

**A Narrative Inquiry on Chinese International Doctoral Students’
Perspectives on Developing Critical Thinking in the U.S.**

A Dissertation Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Shuaipu Jiang

December 2023

Copyright © 2023 by Shuaipu Jiang
All rights reserved.

ACKNOWLEDGEMENTS

Pursuing my PhD over the past five and a half years has been an extremely challenging journey. I encountered numerous difficulties and obstacles throughout the process, and it was far from easy. Along the way, I faced physical pain, illnesses, and financial struggles. Despite these challenges, I persevered and successfully completed my degree.

I want to express my sincere gratitude to my advisor and my Committee Chair, Dr. Sun. She is not only the most important teacher in my life but also someone I admire greatly and who has provided me with immense assistance. Without her guidance, care, support, and love, I would never have been able to complete this doctoral journey. She showered me with her caring and nurturing teacher's love, encouraging me and giving me strength during my most difficult times. With her wisdom and experience, she guided my research and studies. She is an outstanding mentor, much like Confucius, a truly exceptional and rare educator who tailors her teaching to each individual's needs. Words cannot adequately convey my deep appreciation for her. I truly believe that Dr. Sun is the best advisor. I was fortunate to have an exceptional doctoral mentor. I wholeheartedly appreciate Dr. Sun for her contributions and help during my doctoral journey.

Furthermore, I want to express my gratitude to all the teachers on my committee. I appreciate their valuable time and guidance in my research. I especially would like to express my gratitude to Dr. Misawa for serving on my committee and supporting me despite his busy schedule. I particularly want to thank Dr. Hao as she has been helping me in a lot of aspects beyond my dissertation for a long time, since the time prior to the beginning of my dissertation. I appreciate her kindness and help. I also want to thank Dr. Skolits for his intelligence and guidance on the methodology as well as his high responsibility to stay in my committee even after his retirement.

I am immensely grateful to my parents for the role they have played in shaping me into the person I am today. My father, in particular, has been an unwavering pillar of support, guiding me every step of the way with his sage advice and assistance. As they say, parents are a child's first teachers, and my father has been an exceptional one at that. Without his nurturing influence, I might have just been an ordinary child. But thanks to his constant encouragement, inspiration, and guidance, I have been able to achieve great academic success, and I am now at the cusp of obtaining the highest educational degree. I feel incredibly proud and honored to have such a remarkable and caring father in my life.

I am also very grateful to my mother for providing me with financial support during my PhD studies. Without her assistance, I would not have been able to complete my doctoral degree. Additionally, I appreciate my aunt for taking care of me from a young age and showing me love, care, and support throughout my life. I would also like to express my gratitude to Bear, who has been with me through thick and thin, taking care of me even during my lowest moments. Finally, I want to thank all of my dear friends for their support and encouragement. In the future, I hope to use the knowledge and skills I have gained through my PhD studies to give back to society and make meaningful contributions to the world.

ABSTRACT

Guided by transformative learning theory and Perry's scheme of intellectual and ethical development, this dissertation study examines Chinese international doctoral students' critical thinking development process in the US. The two research questions that guided this study are: (1) How do Chinese international doctoral students understand and conceptualize critical thinking? and (2) How have Chinese international doctoral students developed critical thinking during their doctoral studies in the U.S.? Narrative method design is applied to the study, which interviews eight participants. Using narrative thematic analysis of data, four key themes emerged from the study: a) awareness of critical thinking in Western versus Chinese context, b) sufficient understanding of critical thinking, c) transformation versus amplification, and d) developing critical thinking relying on self and others. Through participants' narratives, this study enriches our understanding of Chinese international doctoral students' journey towards elevated critical thinking. The study sheds light on how critical thinking develops in Western and Chinese contexts, influenced by cultural factors, education, and personal agency. The study has provided valuable insights into different ways of comprehending and advancing critical thinking. As a result, the study enhances our understanding of the journey of Chinese international doctoral students toward elevated critical thinking, by providing valuable insights into educational theory and international adult learning experiences. These findings have implications for educational practices, highlighting the need for personalized support systems and culturally sensitive approaches. It emphasizes the importance of creating an environment that fosters independent inquiry and sophisticated epistemological beliefs. The research makes a significant contribution to the literature on critical thinking, cross-cultural education, and transformative learning.

TABLE OF CONTENTS

CHAPTER ONE INTRODUCTION	1
Problem Statement.....	7
Purpose Statement.....	8
Research Questions.....	8
Significance of the Study	8
Theoretical Framework.....	9
Limitations	11
Delimitations.....	11
Definition of Critical Thinking	12
Chapter Summary	12
CHAPTER TWO LITERATURE REVIEW	13
Adult Learners	13
Chinese International Doctoral Students as Adult Learners	15
Critical Thinking.....	17
Historical Origin and Development of Critical Thinking.....	17
Definitions of Critical Thinking.....	23
Critical Thinking as General versus Specific.....	30
Teaching Critical Thinking in Higher Education.....	31
Critical Thinking and Chinese Students	32
Transformative Learning Theory	47
Perry's Scheme of Intellectual and Ethical Development	52
Chinese and American Educational Philosophies and Pedagogies in Contrast.....	60
Historical and Cultural Perspectives on Chinese Pedagogy	61
Western Educational Philosophies.....	66
American Teaching and Chinese Teaching	71
Reforms of Classrooms in China	75
World Culture Theory.....	79
Challenges Chinese International Students Face	79
Strengths Chinese International Students Hold	85
Strategies to Resolve Challenges	86
Chapter Summary	89
CHAPTER THREE METHODOLOGY	91
Research Questions and Research Design	91
Epistemological/Ontological Assumptions.....	91
Characteristics of Qualitative Research	93
Narrative Inquiry.....	96
Definitions of Narrative	97
Development of Narrative Inquiry	97
Approaches to Narrative Inquiry	101
Approaches to Narrative Analysis	102
Participants and Sample Description	105
Data Collection Process and Procedures.....	106
Data Analysis Process and Procedures	111
Trustworthiness.....	114
Thick Description.....	116
Triangulation.....	117
Member Checking and Member Reflections	119
My Subjectivity Statement.....	120

Chapter Summary	122
CHAPTER FOUR FINDINGS	123
Story and Contexts of Each Participant	125
Mike	125
James.....	129
K.....	133
Shawn.....	138
Serene.....	143
Joseph.....	149
Xiaoming.....	156
Amy.....	163
Primary Themes from the Study	170
Theme One: Awareness of Critical Thinking in Western Contexts VS. Chinese Context	170
Theme Two: Sufficient Understanding of Critical Thinking.....	176
Theme Three: Transformation VS. Amplification.....	184
Theme Four: Developing Critical Thinking Relied on Self as well as Others	191
Chapter Summary	205
CHAPTER FIVE DISCUSSION AND CONCLUSION	206
Addressing Research Questions.....	208
Implications for Practice	233
Significance of the Dissertation	236
Further Research	238
Conclusion	240
REFERENCES.....	242
APPENDICES	267
VITA.....	283

LIST OF TABLES

Table 1 Examples of Coding Process	116
Table 2 Participant Demographics.....	125
Table 3 Mike’s Themes and Categories.....	275
Table 4 James’ Themes and Categories.....	276
Table 5 K’s Themes and Categories	277
Table 6 Shawn’s Themes and Categories	278
Table 7 Serene’s Themes and Categories	279
Table 8 Joseph’s Themes and Categories	280
Table 9 Xiaoming’s Themes and Categories	281
Table 10 Amy’s Themes and Categories	282
Table 11 Primary Themes and Categories from the Study.....	172
Table 12 Participants and Theme One: Awareness of Critical Thinking in Western Contexts VS Chinese Context.....	173
Table 13 Participants and Theme Two: Sufficient Understanding of Critical Thinking.....	178
Table 14 Participants and Theme Three: Transformation VS Amplification	187
Table 15 Participants and Theme Four: Developing Critical Thinking Relied on Self as well as Others.....	193

LIST OF FIGURES

Figure 1. Developing Critical Thinking Relied on Self as well as Others.....	194
--	-----

CHAPTER ONE INTRODUCTION

Higher education and adult education are not considered synonymous, yet, these two fields have overlapped significantly in the past several decades. The adult and continuing education field is an extensive landscape in which adult learners in higher education make up a critical piece (Chuang, 2012; Ross-Gordon et al., 2017; Schroeder & Terras, 2015;). Most graduate students in higher education are classified as adult learners being 24 years old, and have responsibilities and commitments outside of higher education (Ross-Gordon et al., 2017). This dissertation focuses on this critical piece of adult learners in the higher education setting.

Globalization influences and changes every aspect of human life and is thus also influencing education in multiple ways (Knight, 2015). In response to globalization, education internationalization has become necessary in higher education. As Jane Knight remarked: “internationalization is changing the world of higher education, and globalization is changing the world of internationalization” (2008, p. 1). Also, internationalization is a multi-level phenomenon. As proposed by Knight (2003), “internationalization at the national, sector, and institutional levels is defined as the process of integrating an international, intercultural, or global dimension into the purpose, functions or delivery of postsecondary education” (p. 2).

Knight (2008) further stated that internationalization of higher education has two aspects: one is ‘internationalization at home,’ which emphasizes cultivating students’ intercultural skills and international awareness on campus; the other is ‘internationalization abroad,’ which includes all types of education across borders such as mobility of students, faculties, providers, programs, and projects. These two aspects are not mutually exclusive but rather highly intertwined. In response to globalization and internationalization in higher education, cross-cultural learning and international students studying on U.S. host campuses

have become a norm. Among all the international students, students from China consist of the most significant percentage (IIE). Chinese graduate students reached 118,859 in the 2020/21 academic year, making up 37.5% of all international graduate students in the U.S. (IIE).

Education in China has been viewed as exam-oriented, teacher-centered, and memorization-based (Chen, 2017). In contrast, education in the U.S. has been regarded as quality-oriented, student-centered, and critical thinking emphasized (Chen, 2017). In addition, China and the U.S. have different ideologies, cultures, and political systems, which may lead to difficulties for international graduate students studying in US higher education institutions. Major difficulties include language incompetency (Ma & Luke, 2014; Moon et al., 2020), cultural intricacies (Campbell & Li, 2008; Sharif & Osterling, 2011; Tung, 2016), and academic unfamiliarity (Campbell & Li, 2008; Ma & Luke, 2014; Simpson, 2008). One specific difficulty of learning domain Chinese students face in US universities lies in the idea of lack of critical thinking experience before coming to US universities (Durkin, 2008; Turner, 2006).

Different thinking patterns between Westerners and Easterners exist or not have been debated, which further contributes to the challenges Chinese international students encounter when studying abroad in Western higher education institutions (Chen, 2017; Durkin, 2008; Heng, 2018; Turner, 2006). Chen (2017) studied Chinese undergraduate students in the U.S. and found that the challenges this group of students faced in their international learning journey were not necessarily related to critical thinking. Rather, the issues were associated with their English language competency and safe classroom environment for expressing opinions. It also depended on whether US faculties and students valued their experiences and point of view brought to the classroom and how well they understood the American ways of expression.

Heng (2018) indicated that Chinese undergraduate students in the U.S. illustrated thinking differences as one of the challenges faced when studying abroad. Such differences noted thinking like an ‘Easterner’ versus thinking like a ‘Westerner.’ Specifically, the students noticed their tangible thinking differences between what they were used to in China and that in the U.S. These thinking differences were especially evident in social sciences, humanities, and language classes (SSHL) than in science and math classes. These Chinese students categorized logical, critical, and divergent thinking as thinking like a ‘Westerner,’ which was more emphasized in SSHL classes in the U.S. In contrast, contextual thinking and intuitive thinking as thinking like an ‘Easterner,’ which was less stressed in the U.S. Logical thinking was exemplified by explicating tight step-by-step logic in argumentation and writing in the U.S. In contrast, in China, logic in writing differs from the requirement in the U.S.

However, it does not necessarily mean that the Chinese student lacked logical thinking; instead, historical-sociocultural circumstances were embedded as common sense without having to lay them out as a Western style of step-by-step development of ideas and arguments. This also demonstrates that Chinese people have dispositions toward contextual and intuitive thinking compared to Westerners.

