medical subjects.

Type 2 transfer, namely far transfer, was found to occur in two situations in the data. Firstly, it involved the transfer of critical thinking from a learning context to an application context or the transfer of critical thinking from a context of learning to an entirely new situation, such as personal life, professional situations, and non-clinical events. Secondly, this type of transfer also involved the transfer of critical thinking from a learning situation to a real-life situation. These findings are consistent with other studies that have also provided similar evidence on far transfer (Kilbrink et al., 2018; Makransky et al., 2016; Raaijmakers et al., 2018; Tibebu et al., 2018). Although the Type 2 transfer has been termed differently, including "high road transfer," "far transfer," and "transfer across a domain" (Makransky et al., 2016; Perkins

& Salomon, 1992), all of them are in accordance with the findings on far transfer in this study. Moreover, the current results revealed details that the understanding was also found to be more frequently contextualised in the critical thinking curriculum in the early clinical year of the undergraduate medical programme in Malaysia.

The final type of transfer (Type 3), also known as integrated transfer, gives added value to the theory of transfer. It was found that Type 3 transfer involved general critical thinking skills such as critical reasoning skills, and that this type of transfer occurred from one context of situation to all contexts of the situation, whether in learning or non-learning situations. Findings regarding Type 3 transfer are supported by generalists such as Ennis (2016), Halpern (2014) and Kuhn (1999) who agree that there exists a set of general critical thinking skills that can be applied in any learning domain.

CONCLUSION

This study has provided detailed information regarding the Critical Thinking Learning Transfer process by presenting the types of CTLT, including the components of transfer. All the types of CTLT presented in the model add extra value to the available descriptions of the concept critical thinking transfer from past theoretical and empirical work (Ennis, 2016; Haskell 2016; Tibebu et al., 2018; Peters et al., 2018; Raaijmakers et al., 2018; van Peppen et al., 2018). Additionally, the study has contributed to the body of literature in terms identifying the elements needed for the transfer of critical thinking and learning to occur. These elements are prerequisite skills such as concept relationship and the equality of characteristics across contexts. However, the similarity of these characteristics is only in the transfer of critical thinking in intra-subject situations. The use of the qualitative approach allowed an in-depth exploration of CTLT, leading to a better understanding of the concept as well as the extension of occurrence of CTLT among participants. It also helped in the development of a CTLT model that is more contextualised in the curriculum of early clinical years of an undergraduate medical programme in a Malaysian public university. The study is expected to help other educators and researchers in the advancement of critical thinking pedagogies in medical education.

ACKNOWLEDGMENT

This work was supported by the *Sekretariat Penyelidikan Perubatan dan Inovasi* (Medical Research and Innovation Secretariat), Universiti Kebangsaan Malaysia Medical Centre Grant FF-2017-436.

REFERENCES

- Abd El-Hay, S. A., El Mezayen, S. E., & Ahmed, R. E. (2018). Effect of concept mapping on problem solving skills, competence in clinical setting and knowledge among undergraduate nursing students. *Journal of Nursing Education and Practice*, 8(8), 34-46. <https://doi.org/10.5430/jnep.v8n8p34>
- Abdul Hamid. (2015). Prospective critical thinking and cognitive students based learning through inquiry. *International Conference on Chemistry* (pp. 169–174). Lambung Mangkurat University.
- Atabaki, A. M. S., Keshtiaray, N., & Yarmohammadian, M. H. (2015). Scrutiny of critical thinking concept. *International Education Studies*, 8(3), 93–102. <https://doi.org/10.5539/ies.v8n3p93>
- Azizi-Fini, I., Hajibagheri, A., & Adib-Hajbaghery, M. (2015). Critical thinking skills in nursing students: A comparison between freshmen and senior students. *Nursing and Midwifery Studies*, 4(1), 1–5.
- Badyal, D. K. & Singh, T. (2017). Learning theories: The basics to learn in medical education. *International Journal of Applied & Basic Medical Research*, 7(5) 1-3.
- Baser, J. A., Hasan, A., & Asha, A. H. (2017). A study on the transferable skills of the engineering students at Universiti Tun Hussein Onn Malaysia. *Jurnal Pendidikan Teknologi Dan Kejuruan*, 23(3), 257–264.
- Billing, D. (2007). *Teaching for transfer of core/key skills in higher education: Cognitive skills. Higher Education* (Vol. 53). <https://doi.org/10.1007/s10734-005-5628-5>
- Brell, C. D. (1990). Critical thinking as transfer : The reconstructive integration of otherwise discrete interpretations of experience. *Educational Theory*, 40(1), 1–3.
- Christie, B., Beames, S., & Higgins, P. (2016). Context, culture and critical thinking : Scottish secondary school teachers ' and pupils ' experiences of outdoor learning. *British Educational Research Journal*, 42(3), 417–437. <https://doi.org/10.1002/berj.3213>
- Creswell, J. W. (2014). *Research design qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design. Choosing among five approaches* (4th ed.). Sage Publications.
- Ennis, R. H. (2016). Critical thinking across the curriculum : A vision. *Science + Business Media*, 1–20. <https://doi.org/10.1007/s11245-016-9401-4>
- Geertsen, R. (2013). Barriers to critical thinking across domains. *Review of Management Innovation & Creativity*, 6(20), 52–60.
- Ghee, L. K. (2016). *The history of medicine and health in Malaysia*. Lim Kean Ghee.