Besides, most Chinese students perceived that critical thinking was not prioritized and unclear for them because the emphasis on memorization rather than analysis and the dense curriculum rather than interactive instruction style discourages students’ questioning and self-interpretation in China, causing them to lose the ability to think and question (Heng, 2018). The same applied to their divergent thinking: they tended to have a ‘more fixed way of thinking,’ be less risk-taking, be more afraid of making mistakes, and be less familiar with US contexts than their American peers (Heng, 2018). The standardized tests where only one correct answer existed in China contributed to this disadvantage in the divergent thinking of Chinese students (Heng, 2018). These participants indicate that changing different ways of

thinking takes time; however, after studying in the U.S. for a while, they progressed and became more conscious of applying critical thinking skills.

Relevant to thinking, writing differences contribute to another challenge Chinese international students face in the U.S. (Heng, 2018). These students were familiar with narrative format essays often required to write when in China but unfamiliar with the argumentative format required in US classes (Heng, 2018). The writing style differences exhibit that Chinese students tend to present ideas and arguments in a circular way, explained in layers and instead of straightforward, from point A to point B.

In other words, the Chinese tend to express by laying out several points with varied evidence and arguments for readers to naturally make the connections, using contextual clues and intuitive thinking, to see the whole picture or make a conclusion. In short, Chinese writers write like ivy that grows in all directions, whereas Westerners write like a branch with details with sub-branches that clearly extend from the main branch. Chinese tend to value the beauty of the language in writing, whereas Westerners tend to value logic from 1- to 2 and cause-and-effect reasoning.

Thinking differences rest upon not only language structure but more importantly, culture and traditions (Chen, 2017). Therefore, enhancing language competency alone is insufficient to solve Chinese students' challenges in Western higher education (Chen, 2017). Critical thinking therefore is seen as one difference and difficulty Chinese students face in their study on US campuses (Chen, 2017). This dissertation intends to research the critical thinking of Chinese students and explore this issue.

Critical thinking has long been underlined in American education. In adult and continuing education, Brookfield (1987) indicated that thinking critically was essential in learning activities. He regarded critical thinking as identifying and reflecting on assumptions and contemplating alternative ways of thinking and doing. Because of the variety, breadth,

and intensity of most adults' experiences, it is expected that adults have developed the ability to reflect on their lives critically and to be skeptical towards dualism and norms; thus, critical thinking seems to figure more strongly in adulthood than in childhood and adolescence.

“Adulthood is characterized by critical thinking” (Brookfield, 1987, p. 39).

Could (1980) studied the development of adult consciousness and found that adults strive to be free from the restraints obtained from childhood and constantly transform themselves; the process of transforming is the one proposed by Mezirow as perspective transformation: a learning process by which adults realize their cultural constraints and take actions to overcome them (as cited in Brookfield, 1987, p. 38). To be indicative of an adult consciousness is the critical reflective abilities that enable adults to critically analyze and examine the validity of uncritically accepted norms from childhood (Brookfield, 1987). In other words, critical thinking heightens adult consciousness.

There has never been a universal definition of critical thinking. Some overlapping understandings of critical thinking exist. Moore (2013) summarized seven strands of critical thinking. They are judgment, skepticism, simple originality, sensitive readings, rationality, activist engagement with knowledge, and reflexivity (as cited in Luca, 2018). Others have defined critical thinking as a set of cognitive skills, such as interpretation, analysis, inference, and evaluation and dispositions, such as being open-minded, inquisitive, and far-minded (Luca, 2018).

Reviewing existing literature on Chinese students and critical thinking, seven themes were generated:

1. critical thinking cultivation in China (Chen, 2019; Du et al., 2013; Li et al., 2019; Tang, 2016; Wang et al. 2017; Zhang, 2017; Zhang & Lambert, 2008; Zhang & Kim, 2018),

2. Chinese international students' experiences (critical thinking included) in Western higher education (Badger, 2019; Hu et al., 2016, as cited in Wu & Hu, 2020; Jiang & Altinyelken, 2020; Jones, 2005; Lu & Singh, 2017; Ma, 2020; Scally & Jiang, 2020; Turner, 2006; Wu & Hu, 2020; Xu & Grant, 2017),
3. Chinese international students' understanding of critical thinking (Chen, 2017; Lucas, 2019; Pu & Evans, 2019),
4. a stereotype of Chinese international students lacking or having no critical thinking skills (Tian & Low, 2011),
5. contradicting stereotypes that Chinese students lack critical thinking (Heng, 2018; Li, 2013; Turner, 2006),
6. Chinese students' journey of developing critical thinking in Western universities (Durbin, 2008; Fakunle et al., 2016), and
7. comparative study of critical thinking between Chinese and American college students (Dennett, 2014; Yan, 2018; Zhang, 2009).

However, the literature demonstrates contradictory viewpoints regarding Chinese international students' critical thinking. For example, some perceive Chinese international students as needing more critical thinking skills due to China's teacher-centered instruction and the exam-oriented educational system (Badger, 2019; Heng, 2018). Others believe that Chinese international students are not deficient in critical thinking. Still others believe that US host faculty and peers perceive otherwise because Chinese international students have language challenges and different communication styles, differences in culture and thinking modes, and unfamiliarity with the U.S. social-cultural environment and educational environments (Heng, 2018; Lu & Singh, 2017).

Literature shows that an earlier study on Chinese master's students in the UK showed that even as graduates of master's degrees, Chinese students still lacked the awareness of

critical thinking in their reflections and accounts of their academic journey in Western universities (Turner, 2006). Indeed, cognitive development is gradual and takes a long time (Yan, 2018). Critical thinking demands a more complicated and higher level of cognition because critical thinking requires identifying and challenging assumptions and alternative thinking and doing (Brookfield, 1981).

As depicted in the Perry Scheme (1970), undergraduate college students in the first year or second year tend to have simplistic and dichotomous thinking. Only people who have reached higher positions in the Perry Scheme, which represents relativistic and complicated thinking, can achieve good critical thinking. Even though some fourth-year college students can reach higher places in Perry's sample, early adults generally locate in lower positions in the Perry Scheme.

On the other hand, doctoral students have completed college education and may have earned master's degrees. They have mostly reached higher positions in the Perry Scheme, meaning they have more complicated thinking than undergraduate students. Therefore, it can be assumed that the doctoral study journey will significantly develop critical thinking since doctoral research and study require critical thinking and cultivate critical thinking.

Problem Statement

Despite the importance of the topic of Chinese international graduate students and the development of critical thinking, there are only a few studies on this important topic. Even though some Chinese international doctoral students have demonstrated their critical thinking capability and dispositions by achieving academic success in US higher education institutions (Heng, 2018), their journey of developing critical thinking is barely explored (Fakunle et al., 2016). For instance, only two studies found focused on the development of critical thinking of Chinese international students (Durbin, 2008; Fakunle et al., 2016) targeted Chinese Master's students in the UK (Durbin, 2008; Fakunle et al., 2016).

Nevertheless, perspectives on Chinese international graduate students' critical thinking in US doctoral programs are paramount due to the importance of critical thinking emphasized by American education. However, the literature on the topic in the U.S. context is missing. Additionally, the increasing Chinese doctoral students' coming to the U.S require the development and application of critical thinking in the host campuses. Moreover, the contradictory viewpoints and debates call for new understandings of this crucial intersection of Chinese international students and critical thinking development by host faculty and peers. Thus, my dissertation study exploring the experiences of Chinese doctoral students developing critical thinking in the U.S. may present valuable information in closing a research gap.

Purpose Statement

This dissertation study aimed to explore and understand how Chinese international doctoral students present and develop critical thinking in US higher education institutions. Through narrative inquiry approach, their critical thinking experiences were investigated, including their awareness, understanding, and conceptualizations of critical thinking and their perspectives on critical thinking development processes.

Research Questions

The following research questions guided this study:

- 1) How do Chinese international doctoral students understand and conceptualize critical thinking?
- 2) How have Chinese international doctoral students developed critical thinking during their doctoral studies in the U.S.?

Significance of the Study

This study may provide several benefits. First, theoretically, critical thinking and adult international students are both important components in the field of adult education.

However, the intersection of these two is rarely studied. Further, research on Chinese international students can think critically or not like their US peers is worthy scholarship from cross-cultural learning lens and education internationalization context (Chen, 2017; Fakunle et al., 2016; Heng, 2018; Lucas, 2019; Tian & Low, 2011). Therefore, this study fills a missing piece on literature for the adult and continuing education landscape. Second, the study presents valuable critical thinking experiences of Chinese doctoral students on US campus and thus will inform host faculty to effectively facilitate Chinese international students to succeed academically. Third, the study provides practical strategies for developing critical thinking map to Chinese international students that may help inform incoming international students to better prepare.

Specifically, the study will help host faculties better understand and apply alternative teaching examples and strategies to facilitate critical thinking development in the classroom. It also allows administrators to effectively apply procedures and policies when working with these culturally different applicants and students. It helps fellow American students to better interact and collaborate with Chinese international students in research and learning projects. In return, these international students help diversify host institutions' learning and teaching environments for deeper internationalization of education. Last, this study will provide new insights into critical thinking, a core concept that drives American educational development.

Theoretical Framework

Two theoretical frameworks guided the study. The first framework is the transformative learning theory (Mezirow, 1991). The second is Perry's scheme of intellectual and ethical development (Perry, 1970). Fakunle et al. (2016) studied Chinese students who pursued Master's degrees in the UK reported negative coursework feedback as a trigger event for them to realize the importance of developing critical thinking. They were shocked by the fact that what made them good students in China got them lower scores in the UK higher

education institutions. Such trigger events spurred them to seek ways to develop critical thinking for academic success. It usually took 2-4 months for them to become aware and develop critical thinking, using various methods, such as reading books on developing critical thinking, reading recommended journal articles, asking for help from tutors, class discussions, writing assignments, and participating in social groups. These students transformed into better critical thinkers who no longer perceived critical thinking as simply providing opposite opinions from others as they initially did but instead demonstrated using critical thinking in their improved academic results.

Therefore, how Chinese international students develop critical thinking in Western institutions may be a transformative learning experience. Transformative learning theory explains how adults make sense of their experiences (Merriam & Baumgartner, 2020). When old knowledge is no longer sufficient when facing new experiences, people will use critical reflection to change old ideas (Mezirow, 1991). Thus, their worldviews and perspectives shifted and transformed. Transformative learning theory is one framework to view the issue of critical thinking of the participants and to analyze and explain the findings. This study explored whether the development of critical thinking is a transformative learning experience for the participants, if so, what specific phases the participants experienced, and whether their phases echoed or differed from the phases presented by the transformative learning theory (Mezirow, 1991).

Scholars believe that critical thinking is highly related to intellectual and cognitive development theories, such as the Perry Scheme (Yan, 2018). The Perry Scheme is rooted in decades of research dedicated to the examination of cognitive and ethical growth within the context of undergraduate education (Perry, 1970). His theory posits that individuals at the college level (and beyond) undergo a progressive evolution across four significant stages of intellectual and ethical development: transitioning from a state of dualism to multiplicity,

then to relativism, and ultimately to commitment (Perry, 1970). This study's participants' epistemology is highly intertwined with critical thinking; thus, this study also displayed the participants' epistemological development. When the participants narrated their development of critical thinking, their perspectives and perceptions of knowledge and teachers unavoidably showed. Epistemological development in the Perry Scheme moves from simplistic and dualistic thinking to complicated and relativist thinking. Good critical thinking requires the capability to practice complicated thinking rather than simplistic thinking. A study by Zhu and Cox (2015) found that doctoral training promoted epistemological development for Chinese international engineering doctoral students.

Therefore, doctoral training cultivates these students to be able to practice more complicated, multiplistic, and relativistic thinking. This dissertation intends to find out if the epistemological development will emerge in the findings of the critical thinking development for the participants, whether the epistemological development moves from simplistic and dualistic thinking to complicated and relativist thinking, and whether the development of critical thinking and epistemology follow the same direction: the more developed critical thinking, the more complicated and relativist thinking.

Limitations

This study focuses on the students' perspectives and experiences; therefore, the perspectives and experiences of the faculties, educators, administrators, and staff are not included. In addition, the participants in this study are in different grade in their doctoral programs, ranging from the second year to completion of the doctoral program.

Delimitations

This study delimits Chinese international doctoral students and focuses on their experiences and reflections in narration regarding their understanding and development of

critical thinking in the US. The teaching effectiveness of critical thinking is not examined. The participants' subjective experiences of critical thinking are the focus of the study.

Definition of Critical Thinking

In this dissertation study, I will not provide a single definition of critical thinking. Instead, in Chapter Two, I will present multiple definitions found in existing literature. Since there is no definite agreement on the concept of critical thinking and it is a controversial topic, providing multiple definitions will give a broader understanding.

Chapter Summary

This dissertation comprises five chapters, a reference list, and appendices. Chapter One introduces the study, providing the context of the study, problem statement, purpose statement, research questions, and significance of the study. By understanding the background and fundamental research questions and purposes guiding this study, readers can get a holistic sense of this study. Chapter Two presents a review of the literature on adult learners, critical thinking, transformative learning theory, Perry's scheme of intellectual and ethical development, Chinese education, Chinese and American teaching, and Chinese international students.

CHAPTER TWO LITERATURE REVIEW

In this chapter, I reviewed the existing literature relevant to adult learners, critical thinking, transformative learning theory, Perry's intellectual and ethical development scheme, Chinese education, Chinese and American teaching, and Chinese international students.

Adult Learners

Due to the reason that the coverage of adult education is so varied and wide-ranging from formal institutions, such as community colleges and universities, to non-formal and informal settings, including casual interest groups, it is impossible to have an agreed-upon blank statement or definitions of adult learners (Kasworm et al., 2010). Societal factors such as changes in population composition and human differences, such as social class, gender, race, age, ability, sexual orientation, and others, all shape who adult learners are (Kasworm et al., 2010). Thus, complex factors should all be considered when defining who adult learners are (Kasworm et al., 2010).

Merriam and Brockett (2007) proposed three definers of adult learners: the first one centers around an individual's biological age; the second is based on a person's responsibilities and social roles of adulthood; and the third is a person's self-perception as an adult. Specifically, a person who reaches a certain age becomes an adult. This chronological age as a definer is echoed by legal requirements. Typically, legal requirement defines an adult when a person reaches a certain chronological age, such as the ages of 18 to 21 in most of the U.S. (Kasworm et al., 2010).

However, according to Ross-Gordon et al. (2017), some problems rely on chronological age to define an adult. For example, changes happened in American history on what age is the legal age: before the 1970s, most areas in America required twenty-one as the legal age, but in the 1970s, the majority of America stipulated eighteen as the legal age.

Developmental markers are another factor that problematizes the age-distinct category of adults. In addition, gender roles, variations in socioeconomic and ethnic factors, postponement of education and marriage, and stable work-life further swayed the absoluteness of defining adults solely on the chronological age (Ross-Gordon et al., 2017).

The second definer is responsibilities and social roles in adulthood (Havighurst, 1972; Merriam & Brockett, 2007, as cited in Ross-Gordon et al., 2017, p. 218). For instance, typical adult responsibilities include significant commitments to the community, family, and work. These social roles and responsibilities also include financial independence and responsibility, which means that adults do not rely upon their parents for money and can support others financially (Ross-Gordon et al., 2017).

The third definer of adults is self-perception (Ross-Gordon et al., 2017). An individual's sense of being an adult is formed by his or her life experiences, perspectives, perceptions, and worldview. This emphasis on self-perception in adulthood is echoed and supported by adult development theories, especially Erikson's theory of psychosocial development (Clark & Caffarella, 1999; Ross-Gordon et al., 2017). Erikson's psychosocial development consists of eight stages, with the last three focusing on adult development (Clark & Caffarella, 1999; Tennant & Pogson, 1995).

These three stages laid out specific tasks and psychosocial conflicts that adults have to accomplish and resolve (Clark & Caffarella, 1999; Ross-Gordon et al., 2017; Tennant & Pogson, 1995). In the young adulthood stage, which is between 18-35, the task is to gain psychosocial strength of love and intimacy; in the middle adulthood stage, which is between 35-60, the task is to gain psychosocial strength of generativity and care; and in the late adulthood stage, which is 60 and above, the task is to reflect on life and gain wisdom (Clark & Caffarella, 1999; Hearn et al., 2011; Ross-Gordon et al., 2017; Tennant & Pogson, 1995).

In a similar vein, other scholars believed that social roles (responsibilities and expectations as an adult at any given time), psychological age (the level of developmental maturity), economic role as an adult expected by a particular culture or society, and life situations also define adulthood (Bjorklund & Bee, 2008; Kasworm et al., 2010). For example, a person who could be younger than 18, an age that marks adulthood in most of the United States legally, could already be a parent and caregiver of others. In this case, this person could be considered as an adult because of his or her social role, economic role, and psychological age. Bjorklund and Bee (2008) further stated that these many dimensions of adults, including chronological age, psychological age, and social age, all contribute to the motivation and abilities of adults in learning.

In addition, what is worth noticing is that culture has an enormous influence on defining adults, and other non-western cultures and societies may define adults differently from how Americans define them (Kasworm et al., 2010). For instance, instead of stressing biological age alone, other cultures may rely on other factors to determine if a person is considered as an adult or not, such as gender, race and ethnicity, the cultural norms of one specific social group, and how a person behaves (Kasworm et al., 2010).

Chinese International Doctoral Students as Adult Learners

The internationalization of higher education has led to a growing number of adult learners pursuing advanced degrees in foreign countries. International adult learners represent a diverse and complex group of individuals who choose to pursue higher education abroad due to personal and professional needs (Tyner, 2019). These learners often exhibit distinct characteristics that differentiate them from traditional, domestic students. The decision to embark on international education is influenced by intrinsic and extrinsic motivations, including academic growth, career advancement, and exposure to intercultural experiences (Hunter-Johnson, 2022). The concept of "nontraditional adult learners" encompasses those

who possess characteristics such as delayed enrollment, part-time status, full-time employment, financial independence, and responsibilities for dependents (Hunter-Johnson & Niu, 2019).

Chinese international doctoral students constitute a significant proportion of the global international student body, particularly in the United States (Brazill, 2022; Zhang, 2016). Chinese international doctoral students are typically defined as Chinese students who come to study in US universities' doctoral programs holding either an F1 or J1 visa. These students contribute to U.S. higher education in various ways, including economic revenue, academic prestige, and cultural diversity (Brazill, 2022). The decision to pursue doctoral education abroad is influenced by a desire for academic excellence, career prospects, and personal development (Brazill, 2021). Chinese students often come from diverse cultural backgrounds and have unique learning experiences that shape their perspectives and approaches to education (Brazill, 2022).

While Chinese international doctoral students bring numerous benefits to their host institutions, they also encounter distinct challenges as adult learners in a foreign educational environment. These challenges encompass academic, cultural, and psychological dimensions. For instance, they grapple with language barriers, unfamiliar teaching styles, and cultural differences that affect their academic integration (Zhang, 2016). The process of socialization and adjustment involves navigating a new culture, educational system, and social identity (Brazill, 2021; Hunter-Johnson, 2022).

The transition to adulthood, combined with the internationalization of their educational journey, demands resilience from these students. Financial pressures, including higher tuition fees and limited access to financial support, amplify their stress (Hunter-Johnson, 2022). The need to balance academic demands with personal and family responsibilities poses additional challenges (Hunter-Johnson & Niu, 2019). Furthermore, the

global political climate and the rise of xenophobia after the pandemic can exacerbate feelings of isolation and anxiety (Brazill, 2021; Brazill, 2022).

Understanding Chinese international doctoral students as adult learners is crucial for educational institutions, policymakers, and researchers. By acknowledging their unique characteristics and challenges, institutions can create targeted support systems that enhance academic success, psychological well-being, and social integration. Academic advisors and faculty members play a pivotal role in fostering a conducive environment for learning and growth (Zhang, 2016). Institutions can also cultivate cultural competence and promote diversity awareness to facilitate the positive integration of international students (Brazill, 2022).

In essence, Chinese international doctoral students represent a distinctive group of adult learners pursuing higher education abroad. Their journey involves negotiating academic, cultural, and psychological challenges while contributing significantly to their host institutions. Recognizing their experiences as adult learners and addressing their needs can promote their success and enrich the global higher education landscape.

Critical Thinking

This section will present the relevant literature on the historical origin and development of critical thinking, definitions of critical thinking, whether critical thinking is generic or specific to the discipline, teaching critical thinking in higher education, and critical thinking and Chinese students.

Historical Origin and Development of Critical Thinking

The concept of critical thinking originated from the domain of philosophy in the earliest times in Western tradition (Hare, 1999). For instance, a series of intellectual virtues, including judgment, wisdom, and open-mindedness that was believed to be within the family of concepts of critical thinking, were manifested through ideas proposed by philosophers in

history: John Stuart Mill encouraged people to keep their minds open to criticism; Immanuel Kant advocated for thinking for oneself; David Hume rooted for proportioning belief to the evidence; Rene Descartes stressed the need to evaluate the points of views of other philosophers; and Socrates believed that unexamined life is not worth living and that people have to use sufficient reasons to justify what they do and believe (Hare, 1999).

Critical thinking was alive and discussed in multiple areas, such as reflective thinking, rote learning, inquiry and scientific method, and intellectual independence in the early twentieth century (Hare, 1999). John Dewey (1909), an American philosopher and educator who first brought up the concept of “reflective thinking,” a thinking process for learners to explore the answer, was one of the very first scholars who affected the following research on critical thinking in the Western world. In his book *How We Think* (Dewey, 1910), he introduced the term critical thinking as an educational goal and interpreted it as the scientific attitude of mind. He called this goal “reflective thinking,” “thinking,” “thought,” or “reflection”. In this book, he appreciated the kinship of children’s native curiosity and experimental exploration. He advocated for recognizing and promoting such kinship in educational practice.

Later, Dewey (1933) rewrote *How We Think* with the sub-title *A restatement of the relation of reflective thinking to the educative process*. He proposed “five distinct steps in reflection,” which includes “a felt difficulty,” “its location and definition,” “suggestion of possible solution,” “development by reasoning of the bearings of the suggestion,” and “further observation and experiment leading to its acceptance or rejection; that is, the conclusion of belief or disbelief” (Dewey, 1910, p. 73).

However, without explaining the reasons, Dewey discarded using the term “critical” and “uncritical”, instead, regarded being critical as one component of being reflective; and adopted reflective thinking in his subject matter. Dewey’s pragmatism philosophy focuses on

the world of experience and the connection between thought and action (Ross-Gordon et al., 2016). Dewey perceived the scientific inquiry as a method to solve problems, which he associated with critical and reflective thinking (Dewey, 1910; Ross-Gordon et al., 2016). Solving problems requires critical dispositions and the ability of individuals to come up with tentative solutions and conclusions backed up by sufficient data and evidence (Dewey, 1910). In other words, the basis of scientific inquiry manifested in problem-solving, such as intellectual curiosity, creative thinking, and sound judgment is tightly correlated and overlaps with critical thinking. Critical thinking originated with a sense of problems.

Critical thinking had found its name and a vital place in the discussions among educational theorists by the mid-twentieth century (Hare, 1999). Critical thinking tests were first created in the 1940s (Hare, 1999). Edward M Glaser (1941) reported in his book *An Experiment in the Development of Critical Thinking* the method and results of a 1938 experiment on improving the critical thinking abilities of high school students. The pre-test and post-test of the students used tests, including the Watson-Glaser Tests of Critical Thinking, which is an aptitude assessment that covers the assessment of inferences, recognition of assumptions, deduction, interpretation, and evaluation (Crites, 1965; Glaser, 1941).

Besides the critical thinking tests, Bloom's taxonomy is highly intertwined with the concept of critical thinking. In 1948, the US college examiners decided to come up with a series of taxonomies of educational goals for the sake of better communicating test items to each other (Bloom et al., 1956). There are cognitive domain, affective domain, and psychomotor domain, among which the cognitive domain touches on the educational goal of critical thinking (Bloom et al., 1956).

In the cognitive domain, there are six hierarchical classifications: knowledge, comprehension, application, analysis, synthesis, and evaluation from the lowest to the highest

(Bloom et al., 1956). The higher-level objectives require the alleged achievement of the lower-level objectives (Bloom et al., 1956). The lowest level objective, knowledge, “involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting” (Bloom et al., 1956, p. 201).