- Glaser, R. (1984). Education and thinking the role of knowledge. *American Psychologist*, 39(2), 93–104.
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains. *American Psychologist*, 53(4), 449–455.
- Halpern, D. F. (2014). *Thought & knowledge: An introduction to critical thinking* (5th Ed.). Psychology Press.
- Haskell, R. E. (2016). *Transfer of learning cognition, instruction, and reasoning*. Academic Press (Vol. 6). Academic Press.
- Holland, C., & Ulrich, D. (2016). Critical thinking cards: An innovative teaching strategy to bridge classroom knowledge with clinical decision making. *Teaching and Learning in Nursing*, 11(3), 108–112. <https://doi.org/10.1016/j.teln.2016.01.005>
- Huang, L., Wang, Z., Yao, Y., Shan, C., Wang, H., Zhu, M., & Zhao, X. (2015). Exploring the association between parental rearing styles and medical students' critical thinking disposition in China. *BMC Medical Education*, 15, 88. <https://doi.org/10.1186/s12909-015-0367-5>
- Jerome, C., Lee, J. A. C., & Ting, S. H. (2017). What students really need: Instructional strategies that enhance higher order thinking skills (HOTS) among UNIMAS undergraduates. *International Journal of Business and Society*, 18(S4), 661–668.
- Khalil, M. K., & Elkhider, I. A. (2016). Applying learning theories and instructional design models for effective instruction. *Advances in Physiology Education*, 40(2), 147–156.
- Kilbrink, N., Bjurulf, V., Baartman, L. K. J., & de Bruijn, E. (2018). Transfer of learning in Swedish technical vocational education: Student experiences in the energy and industry programmes. *Journal of Vocational Education and Training*, 70(3), 455–475. <https://doi.org/10.1080/13636820.2018.1437064>
- Kivunja, C. (2014). Do you want your students to be job-ready with 21st century skills? Change pedagogies: A pedagogical paradigm shift from Vygotskyian social constructivism to critical thinking, problem solving and Siemens' digital connectivism. *International Journal of Higher Education*, 3(3), 81–91. <https://doi.org/10.5430/ijhe.v3n3p81>
- Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2005). *The adult learner* (6th ed.). Elsevier.
- Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (1999). *Experiential learning theory: Previous research and new directions*. Euclid Avenue.
- Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher*, 28(2), 16–25. <https://doi.org/10.2307/1177186>
- Lai, E. R. (2011). Metacognition: A literature review research report. *Research Reports*, (April), 41. <https://doi.org/10.2307/3069464>
- Lim, J. W., Othman, J., & Lo, Y. Y. (2019). Implementing a discipline-specific reflective critical thinking module for literature in English in Malaysia. *Innovations in Education and Teaching International*, 56(6), 690-699. <https://doi.org/10.1080/14703297.2019.1567370>