The other five higher-level objectives are collectively called “intellectual abilities and skills” (Bloom et al., 1956, p. 204), which could be interpreted as critical thinking abilities and skills. Comprehension “represents the lowest level of understanding. It refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications” (Bloom et al., 1956, p. 204). Application is “the use of abstractions in particular and concrete situations. The abstractions may be in the form of general ideas, rules of procedures, or generalized methods. The abstractions may also be technical principles, ideas, and theories which must be remembered and applied” (Bloom et al., 1956, p. 205). Analysis is “the breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit” (Bloom et al., 1956, p. 206). Synthesis is “the putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to constitute a pattern or structure not clearly there before” (Bloom et al., 1956, p. 206). Evaluation is “judgments about the value of material and methods for given purposes” (Bloom et al., 1956, p. 207).

Critical thinking abilities and skills are reflected in the three highest-level categories in the taxonomy, namely analysis, synthesis, and evaluation. For example, the condensed version of Bloom’s taxonomy (Bloom et al., 1956) provides the following examples in these three categories:

- *analysis objectives*: ability to identify unstated assumptions, ability to differentiate facts from hypotheses, ability to examine the congruency between hypotheses and provided information and assumptions, ability to spot the general techniques used in advertising, propaganda, and other persuasive materials
- *synthesis objectives*: effective telling stories and writing in a good order and organized way, ability to come up with ways of testing a hypothesis and to modify hypothesis according to new factors, ability to devise a plan of instruction in a teaching situation, ability to make generalization
- *evaluation objectives*: ability to justifiably assess the accuracy of reporting based on exactness of proofs and evidence, ability to recognize logical fallacies, ability to compare the work to the highest standards in one field (pp. 201-207).

The analysis, synthesis, and evaluation in Bloom's taxonomy are collectively called as "higher-order thinking" (Tankersley, 2005, p. 147). This "higher-order thinking" is similar to the five-step reflective thinking process proposed by Dewey: the sense of difficulty, definition, location of difficulty, suggestion of potential solution, evaluating solutions, and judgment (Dewey, 1910; Tankersley, 2005). However, this process has not yet been widely used as a critical thinking process despite the overlapping nature between the two.

A revised version of Bloom's taxonomy changed the categories from none-forms to verb-forms to empathize the nature of process and activity (Anderson et al. 2001). There are six cognitive processes in the revised version: remember, understand, apply, analyze, evaluate, and create (Anderson et al. 2001). Anderson and other authors (2001) retained the hierarchical nature of the original Bloom's taxonomy yet acknowledge some shared commonalities between different categories, such as understand and apply. Another difference from the original Bloom's taxonomy is that Anderson and other authors (2001) reversed the order between 'evaluate' and 'create' to make 'create' the highest level among

all the categories rather than keeping ‘evaluate’ as the highest level as the original Bloom’s taxonomy did.

Critical thinking and the development of thinking received considerable attention and emphasis in education in the 1970s and 1980s (Hare, 1999). McPeck (1981) argued that among people who ever think about education, including theorists, reflective parents, traditionalists, and radical reformers, it is agreed upon that the capability to think critically should be taught in schools due to its desirability as an essential human trait. In 1980, Executive Order 338 made critical thinking in formal instruction compulsory throughout the California State University system (Hare, 1999). In 1983, the College Entrance Examination Board made reasoning one of the most important skills that college students should have (College Board, 1983). In the field of adult education, particularly, Brookfield (1987) was one of the first researchers who valued the importance of critical thinking as he stated that one of the most important activities of adult life is to think critically. Brookfield (1987) understood critical thinking as identifying and challenging assumptions and alternative ways of thinking and doing.

Currently, critical thinking as an educational concern has been stressed and valued by many educators, scholars, school systems, and other areas of society (Chen, 2017; Dennett, 2014; Jeremiah, 2012). The U.S. department of labor created a curriculum centering on cultivating workforce professional and interpersonal skills. Problem-solving and critical thinking was one of the six vital skill areas. In the curriculum of “Skills to Pay the Bills: Mastering Soft Skills for Workplace Success,” it is stated that employers desire workforce who could master critical thinking and problem solving to help grow their businesses according to 2010 Critical Skills Survey by the American Management Association and others (The U.S. Department of Labor, Office of Disability Employment Policy, 2012).

The historical development of critical thinking shows that the concept of critical thinking has three traditions that were agreed upon among scholars: the philosophical tradition, the psychological tradition, and the educational tradition (Sternberg, 1986; Wang, 2017). The philosophical tradition originated from the ancient time of Socrates, Plato, and Aristotle and represented by contemporary scholars, such as Dewey, Ennis, and Paul (Wang, 2017). The philosophical tradition focuses on the nature of critical thinking and the requirement of formal logical systems (Sternberg, 1986; Wang, 2017). The psychological tradition focuses on the behaviors and actions of critical thinkers and the processes and skills of critical thinking in practical contexts (Wang, 2017).

Psychologist Robert Sternberg is one scholar who represents the psychological tradition that he argued that critical thinking consists of “mental processes and strategies” which are employed to “solve problems, make decisions and learn new concepts” (1986, p. 3). The educational tradition focuses on cultivating students to become critical thinkers and is a combination of philosophic and psychologic approaches (Sternberg, 1986; Wang, 2017). Bloom’s taxonomy is one representation of the concept of critical thinking in the educational tradition. More concrete critical thinking nurturing and demonstrating in classrooms can be found in Lipman (1988): “the improvement of student thinking-from ordinary thinking to good thinking-depends heavily upon students’ ability to identify and cite good reasons for their opinions” (p. 43).

Definitions of Critical Thinking

Critical thinking is a vague concept that people may mean differently by it (McPeck, 1981). There is no consensus on the definition of critical thinking (Fakunle et al., 2016; Tang, 2016), as Ryan and Louie (2007) stated that there is a lack of common agreement on the definition of critical thinking. Various definitions of critical thinking exist (Fakunle et al., 2016; Tang, 2016). Here are some examples.

Glaser (1941) defined critical thinking as Dewey defined reflective thinking:

Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends (Dewey, 1910, p. 6; Dewey, 1933, p. 9; Glaser, 1941).

Glaser (1941) further expanded on the definition of critical thinking as consisting of three things: “(1) an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one’s experiences, (2) knowledge of the methods of logical inquiry and reasoning, and (3) some skill in applying those methods” (p. 5-6).

Tang (2016) summarized that critical thinking should consist of four aspects: first, it involves an active logical process of asking questions and solving problems; second, it includes a set of skills and dispositions; third, it requires reasonable judgment; and fourth, it does not mean being criticizing and simple skepticism but a kind of attitude.

After an extended literature review, it is shown that despite all disagreements and debates, there are some common agreements reached by scholars on the definitions of critical thinking. One common agreement on the definitions of critical thinking is that it involves the use of reasoning to create depth and improve thinking (Luca, 2019). As one of the pioneer critical thinking experts in the U.S., Robert Ennis (1991) defined critical thinking as “reasonable reflective thinking that is focused on deciding what to believe or do” (p. 8). This definition did not exclude creative thinking; but rather included creative acts such as formulating hypotheses and possible solutions (Ennis, 1991). Yet, the definition did emphasize reasonableness (which could be roughly understood as rationality), reflection, and decision-making (what to do or believe) (Ennis, 1991).

Paul (1990) believed that “critical thinking is an individual thinking model in which critical thinkers stipulate the inner structure of thinking and apply knowledge to assess them to improve their thinking” (as cited in Tang, 2016, p. 19). He further stated that accustoming

to using and applying critical thinking could help form critical dispositions, such as “intellectual humility, intellectual courage, intellectual perseverance, intellectual integrity, and confidence in reason” (as cited in Tang, 2016, p. 19). Later, Paul (1992) stated that critical thinking involves discernment of the elements of reasoning and rational judgment, contrasting simple information recall with rote memorization.

Moreover, another common agreement on the definitions of critical thinking is that critical thinking involves judgment. Paul (1992) argued that critical thinking involves rational judgment. Tang (2016) summarized four aspects of critical thinking, one of which is that critical thinking requires reasonable judgment. Moore (2013) interviewed scholars from philosophy, history, and cultural studies and found definitional agreements on critical thinking, one of which is judgment. Facione (1990) defined critical thinking as a judgment. Lipman (1988) concurred, believing it is narrow to hold the outcomes of critical thinking simply as decisions and solutions; however, judgment is the outcome of critical thinking by covering making decisions, solving problems, and learning new concepts. Lipman (1988) articulated that “I will argue that critical thinking is skillful, responsible thinking that facilitates good judgment because it (1) relies upon criteria, (2) is self-correcting, and (3) is sensitive to context” (p. 39). Bailin and others echoed: “all aspects of critical thinking centrally involve judgment” (Bailin et al., 1999, p. 280).

Recently, Moore (2013) asked academics from different disciplines, such as history, philosophy, and cultural studies, to define critical thinking. And he summarized seven definitional strands of critical thinking: judgment, skepticism, simple originality, sensitive readings, rationality, activist engagement with knowledge, and reflexivity.

In addition, third common agreement on the definitions of critical thinking is to understand critical thinking as a set of cognitive skills and dispositions. Paul and Elder (2001) stated that cognitive skills and abilities of critical thinking could be understood as universal

intellectual standards and elements of thought; dispositions of critical thinking could be understood as intellectual traits and virtues. Facione (1990) conducted a study that required experts on critical thinking to reach an agreement on the definition of critical thinking and presented some overlapping understandings of this controversial and complex concept.

These overlapping understandings of critical thinking include several skills (analysis, interpretation, inference, evaluation, explanation, and self-regulation) as well as several dispositions (such as being far-minded, inquisitive, open-minded, and open to alternative positions).

In a similar manner, Ennis listed overlapping critical thinking abilities and dispositions: for example, abilities, which could be understood as the skills needed for critical thinking, include analyzing arguments, making deductions, and dispositions, which could be understood as the attitudes of mind, including seriously considering alternative viewpoints and fairly and honestly representing positions (Ennis, 1998; Ennis, 2000).

Specifically, Ennis (1991) detailed a set of somewhat overlapping and interrelated dispositions and abilities that characterize ideal critical thinkers. There are twelve dispositions and sixteen abilities in total. The twelve dispositions and the first twelve abilities are constituents of ideal critical thinkers; the last four abilities are encouraged and helpful for ideal critical thinkers (Ennis, 1991). Twelve dispositions are listed below:

1. to be clear about the intended meaning of what is said, written, or otherwise communicated
2. to determine and maintain focus on the conclusion or question
3. to take into account the total situation
4. to seek and offer reasons
5. to try to be well informed
6. to look for alternatives

7. to seek as much precision as the situation requires
8. to try to reflectively aware of one's own basic beliefs
9. to be open-minded: consider seriously other points of view than one's own
10. to withhold judgment when the evidence and reasons are insufficient
11. to take a position (and change a position) when the evidence and reasons are sufficient to do so
12. to use one's critical thinking abilities. (Ennis, 1991, p. 8)

Sixteen items of abilities that define ideal critical thinkers are the following:

(The first five items involve clarification.)

1. to identify the focus the issue, question, or conclusion
2. to analyze arguments
3. to ask and answer questions of clarification and/or challenge
4. to define terms, judge definitions, and deal with equivocation
5. to identify unstated assumptions

(The next two involve the basis for the decision.)

6. to judge the credibility of a source
7. to observe, and judge observation reports

(The next three involve inference.)

8. to deduce, and judge deductions
9. to induce, and judge inductions
 - a. to generalizations
 - b. to explanatory conclusions (including hypotheses)
10. to make and judge value judgments

(The next two are metacognitive abilities-involving supposition and integration.)

11. to consider and reason from premises, reasons, assumptions, positions, and other propositions with which one disagrees or about which one is in doubt-without letting the disagreement or doubt interfere with one's thinking ("suppositional thinking")
12. to integrate the other abilities and dispositions in making and defending a decision (The next four are auxiliary critical thinking abilities-having them is not constitutive of being a critical thinker.)
13. to proceed in an orderly manner appropriate to the situation, for example,
 - a. to follow problem solving steps
 - b. to monitor one's own thinking
 - c. to employ a reasonable critical thinking checklist
14. to be sensitive to the feelings level of knowledge, and degree of sophistication of others
15. to employ appropriate rhetorical strategies in discussion and presentation (orally and in writing)
16. to employ and react to "fallacy" labels in an appropriate manner. (Ennis, 1991, p. 9)

There are corresponding measurements designed to test critical thinking skills and dispositions, which could offer another way of understanding as to what could be viewed as critical thinking skills and dispositions, respectively. The California Critical Thinking Skills Test (CCTST) tests critical thinking skills in the following subcategories: overall reasoning skills, analysis, interpretation, evaluation, explanation, inference, deduction, induction, and numeracy (Insight Assessment).

Specifically, CCTST tests overall critical thinking skills, which is "sustained use of critical thinking to form reasoned judgments"; analysis, which is "accurate identification of the problem and decision-critical elements"; interpretation, which is "discovering and

determining significance and contextual meaning”; inference, which is “drawing warranted and logical conclusions from reasons and evidence”; evaluation, which is “assessing credibility of claims and the strength of arguments”; explanation, which is “providing the evidence, reasons, assumptions, or rationale for judgments and decisions”; induction, which is “reasoned judgment in ambiguous, risky, and uncertain contexts”; deduction, which is “reasoned judgment in precisely defined, logically rigorous contexts”; and numeracy, which is “sustained use of critical thinking skills in quantitative contexts (quantitative reasoning)” (Insight Assessment, 2021).

The California Critical Thinking Disposition Inventory (CCTDI) measures the seven attributes that influence an individual’s capacity to learn and to apply critical thinking skills effectively: the disposition toward truth-seeking or bias, toward open-mindedness or intolerance, toward anticipating possible consequences or being heedless of them, toward proceeding in a systematic or unsystematic way, toward being confident in the powers of reasoning or mistrustful of thinking, toward being inquisitive or resistant to learning, and toward mature and nuanced judgment or toward rigid simplistic thinking (Insight Assessment, 2021).

Truth-seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and cognitive maturity complete the seven scales of the critical thinking disposition. Specifically, truth seeking is “courage to follow reasons and evidence wherever they lead”; open-mindedness is “willingness to consider a variety of alternative opinions”; analyticity is “consistent effort to anticipate consequences”; systematicity is “habit of taking an orderly and organized approach to problem-solving”; confidence in reasoning is “disciplined reliance on well-reasoned judgment”; inquisitiveness is “continuous attention to and desire for learning”; and cognitive maturity is “expectation of making timely, well considered judgments” (Insight Assessment, 2021).

The agreement on the concept of critical thinking was intensified by the Delphi Report (Wang, 2017). Under the sponsorship of the American Philosophical Association, a panel of 46 experts on critical thinking from various disciplines conducted a multi-round, method-strict research. It explored the essential commonalities of the concept of critical thinking (Facione, 1990).

The result of the research is called the Delphi report, in which it stated the conception of critical thinking as follows: “we understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Facione, 1990, p. 2). This agreed upon definition displays five core skills that critical thinking includes: interpretation, explanation, analysis, inference, and evaluation (Facione, 1990).

Critical Thinking as General versus Specific

Dichotomy of viewing critical thinking as general versus specific have existed among scholarly debate. On one hand, there are some scholars who believed that critical thinking is a general ability. Hare (1999) stated that although domain specific knowledge is important since it is empty to critically discuss disciplinary questions without any background knowledge of that discipline, there are general knowledge to follow any discussions and general principles to apply to all subjects. Thus, critical thinking can be learned in a context-free environment and applied in any relevant context.

Similarly, Reichenbach (2001) argued that some basic thinking skills such as finding topics, issues and theses are applicable to most disciplines. On the other hand, some other scholars consider critical thinking as domain specific. For example, Lucas (2019) mentioned that different professors from different disciplines tend to focus on different elements of critical thinking. McPeck (1981) proposed that a person’s reflective thinking heavily depends

on his or her epistemologies, logics, skills, knowledge, and criteria in a specific area; thus, one person could be a good critical thinker in one discipline but a bad one in another discipline. However, McPeck failed to consider the transcendency of affective dispositions of critical thinking, such as skepticism (Tian & Low, 2011).

Just like the world is not purely black and white, a lot of scholars take a stance away from this dichotomy and hold a compromised view. A group of experts who contributed to the “The Delphi Report,” one of the most fundamental reports on critical thinking, stated that they do not view critical thinking as one school subject delivered to students but rather as something applicable to all aspects of learning and living (Facione, 1990). Therefore, CT instruction could happen in discipline-specific or general programs that build upon everyday life (Facione, 1990).

However, one agreement reached by these experts was that although the identification and analysis of CT skills transcend, domain-specific knowledge, including mastery of disciplinary methodologies and norm-regulated practices was a must in terms of learning and applying CT skills (Facione, 1990). In addition, Dam and Volman (2004) pointed out that most recent literature took the compromised point of view and believed that although domain-specific knowledge is vital, some basic principles of critical thinking can transcend and apply to more than just one subject.

Teaching Critical Thinking in Higher Education

A variety of approaches are adopted for instruction in critical thinking in higher education (El Soufi & See, 2019). For instance, instruction in general critical thinking skills, which includes “training students to define arguments, evaluate reliability of sources, identify fallacies and assumptions, use inductive and deductive logic, synthesize information, make inferences” (p. 145), is seemingly promising and plausible to contribute to growth in critical thinking due to positive effects of this approach reported in a large number of studies.

In addition, other approaches include debate, which is used as an instructional strategy for English language learners in higher education and has shown some positive effects; brainstorming techniques, which include concept mapping that is believed to effectively enhance critical thinking of students; scaffolding, which refers to a method where teachers provide support to students or demonstrate how to solve a problem; and other active learning strategies, such as collaborative writing (El Soufi & See, 2019).

Moreover, problem-based learning, project-based learning, and case-based studies are popular strategies for teaching critical thinking in engineering education because they can engage students in real-life complex engineering problems (Ahern et al., 2019). For example, role-play allows students to play different roles they might experience in real work situations, such as a structural engineer or an architect (Ahern et al., 2019). Furthermore, lecture discussions (argumentation), group work, self, and peer assessment, and context-based learning were used in engineering education to develop critical thinking (Domingue, 2018).

Critical Thinking and Chinese Students

Existing literature on Chinese students and critical thinking clustered around seven themes: critical thinking cultivation in China (Chen, 2019; Du et al., 2013; Li et al., 2019; Tang, 2016; Wang et al. 2017; Zhang, 2017; Zhang & Lambert, 2008; Zhang & Kim, 2018), Chinese international students' experiences (critical thinking included) in Western higher education (Badger, 2019; Hu, van Veen, and Corda, 2016, as cited in Wu & Hu, 2020; Jiang & Altinyelken, 2020; Jones, 2005; Lu & Singh, 2017; Ma, 2020; Scally & Jiang, 2020; Turner, 2006; Wu & Hu, 2020; Xu & Grant, 2017), Chinese international students' understanding of critical thinking (Chen, 2017; Lucas, 2019; Pu & Evans, 2019), stereotype of Chinese international students lacking or having no critical thinking skills (Tian & Low, 2011), contradicting stereotypes that Chinese students lack critical thinking (Heng, 2018; Li, 2013; Turner, 2006), Chinese students' journey of developing critical thinking in Western

universities (Durbin, 2008; Fakunle et al., 2016), and comparative study of critical thinking between Chinese and American college students (Dennett, 2014; Yan, 2018; Zhang, 2009).

The first theme is critical thinking cultivation in China, which includes topics of critical thinking in Chinese college English classes (Tang, 2016; Zhang & Kim, 2018), service learning and critical thinking (Chen, 2019; Li et al., 2019), critical thinking of medical and nursing students (Du et al., 2013; Wang et al. 2017; Zhang & Lambert, 2008), and clues from the higher education curriculum in China to explain why Chinese postgraduates struggle with critical thinking in English-speaking universities (Zhang, 2017).

The traditional Chinese college English class is lecture-based and teacher-focused, emphasizing linguistic ability but no cultivation of critical or creative thinking (Tang, 2016). To resolve this issue, reforms and innovation were taken place in Chinese college English classes. For example, one lesson (i.e., Intensive Reading Course) adopted the “brainstorming” method before reading prior to the class (Tang, 2016). The instructor aimed to create an atmosphere that allows students to raise questions, explore and dig into more situations, evaluate different choices, and come up with rational decisions. The instructor designed activities that guide and inspire students to reflect, infer, critique, compare, contrast, argue, analyze, and integrate different situations. Students were also required to complete reflective writing to share thoughts and critique others’ writing after the class.

In a similar vein, other approaches to cultivating critical thinking in Chinese college English classes include using computer-mediated technology to increase interactive learning through online discussions, incorporating cultivation of critical thinking into the teaching process via combining critical thinking cultivation with course materials, utilizing classroom discussions, homework, classroom activities, extracurricular activities, and exams. Specifically, students were asked to work as a group to produce a presentation, such as a case study, a research project, a report, or a group plan. Students are also offered the freedom to

explore answers to their own questions instead of following pre-determined instructions (Zhang & Kim, 2018). In short, developing critical thinking has become one indispensable element in Chinese college English classes. The approaches mentioned above contribute to the success of the college English reform in China (Tang, 2016; Zhang & Kim, 2018).

Second, service learning that integrates community service and classroom learning would motivate Chinese college students to think critically when reflecting on their own behaviors and issues they encounter. They would maintain a critical thinking process when they met problems while doing community service instead of simply accepting the service-site teacher's instructions (Li et al., 2019).

Third, problem-based learning (PBL) and evidence-based learning were utilized to promote critical thinking among students, especially those in medical fields in China (Du et al., 2013; Wang et al. 2017; Zhang & Lambert, 2008). PBL could promote critical thinking development because it provides students opportunities to solve complex and real-life problems (Oja, 2011, as cited in Li et al., 2019). A Chinese version of the California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1992) which measures individuals' critical thinking disposition from seven scales (e.g., truth seeking, open-mindedness, analyticity, systematicity, CT self-confidence, inquisitiveness, and cognitive maturity) was used to investigate Chinese medical students' critical thinking (Li et al., 2019).

The finding revealed a generally positive effect of PBL on CT dispositions of Chinese medical students (Li et al., 2019), indicating that the Evidence-based medicine (EBM) courses would enhance the overall critical thinking of Chinese medical students, especially in confidence and inquisitiveness (Wang et al., 2017). The enhancement of critical thinking proved the malleability of Chinese students' critical thinking: critical thinking was still reversible even after years of forced rote learning for these Chinese students (Wang et al., 2017). However, these Chinese students still showed weak skills in truth-seeking, which

indicates the long-lasting effect of longtime force-feeding education and entrance pressure (Wang et al., 2017).

Similarly, Chinese college nursing students also demonstrated low truth-seeking disposition, which was shaped by didactic teaching and conformity to authority in China (Zhang & Lambert, 2008). In addition to that, these students suffered from low scores toward open-mindedness, which suggests a culture of maintaining surface harmony and avoiding questioning teachers in China (Zhang & Lambert, 2008).

Finally, Zhang (2017) examined Chinese college mandatory courses called “four treasures.” The four mandatory political courses were ‘The Fundamentals of Marxism,’ ‘Maoism and Chinese Characteristic Socialism,’ ‘The Outline of Modern Chinese History,’ and ‘Moral Thoughts, Legal and Civic Education.’ They concluded that these political courses may at some level prevent Chinese students from thinking critically and independently, leading to Chinese international graduate students’ struggle with critical thinking in Western classrooms.

In recent years, the implement of reforms has attempted to promote critical thinking through PBL, along with other new instructional methods in China. Positive outcomes have been achieved. However, the traditional didactic teaching and learning style, and the culture of maintaining harmony and conforming to authority have produced difficulties for Chinese students’ critical thinking, leading to low dispositions of truth-seeking and open-mindedness of Chinese students. Therefore, more interventions should be done to resolve these problems. Further, interventions should be used to adjust the teaching and learning style due to the deep influence of traditional pedagogy and culture on Chinese students.

The second theme is Chinese international students’ experiences (critical thinking included) in Western higher education. It includes various topics. For instance, Ma (2020) presented the success and struggles of Chinese college students in American higher

education, where insights of Chinese international students on critical thinking were included. Chinese education stresses conformity, rote learning, and standardized curriculum, which were influenced by Confucianism that Chinese students put great efforts in study and show obedience to professors. In contrast, American education emphasizes critical thinking and creative thinking, which covers “multiplistic thinking,” “truth seeking and challenging authority,” and “emphasizing process over outcome” (Ma, 2020, p. 84).