- Ludin, S. M. (2018). Does good critical thinking equal effective decision-making among critical care nurses? A cross-sectional survey. *Intensive and Critical Care Nursing*, 44, 1–10. <https://doi.org/10.1016/j.iccn.2017.06.002>
- Makransky, G., Bonde, M. T., Wulff, J. S. G., Wandall, J., Hood, M., Creed, P. A., ... Nørremølle, A. (2016). Simulation based virtual learning environment in medical genetics counseling: An example of bridging the gap between theory and practice in medical education. *BMC Medical Education*, 16(1), 1–9. <https://doi.org/10.1186/s12909-016-0620-6>
- McPeck, J.E. (1990). Critical thinking and subject specificity: A reply to Ennis. *Educational Researcher*, 19 (4), 10-12.
- Merriam, S. B. (2009). *Qualitative research a guide to design and implementation revised and expanded from qualitative research and case study applications in education* (2th ed.). Jossey-Bass.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. Wiley.
- Njiro, E. (2014). Moving transfer to transformative learning: A curriculum model for adult educators in Open Distance Learning (ODL). *Journal of Educational and Social Research*, 4(3), 479–486. <https://doi.org/10.5901/jesr.2014.v4n3p479>
- Perkins, D. N., & Salomon, G. (1992). Transfer of learning. In *International Encyclopedia of Education* (Second Edition.). Pergamon Press.
- Peters, S., Clarebout, G., van Nuland, M., Aertgeerts, B., & Roex, A. (2018). A qualitative exploration of multiple perspectives on transfer of learning between classroom and clinical workplace. *Teaching and Learning in Medicine*, 30(1), 22–32. <https://doi.org/10.1080/10401334.2017.1339605>
- Raaijmakers, S. F., Baars, M., Paas, F., van Merriënboer, J. J. G., & van Gog, T. (2018). Training self-assessment and task-selection skills to foster self-regulated learning: Do trained skills transfer across domains? *Applied Cognitive Psychology*, 32(2), 270–277. <https://doi.org/10.1002/acp.3392>
- Reece, G. J. (2007). Critical thinking and cognitive transfer : Implications for the development of online information literacy tutorials. *Research Strategies*, 20, 482–493. <https://doi.org/10.1016/j.resstr.2006.12.018>
- Rhind, S. M., Shaw, D. J., Bell, C. E., Mellanby, R. J., Hudson, N. P. H., Whittington, R. E., ... Donnelly, R. (2011). The transition into veterinary practice: Opinions of recent graduates and final year students. *BMC Medical Education*, 11(1), 1–10. <https://doi.org/10.1186/1472-6920-11-64>
- Riesenmy, M. R., Mitchell, S., Hudgins, B. B., & Ebel, D. (2013). Retention and transfer of children's self-directed critical thinking skills. *The Journal of Educational Research*, (March 2015), 37–41. <https://doi.org/10.1080/00220671.1991.10702808>

- Roumell, E. A. (2019). Priming adult learners for learning transfer: Beyond content and delivery. *Adult Learning*, 30(1), 15–22. <https://doi.org/10.1177/1045159518791281>
- Sahoo, S., & Mohammed, C. A. (2018). Fostering critical thinking and collaborative learning skills among medical students through a research protocol writing activity in the curriculum. *Korean Journal of Medical Education*, 30(2), 109–118. <https://doi.org/10.3946/kjme.2018.86>
- Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (3rd ed.). Teachers College Press.
- Tibebu, D., Gu, X., Cock, M. De, & Elen, J. (2018). Systematic design of domain-specific instruction on near and far transfer of critical thinking skills. *International Journal of Educational Research*, 87, 1–11. <https://doi.org/10.1016/j.ijer.2017.10.005>
- Turner, K., & Wattanakul, B. (2016). Development of EREC IF model to increase critical thinking and creativity skills of undergraduate nursing students. *International Journal of Social, Behavioral, Educational, Economic, Business, and Industrial Engineering*, 5(6), 1763–1767.
- van Peppen, L. M., Verkoeijen, P. P. J. L., Heijltjes, A. E. G., Janssen, E. M., Koopmans, D., & van Gog, T. (2018). Effects of self-explaining on learning and transfer of critical thinking skills. *Frontiers in Education*, 3(November), 1–11. <https://doi.org/10.3389/educ.2018.00100>
- Wang, C., Zhang, X., & Yao, M. (2018). Enhancing Chinese college students' transfer of learning through service-learning. *Studies in Higher Education*, 0(0), 1–16. <https://doi.org/10.1080/03075079.2018.1435635>
- Sieck, W. (2013). Critical thinking in decision making. *Global Cognition*, 1–2. <https://doi.org/10.1016/j.learninstruc.2009.12.001>
- Yin, R. K. (2014). *Case study research design and methods* (5th ed.). Sage Publications.
- Yue, M., Zhang, M., Zhang, C., & Jin, C. (2017). The effectiveness of concept mapping on development of critical thinking in nursing education: A systematic review and meta-analysis. *Nurse Education Today*, 52. <https://doi.org/10.1016/j.nedt.2017.02.018>
- Zabit, M. N. M., Karagiannidou, E., & Zacharia, T. Z. (2016). Teaching business in Malaysia and the use of PBL to nurture students' critical thinking: A case study of Sultan Idris Education University. *Geografia - Malaysian Journal of Society and Space*, 12(6), 1–11.
- Zvauya, R., Purandare, S., Young, N., & Pallan, M. (2017). The use of mind maps as an assessment tool in a problem based learning course. *Creative Education*, 8(11), 1782–1793. <https://doi.org/10.4236/ce.2017.811122>

APPENDIX

Sample Interview Questions

1. How can the critical thinking skills learned in the classroom be applied to clinical year situations, for example during bedside teaching?
2. Do you think the application of critical thinking may differ between different subjects, such as Physiology and Parasitology?
3. What are your opinions on the need for critical thinking in helping or solving your daily problems, or in your profession?