Similar as in American academic context, Badger (2019) studied perceptions of Chinese college students and faculty of a creativity and critical thinking course in an Intensive English Program (IEP), whose goal was to prepare for college courses before college officially started. The Chinese students reflected that a creativity class might have existed in primary education in China but was missing in secondary education, where memorization and examinations were emphasized. In China, students were not asked to think for themselves. Instead, they were directed to think in a particular direction provided by teachers. The IEP course instructor commented that even though Chinese students may not possess the same innovative thinking as American peers, it does not mean that they have a deficit thinking. Instead, Chinese students displayed critical thinking skills in the class and written reflections about the projects and activities.

Research focusing on doctoral supervision discussed how Chinese international doctoral students experienced, re-conceptualized, and reconciled critical thinking in the doctoral journey in Australia and New Zealand, especially how the relationship between Western supervisors and Chinese students was transformed: the traditional Chinese supervision where students obey and conform to the supervisor was replaced by the courage and ability to critique supervisors rather than viewing them as absolute authorities (Xu & Grant, 2017; Wu & Hu, 2020).

Specifically, Wu and Hu (2020) conducted an autoethnographic study on one female doctoral student under an Australian supervisor and how the student resolved cross-cultural conceptual conflicts, such as the concept of critical thinking. Western teaching often emphasizes the active exchange of ideas. In contrast, Chinese teaching focuses on modeling teachers who are generally perceived as authorities and models (Hu et al., 2016, as cited in Wu & Hu, 2020). Hence, Chinese students sometimes lack self-confidence in their own opinions and self-awareness of self-approval (Wu & Hu, 2020). The doctoral journey enabled the Chinese student to know different critical thinking styles and realize that being a critical thinker is not simply being informed but rather having the courage to challenge authorities (Wu & Hu, 2020).

In a similar vein, another study on doctoral supervision investigated how one Chinese international doctoral student assimilated the most transformative yet foreign voice that is critical thinking, in her intercultural supervision in New Zealand (Xu & Grant, 2017). Specifically, how she renovated her enrooted cultural root of respectful dependence that represents obeying teachers as authorities and experts to practice Western critical thinking that requires students to ‘not listen to the teacher,’ which paradoxically contradicts what Chinese students have been asked to do their whole education life: “listen to the teacher” (Xu & Grant, 2017).

Jones (2005) addressed the issue of a deficit view of Chinese students by proving the adaptability of Chinese international students in the Australian academic context. Chinese international students exhibited similar conceptualizations of critical thinking as their local counterparts despite cultural and linguistic differences. How the assessment and a subject were presented to the students enormously impacted students’ learning.

Similar as in the Australian academic context, Lu and Singh (2017) argued for a full linguistic repertoire by including the Chinese mode of critical thinking in the Chinese

language and culture and viewed Chinese international students in Australia as multilingual rather than deficient in critical thinking. The study acknowledged Chinese students' multilingual skills and the capability to think critically.

Jiang and Atinyelken (2020) explored the experiences of Chinese Bachelor's and Master's students in the Netherlands. Critical thinking was one of the many challenges these groups of students encountered in the shift from teacher-centered and exam-oriented education to student-centered and interactive pedagogy. Some of these students perceived themselves as active learners and remained silent in classroom participation because they needed to comprehend the content before asking effective questions (Jiang & Altinyelken, 2020).

However, most of them did admit that Chinese education had a negative impact on their critical thinking because they were asked to follow teachers without questioning or interaction, through which their curiosity and critical thinking were inhibited gradually (Jiang & Altinyelken, 2020). They became dependent on others to think and lost their ability to think independently, let alone to think critically (Jiang & Altinyelken, 2020).

It is also worth mentioning the lack of awareness of critical thinking in Chinese students' learning journey in the West, which was demonstrated in a study on Chinese business and management master's students in the UK (Turner, 2006). The study participants discussed other areas, such as group working and problem-solving, in their study accounts where explicit discussion of critical thinking was absent (Turner, 2006). By their graduation, these students did not clearly understand what contributed to their academic success in a Western academic environment, which is striking and interesting given the centrality of critical thinking in Western education (Turner, 2006). This absence of awareness of critical thinking underlines ambiguities and lack of transparency in the cultural translation of

teaching, learning, and assessment standards in this postgraduate program in the UK (Turner, 2006).

The third theme is Chinese international students' understanding of critical thinking (Chen, 2017; Lucas, 2019; Pu & Evans, 2019). Chen (2017) presented understandings and conceptualizations of critical thinking by Chinese undergraduate students in American higher education institutions. Some of the understandings included that they believed that doing projects in STEM classes promoted critical thinking; that critical thinking was important for academic success but had little importance on future career and life; and that a majority of challenges of their international study experiences lied in other factors, such as a safe environment to speak up and perceived value of their perspectives by American faculties and peers, rather than critical thinking (Chen, 2017).

A narrative case study by Lucas (2019) also provided an understanding of critical thinking by Chinese graduate students in the U.S. Regardless of variances and differences, predominant common understandings of critical thinking clustered around themes, such as critical thinking is innovative thinking, independent thinking, and questioning attitude; and challenges of critical thinking originated from lack of background knowledge and educational differences in China and the U.S. Chinese students' understanding of critical thinking tends to align with dispositions more than skills and abilities, which may imply a need for explicit education on the aspects of skills and abilities of critical thinking for these groups of students.

Pu and Evans (2019) investigated how Chinese students perceived and applied critical thinking in their postgraduate thesis writing. The novice researcher perspective included that employing critical thinking in the discussion chapter of the thesis was challenging due to lack of knowledge; the learner perspective viewed following the directions of the instructor as important instead of using critical thinking; and the practitioner perspective included that using critical thinking to review literature was useless because it was irrelevant to future

career practices. These different perspectives demonstrated various perceptions on the required use of critical thinking in thesis writing by Chinese postgraduate students depending on their goals and perceived roles as novice researchers, learners, and practitioners.

The fourth theme is the stereotype that Chinese international students lack or have no critical thinking skills. The literature on Chinese higher education students studying abroad and critical thinking indicates that Chinese international students often lack or fail to demonstrate critical thinking skills. Some reasons identified by previous studies for Chinese students' lack or absence of critical thinking skills include their tendency to remain quiet in Western university classes, difficulties with creative and innovative writing in Western universities, and typically lower critical thinking scores compared to their Western counterparts (Tian & Low, 2011). Atkinson (1997) pointed out that critical thinking is a Western product and aligns with the Western individualistic culture. Therefore, it is incompatible with the collectivist culture.

However, Paton (2005) disagreed with the cultural deficiency argument and claimed that traditional Chinese culture demonstrates critical thinking. He further asserted that Chinese international students are merely unfamiliar with the academic writing norms in Western culture and lack professional English writing skills, which results in their perceived low level of critical thinking. Some evidence from traditional Chinese culture demonstrates the existence of critical thinking, such as Confucius actively exemplifying and advocating for critical thinking through inquiry, deep and reflective thinking, autonomous thinking, and fair and rigorous judgment (Tian & Low, 2011). Thus, Paton (2005) believes training can develop Chinese international students' critical thinking.

Nevertheless, Chinese students' critical thinking deficiency is due to their collectivist culture, as they are passive in classes, refuse to challenge authorities, and have failed in creative writing (Tian & Low, 2011). Moreover, Chinese university teachers tend not to teach

critical thinking skills because such skills are not required for coursework and test, and students are content with not learning additional skills if they are not mandatory (Tian & Low, 2011). Similarly, Xie (2008) highlighted that teacher-centered instruction limits the space for higher-order thinking development in the Chinese university setting, leading to an increasing number of passive learners who view their teachers as absolute authorities.

On the contrary, Cheng (2000) stated that Chinese students usually remain quiet and passive in Western classes because of their English language incompetence rather than their unwillingness to participate. Chinese students, in fact, show strong adaptability to new learning environments and a high desire to acquire new knowledge (Tian & Low, 2011). Hence, a holistic approach is needed that involves various factors, including language proficiency, content familiarity, personal background, and complex teaching and learning contexts, to accurately evaluate an individual's critical thinking.

The fifth theme is contradicting stereotypes that Chinese students lack critical thinking. Li (2013) did a case study of two high-achieving Chinese undergraduate students in an English language institution and disproved the stereotype that Chinese students lack critical thinking. The skills of writing and learning along with the written assignments for political science course of these two students demonstrate their high critical thinking (Li, 2013). Both students believed that the essence of university learning and writing lies in critical thinking, which is demonstrated by writing with a clear view and sound logic. They both exemplified authorship by raising revised theories on their chosen topics and matching sources with their organizational framework.

Moreover, Heng (2018) also debunked the stereotype that Chinese students are passive and needy. Their studies showed that Chinese undergraduate students in the U.S. can overcome challenges and adapt when studying abroad. In terms of critical thinking, Chinese students perceived it as challenging ideas, overthrowing opinions, and alternative views.

They did admit that the learning environment in China did not prepare them well to think critically due to the rare utilization of questioning, the focus on memorization with no analysis, the fixed way of thinking with only one correct answer on tests, and transmitted knowledge with no questioning in Chinese education.

However, these students demonstrated considerable progress and changes in critical thinking after studying in U.S. institutions. They were able to share viewpoints from various perspectives as the new learning experiences developed their open-minded thinking skill. They learned not simply to accept ideas. Instead, they achieved a questioning mindset and stronger persuasive argument. These studies proved that despite the influence of rooted Chinese education, Chinese students have strong learning and adapting abilities to become good critical thinkers.

The sixth theme is Chinese students' journey of developing critical thinking in Western universities (Durkin, 2008; Fakunle et al., 2016). Chinese students who pursued graduate degrees in UK higher education institutions reported coursework feedback as a trigger event for them to realize the importance of developing critical thinking and later motivated them to seek ways to develop critical thinking for academic success (Fakunle et al., 2016). It usually took 2-4 months for these students to develop critical thinking, using various ways, such as reading books on developing critical thinking, reading recommended journal articles, asking for help from tutors, class discussions, writing assignments, and participating in social groups. After this gradual process of developing critical thinking, these students transformed into better critical thinkers who no longer perceive critical thinking as simply providing opposite opinions from others as they initially did but rather demonstrate improved critical thinking in their improved academic results.

Similar as in UK master's programs, Durkin (2008) studied the adaptation of East Asian students, including Chinese students, to Western norms of argumentation and critical

thinking and presented five stages. In the first stage, Chinese students need to understand and get familiar with Western academic conventions and requirements. Initially, participating in class discussions and debates was alien and challenging for Chinese students. They remained silent and preferred to listen due to fear of offending others and making mistakes. They need to adjust and adapt to the Western academic environment. They need to understand the importance of referencing and not plagiarizing. They also need to understand their expectation to read critically.

In the second stage, Chinese students still had misconceptions regarding critical evaluation by interpreting it as finding mistakes in everything they read (Durkin, 2008). They still had a strong predisposition to agree with the lecturer and perceived critical thinking as argumentative and culturally inappropriate. They lacked confidence in their thinking abilities and felt risky to speak their opinions. However, in this stage, Chinese students gradually changed their perspectives on critical thinking, moving away from simply viewing it as a pure confrontation to finding and using evidence to make persuasive arguments.

In the third stage, Chinese students became capable but not adventurous (Durkin, 2008). They learned to read critically and became more confident in reading materials. They were competent in analyzing, critiquing, and evaluating various viewpoints and weighing up different evidence to make reasonable judgments and opinions; however, they were weak in creatively synthesizing various viewpoints and lacked originality and risk-taking in making judgments.

In stage four, Chinese students developed expertise in critical thinking. They demonstrated original and creative critical evaluation of concepts (Durkin, 2008). They displayed self-reflection, which is the ability to examine their thinking and identify and challenge their assumptions and beliefs. They became confident, natural, and even enjoyable in critical evaluation.

In the fifth stage, Chinese students achieved acculturation; however, few reached this stage (Durbin, 2008). The Chinese students found it unnecessary to reach full acculturation because they only stayed in the UK for a short period and returned to China to work. They instead achieved a “middle way,” which synergizes Eastern and Western approaches to academic critique. This middle way mitigated the confrontational and battlefield critique by embracing the conciliatory and sensitive critique approach; thus, retaining the rigor of traditional Western critical thinking and argumentation but also softening the hostile confrontation by making argumentation and critique more humane, caring, and holistic. This study showed that Chinese students have a strong capability and adaptability to critical thinking but intentionally choose to avoid negative and aggressive ways of expressing it as in traditional Western academic culture.

The last theme is comparative study of critical thinking between Chinese and American college students. One study focuses on engaging university learners in critical thinking to stimulate collaborative learning (Zhang, 2009). Perceptions of Chinese and American students on collaborative learning from one university in China and one university in America were compared and contrasted. This study indicates that collaborative learning could promote critical thinking. The study that unveiled the perspective of Chinese international and domestic STEM students on critical thinking filled the gap in existing literature by exploring how STEM undergraduates perceive and experience critical thinking using qualitative transcendental phenomenology (Yan, 2018). Some scholars believe that Chinese international students have deficit critical thinking because they received lower scores on critical thinking tests compared to those of their western counterparts (Tiwari, Avery & Lai, 2003; Huang, 2008, as cited in Yan, 2018), whereas others argued that these students are only unfamiliar with and unadjusted to the Western style of critical thinking (Durkin, 2018; Tian & Low, 2011, as cited in Yan, 2018).

Due to the reason that critical thinking is highly valued in American higher education, especially in STEM education (Bissell & Lemons, 2006, as cited in Yan, 2018), little or no research has explored the qualitative perception and experience of students on critical thinking. Therefore, Yan's (2018) study included both Chinese international students and domestic undergraduate students to explore their understanding of critical thinking to fill the gap. Four major themes were generated: "critical thinking is a way of thinking comprehensively and logically"; "critical thinking is problem solving"; "critical thinking is a process"; and "critical thinking is confusing" (Yan, 2018, pp. 90-96).

In most cases, Chinese international students displayed a similar understanding of critical thinking as their American peers (Yan, 2018). The findings showed that a majority of Chinese students demonstrated an understanding of the importance of critical thinking concepts when communicating in their native language; thus, disproving the stereotype that Chinese students are deficit in critical thinking (Atkinson, 1997; Hofstede & Bond, 1994; Lee et al., 2014, as cited in Yan, 2018).

Yan's (2018) findings were in line with what Durkin (2008) believed that Chinese students can learn to think critically as their Western counterparts but choose not to due to the cultural norm of maintaining harmony and not being offensive. However, such classroom behavior of not being "insensitive and unnecessarily offensive" for the sake of thinking critically is often misinterpreted as a lack of critical thinking (Durkin, 2008, p. 7, as cited in Yan, 2018, p. 94).

In addition, both groups of Chinese international students and domestic students consider critical thinking as important for their career and education but less important for their personal life (Yan, 2018). Furthermore, in terms of the suggestions toward how to facilitate critical thinking, these students expected more hands-on and real-life research projects, more interactions with professors, more encouraging students to raise questions, and

more meaningful small group discussions, which are in line with strategies to develop critical thinking (Duron et al., 2006; Pithers & Soden, 2000, as cited in Yan, 2018) and particular strategies to foster critical thinking in STEM disciplines (Gottesman & Hoskins, 2013; Lord, 2001; Quitadamo et al., 2009, as cited in Yan, 2018).

Finally, Chinese culture is sharply different from American culture because of significance of the Confucianism; therefore, educators question whether Chinese culture may create barriers to an inquiring mind and if so, they can provide activities to help remove these barriers (Dennett, 2014). Due to these reasons, Dennett (2014) examined whether differences in critical thinking skills dispositions exist between Chinese and American college students.

The California Critical Thinking Dispositions Inventory (CCTDI) Scale was used as a measure to test the differences in seven scales that are “inquisitiveness”, which stands for “curiosity and a desire to learn”; “open mindedness”, which stands for “being aware of own views and biases and being open to others’ views”; “systematicity”, which stands for “being organized, focused, and having an inquiring mind”; “analyticity”, which stands for “use of reasoning and the use of evidence in problem-solving”; “truth-seeking”, which stands for “asking questions, seeking knowledge, and being objective and honest”; “self-confidence”, which stands for “trusting one’s own reasoning abilities”; and “maturity of judgment”, which stands for “using judgment when making decisions or problem-solving” (Insight Assessment, 2013, as cited in Dennett, 2014, p. 11). The results of independent t-tests showed that there were no differences between the group of Chinese students and American students in each of the seven scales on the CCTDI (Dennett, 2014).

Moreover, the results of a factorial analysis of variance that test the differences based on gender, discipline of study, enrollment as undergraduate in the U.S., and undergraduate or graduate status showed that there were significant differences of critical thinking dispositions between Chinese and American students when comparing the open mindedness and gender.

Additionally, significant differences were found for the scale of self-confidence and discipline of study; and that there were no significant differences for the rest (Dennett, 2014). This research advocated for using CCTDI as a helpful tool to determine students' critical thinking dispositions before training or learning activities.

The comparative studies showed that Chinese students and American students shared more similarities in understanding and dispositions of critical thinking. Chinese students are not lacking critical thinking. Instead, they chose not to argue in public because they try to avoid conflicts and maintain harmony that is in line with their Chinese culture. In other words, Chinese students can think critically as Western academic standards; however, they sometimes fail to demonstrate it because of their own cultural norms.

Transformative Learning Theory

As a metatheory, transformative learning theory has a long-reaching impact on adult education. As Mezirow (1997) said, "Transformative learning is not an add-on. It is the essence of adult education" (p. 11). Mezirow, Daloz, and Boyd are three scholars who are more concerned with individual transformation than societal transformation. In contrast, some other scholars, Paulo Freire, who is famous for his conscientization and social-emancipatory transformation, for instance, took a sociocultural approach to the transformative learning process (Merriam et al., 2007). This study utilized Jack Mezirow's transformative learning theory as a tool for analyzing Chinese international doctoral students' learning experiences as it emphasizes individual transformative learning experience.

Transformational learning theory is described by Mezirow (1994) as being "constructivist, an orientation which holds that the way learners interpret and reinterpret their sense experience is central to making meaning and hence learning" (Mezirow, 1994, p. 222). In simple terms, old knowledge is no longer sufficient when facing new experiences.

Therefore, people use critical reflection to change old ideas and understandings when getting new information or knowledge. Their worldview shifted and transformed.

Transformative learning theory explains how adults make sense of their experiences (Merriam & Baumgartner, 2020). Because of cultural assimilation, people tend to predict that certain results will happen (Mezirow, 1991; Taylor & Cranton, 2012). However, adults constantly face new life crises, conflicts, or dilemmas and when old meaning perspectives no longer deal with anomalies in new situations, they use critical reflection and rational discourse to combat the automatic response to achieve transformative learning with a more “inclusive, differentiated, permeable ... and integrated meaning perspective” (Mezirow, 1978; Mezirow, 1991, p. 7; Taylor & Cranton, 2012). Chinese international adult learners encounter different cultural and social circumstances in their host country, they have to rethink perceptions to study and live in the new situations and environments. They have to experience learning new things, new forms, and new ways in their cross-cultural learning context. Therefore, transformative learning process arises for them naturally.

Learning about “meaning perspective” is fundamental for adult development (Mezirow, 1978). “A meaning perspective refers to the structure of cultural assumptions within which new experience is assimilated and transformed by one’s past experience” (Mezirow, 1978, p. 101). More specifically, “a meaning perspective is a habitual set of expectations that constitutes an orienting frame of reference that we use in projecting our symbolic models, and that serves as a (usually tacit) belief system for interpreting and evaluating the meaning of experience” (Mezirow, 1991, p. 42). Epistemic, sociolinguistic, and psychological perspectives are the three kinds of meaning perspectives (Mezirow, 1991).

Perspective transformation is the core for transformative learning and Mezirow (1981) brought up this description of perspective transformation as:

The emancipatory process of becoming critically aware of how and why the structure of psycho-cultural assumptions has come to constrain the way we see ourselves and our relationships, reconstituting this structure to permit a more inclusive and discriminating integration of experience and acting upon these new understandings (p. 6, as cited in Kitchenham, 2008, p. 109)

Critical reflection and rational discourse are the two most important ways to achieve perspective transformation (Mezirow, 1991, 1994). Critical reflection becomes important because otherwise, we would automatically follow a chain of actions regardless of the merits or justifications. Reflection requires examining one's embedded grounds or justifications of beliefs, generally formed through cultural assimilation (Mezirow, 1991, 1994). Reflection includes three areas: the content of the problem, the premise of the problem, and the problem-solving process (Mezirow, 1991, 1994). Among all types of reflection, critically reflecting on one's premises or critical self-reflection is the most significant form of reflection (Mezirow, 1994).

Rational discourse can be viewed as within the realm of communicative learning and essential for human communication and learning (Mezirow, 1991, 1994). Communicative learning focuses on intersubjectivity, language, symbolic interactions, and consensual validation, whereas instrumental learning centers around "empirical-analytic" hypothesis testing and cause-and-effect relationships in natural science (Mezirow, 1991). Unlike everyday dialogue, rational discourse is used when people have to justify their beliefs by examining the reasons and assumptions that support them and evidence for and against counterarguments (Mezirow, 1991, 1994). Validity testing is important, and people need to understand something consensually validated, usually reached through rational discourse (Mezirow, 1991, 1994). Idealist and optimal conditions for rational discourse to happen are under which participants will:

Have accurate and complete information

Be free from coercion and distorting self-deception

Be able to weigh the evidence and assess arguments objectively

Be open to alternative perspectives

Be able to become critically reflective upon presuppositions and their consequences.

Have the equal opportunity to participate (including the chance to challenge, question, refute, and reflect and hear others do the same), and

Be able to accept an informed, objective, and rational consensus as a legitimate test of validity. (Mezirow, 1991, p. 77, 78)

In the book “Transformative Dimensions of Adult Learning,” Mezirow (1991) first time made a comprehensive presentation of transformative learning theory and within which he proposed ten phases of perspective transformation as follows:

1. A disorienting dilemma
2. Self-examination with feelings of guilt or shame
3. A critical assessment of epistemic, sociocultural, or psychic assumptions
4. Recognition that one’s discontent and the process of transformation are shared and that others have negotiated a similar change
5. Exploration of options for new roles, relationships, and actions
6. Planning of a course of action
7. Acquisition of knowledge and skills for implementing one’s plans
8. Provisional trying of new roles
9. Building competence and self-confidence in new roles and relationships; and
10. A reintegration into one’s life based on conditions dictated by one’s new perspective. (pp. 168-169)

This original ten-phase transformation process developed into 11 phases, adding a new phase of “renegotiating relationships and negotiating new relationships” in between the eighth and ninth phase (Mezirow, 1991, 1994; Kitchenham, 2008).

There are also some major critiques about the transformative learning theory. For instance, Mezirow views transformative learning as the essence of adult education and that the goal of adult education is to foster autonomous thinkers, which relies upon the belief that transformative learning theory has embedded inherent goals, ideals, and logic (Taylor, 1998). Furthermore, Mezirow viewed the transformative process as irreversible, that once people achieve a fuller understanding, they do not regress to less understanding (Taylor, 1998). Moreover, the result of the developmental process is a worldview that is more discriminating, permeable, and inclusive (Taylor, 1998). Because creating ideal conditions for rational discourse is vital for fostering successful communicative learning, it is important to point out that adult educators should create a classroom atmosphere where power influence is least and reduce the bad consequences associated with instrumental learning and win-lose discourse (Taylor, 1998).

Critiques of Mezirow’s transformative learning theory also included that Mezirow did not consider context and ignored the sociocultural aspects of life, relied too much on rationality and ignored other ways of knowing, did not provide the method to achieve social change from individual change, and finally, put too much pressure on the shoulders of adult educators to advocate social change (Merriam et al., 2007).

Fundamentally, the transformative learning theory offers a framework for enhancing the educational growth of adults, achieved by a continuous journey of critically examining and reflecting on their assumptions and perspectives. This process leads to a shift in their meaning perspectives, enabling them to navigate and decipher new meanings within their experiences. Delving into the intercultural encounters of Chinese adult learners studying

abroad becomes imperative in order to unravel their transformation resulting from their interaction with the host culture. The lens of transformative learning theory provides an opportunity to delve into the ways international adult learners make meanings of their daily lives during their study abroad endeavors, drawing insights from self-reflection, beliefs, and worldviews.

Perry's Scheme of Intellectual and Ethical Development

Scholars believe that critical thinking is highly related to intellectual and cognitive development theories, such as the Perry Scheme (Yan, 2018). Cognitive development theories believe that changes happen in people's thinking over time (Knowles et al., 2005). Children's cognitive development theory by Piaget laid the foundation for most adult cognitive development theories (Merriam & Caffarella, 1991, as cited in Knowles et al., 2005). Piaget proposed four stages in children's thinking development, which are "sensory motor, preoperational, concrete operational, and formal operations"; and at the formal operations stage, children have reached a status where they can think abstractly and hypothetically so that mature adult cognition begins, even though some adults never reach this level of thinking in real life (Knowles et al., 2005, p. 224).

Piaget suggested that once formal operations occur, cognitive development stops in adulthood, which was disagreed with and disputed by many adult cognitive theorists, who believed that cognitive development continues beyond formal operations (Knowles et al., 2005). Such adult cognitive development includes dialectic thinking, which is one important cognitive development for adults to ensure acceptance of controversy and complexity of adult life, and relativistic thinking, which is famously represented by William Perry's nine stages of college students' cognitive development from dualism to relativism (Knowles et al., 2005).

Yet, unlike dialectic thinking, Perry did not describe his work as a post-formal operation (Knowles et al., 2005). Perry proposed a developmental model that reveals the

sequence and nature of cognitive development and emotional maturation (Hodes, 1988; Perry, 1970). It is commonly referred to as the Perry Scheme or the Perry Scheme of Intellectual and Ethical Development (Mak, 2013). Because the Perry Scheme provided a framework for teaching and learning for college students, it is influential for adult educators, especially those who work in higher education (Mak, 2013). Further, researchers expanded the research on the Perry Scheme to include cross-cultural contexts and graduate students by studying Chinese college students in mainland China and Chinese international graduate students in US higher education institutions (Mak, 2013; Zhang, 1995, 1999, 2004; Zhu & Cox, 2015).

Critical thinking is highly intertwined with cognitive development (Yan, 2018). The Perry Scheme was utilized on Chinese graduate students in the U.S. to study their epistemology and cognitive development through existing research (Mak, 2013; Zhu & Cox, 2015). Hence, the Perry Scheme may serve as another framework for the study. Existing studies presented the epistemological development of Chinese international graduate students in the U.S.: specifically, for example, which Position on the Perry Scheme these groups of students reached and what facilitated their epistemological development (Mak, 2013; Zhu & Cox, 2015).

Since the development of critical thinking inevitably relates to epistemology and cognitive development (Yan, 2018), the Perry Scheme can be used as a lens to explore the critical thinking development of Chinese international doctoral students, especially to examine the epistemological development embedded in critical thinking development. As Chinese students cultivate their critical thinking, their epistemological perspectives may change.

Perry presented a nine-stage cognitive development model where each subsequent stage builds on the former and is more complex than the former (Battaglini & Schenkat,

1987; Hodes, 1988; Shapiro, 1985; Stonewater et al., 1981). Perry's nine positions are commonly categorized into four stages: dualism, multiplicity, relativism, and commitment in relativism (EI-Farargy, 2010; Henderson, 1994). In the dualism stage, students are passive learners who accept memory-based, objective, and clear-cut knowledge (EI-Farargy, 2010).

In the multiplicity stage, students begin to realize that dualistic constructs may not be absolute and may experience dissonance in the aspect of knowledge and authority (EI-Farargy, 2010). In the relativism and commitment stage, students believe that themselves, their peers, and lecturers are all legitimate sources of knowledge and that knowledge is actively created and constructed. And in this stage, students appreciate contextual relativism (EI-Farargy, 2010).

In the early positions (1 and 2), students perceive the world and knowledge in a dichotomous and dualistic manner that everything is black or white and right or wrong, that the authority knows all, and that there is no room for contextual or conditional reasoning (Shapiro, 1985; Stonewater et al., 1981). Specifically, Position 1 is called Basic Dualism, where students believe that knowledge is an accumulation of facts and that they must learn the right solutions to all solvable problems (Perry, 1970, 1981).

People in Position 1 typically are biologically very young, yet it does not exclude the possibility that still college students can be in this position. Position 2 is called full dualism, where students realize that other systems of values and beliefs exist but begin to differentiate authorities into two groups, namely, our authorities and other authorities (Perry, 1970, 1981). Our authorities know the right answers but withhold from telling us, expecting to cultivate our thinking ability (Perry, 1970, 1981). Other authorities who do not have the same beliefs as we do are wrong; same with those who fail to provide clear-cut answers (Perry, 1970, 1981).

In simple words, Position 2 still rejects complexities; however, it shows that even our authorities may not have the correct answers right away and that we need to search for answers ourselves. Both Position 1 and Position 2 belong to the first stage of intellectual and ethical development, dualism (Perry, 1970, 1981).

In position 3, students still believe that they could find the right answer; however, they start to form multiplicity that they grow awareness of the diversity of opinions and that they could endure temporary uncertainty (Shapiro, 1985; Stonewater et al., 1981). This position is called early multiplicity, where students realize that “our authorities” do not have all the answers yet still maintain a certain degree of dualism that they wait for “our authorities” to search for answers for them (Perry, 1970; 1981). Worth noting is that multiplicity represents a significant leap to the understanding of knowledge that students no longer see the world as right or wrong but realize multiple ways of looking at things; thus, they have become more able to deal with conflicts with which dualists have so much trouble (Shapiro, 1985; Stonewater et al., 1981). Also, the view of authority that these students hold has changed: they think that in some areas where multiple right answers exist, the authorities have not found the right answer yet; however, authorities still hold strong power based on their belief that eventually, the authorities would find the right answer (Shapiro, 1985; Stonewater et al., 1981).

Position 4 is called late multiplicity, where students realize that some problems are unsolvable and everyone has a right to opinions (Perry, 1970, 1981). Transitioning to Position 4, students have waited so long for answers from authorities to the point that it awakens them to realize that authorities may not have answers as well. And this uncertainty and confusion have caused them fear, betrayal, anger, grief, and depression. Therefore, this transition to Position 4 is a difficult one. Some students who get overstressed and hurt even regress to Position 2 more vehemently than before (Perry, 1970, 1981).

One direction that Position 4 can go centers on rebellion, where students believe that answers are subjective and everyone has a point without having to use evidence to justify it; therefore, the new method of backing up opinions with facts and evidence is hard to understand for them (Perry, 1970, 1981). In other words, in the direction of rebellion in multiplicity, metacognition, which is thinking about thinking, has not been established for most people (Perry, 1970, 1981). The other direction of Position 4 is playing by rules that students no longer assume all answers are equally valid but still stick to the rules to get good grades (Perry, 1970, 1981). After all, even without knowing all the answers, authorities still control most of them. In the direction of playing by the rules of Position 4, students have gained a level of independent and autonomous thinking; however, they choose to strictly follow the rules instead of implementing that level of autonomy they have reached (Perry, 1970, 1981). Position 3 and Position 4 belong to the second intellectual and ethical development stage, multiplicity.

While in position 4, students could recognize relativism, only in position 5, students could be contextually relativist (Shapiro, 1985; Stonewater et al., 1981). As students transform into relativism, a fundamental shift in thinking emerges that they realize that in many areas, there is no correct answer; that they can think in relativistic or contextual terms; that they can argue relatively; and that they can accept multiple perspectives (Shapiro, 1985; Stonewater et al., 1981). Students still seek guidance from authorities but begin to trust that they themselves can reason (Shapiro, 1985; Stonewater et al., 1981).

Specifically, Position 5 is contextual relativism, where students learn to evaluate solutions based on contexts (Perry, 1970, 1981). Position 5 has brought a lot of pain and trauma for most people due to the uncertainty, confusion, and inability to reconcile the coexistence of every “truth: and equally valid opposite “truth” (Perry, 1970, 1981).

Therefore, some ways to deflect from growth to Position 5 emerged, and such ways include

temporizing, which is waiting and refusing to recognize ambiguity; retreat, which is regressing to earlier stages with a closed mindset and hatred of otherness; and escape, which is denying the reality of relativism but most adults will come to terms of the deeper truth of relativism in the end and begin to find meaning from within (Perry, 1970, 1981).

In addition, Position 6 is called commitment foreseen or pre-commitment, where students start to accept the necessity of relativism, make choices, and commit (Perry, 1970, 1981). This position involves narrowing down all possible choices in preparation for Position 7 (Perry, 1970, 1981). Students have confidence and autonomy in their more personal, individualized, and proactive choices rather than reactive ones (Perry, 1970, 1981). Position 5 and Position 6 belong to the third stage of intellectual and ethical development, relativism.

Finally, in positions 7, 8, and 9, the higher positions on Perry's scale, students move to commitment to relativism (Shapiro, 1985; Stonewater et al., 1981). Students have grown their awareness of the need for personal commitment to contextually relative epistemology. This stage does not involve drastic structural cognitive developmental changes as did the earlier stages but includes qualitative stages through which students develop and live with a series of commitments and a sense of identity (Shapiro, 1985; Stonewater et al., 1981). Position 7-9 is called commitment, where people decide to commit in many domains ranging from career choices, spiritual path, moral beliefs, and other important aspects of life (Perry, 1970, 1981).

Such commitment provides people with a sense of certainty and structure in the face of the ambiguity of relativism (Perry, 1970, 1981). While it might seem similar between Position 2 and Position 7-9 at first glance if the person in Position 2 and the person in Position 7-9 both agree to the same statements; however, the giant difference lies in the degree of autonomy where the person in Position 7-9 has made the reasonable decision after living alternatives and evaluating evidence.

In contrast, the person in Position 2 believes the statement simply because the authority has indicated so (Perry, 1970, 1981). Even though Perry did not outline the rest positions past Position 7, broadly, Position 7 revolves around making a formal commitment; Position 8 ensures learning to make commitments in various domains; and Position 9 includes balancing paradox, especially the uncertainties and ambiguities that were once avoided are now lived and accepted by people with calmness (Perry, 1970, 1981).

Zhang (1995) was the first scholar who conducted a cross-cultural application of the Perry Scheme on Chinese students. Interestingly, the university students in Mainland China exhibited a different developmental direction from the sample of the Perry Scheme (Zhang, 1995). Specifically, the first-year students showed high relativism and commitment but low dualism; the sophomore showed mixed positions; the juniors showed the most dualism but the lowest relativism and commitment; and the seniors showed less dualism and more relativism and commitment (Zhang, 1995). Several cultural and environmental conditions in Mainland China back then have to be considered for the discrepancies in results (Zhang, 1995). Such conditions centered on the rare opportunities for these Chinese students to make choices, thus, making the direction of moving towards dualism sense-making (Zhang, 1995).

Furthermore, the reason why first-year students exhibited high relativism was that only 10% of top academic achievers could attend college at that time in China, and such students felt that they had control over what happened to them; therefore, having an optimistic attitude and curiosity of exploring different opportunities (Zhang, 1995). Zhang (1995) devised a 205 items instrument named the Zhang Cognitive Development Inventory (ZCDI), building upon the Perry Scheme (1970), and this instrument was tested the validity and translated into Chinese. Later, Zhang (1999) proved the validity and reliability of the ZCDI instrument on the three samples of one group of U.S. college students and two groups of mainland Chinese college students. The results showed that the American sample

confirmed the progression of cognitive development proposed by Perry, whereas the Chinese sample showed inconsistency (Zhang, 1999). Cultural factors such as limited choices in Mainland China for these Chinese students in terms of career choices, major choices, and social life choices, explained the inconsistency (Zhang, 1999).

Targeting the same participant group as my research, Mak (2013) studied the intellectual development of Chinese international graduate students in U.S. higher education institutions using the Perry Scheme and found that a majority of participants were in Position 4, where students began to realize relativism, or transitioning between Position 4 and 5, between multiplicity to relativism, similar as Western students in the Western higher Education context.

In a similar vein, Zhu and Cox (2015) utilized a modified version of Zhang's Cognitive Development Inventory (ZCDI) that was based on the Perry Scheme (Zhang, 1999) and investigated the epistemological development of Chinese engineering doctoral students in U.S. institutions. The results showed that it was more prevalent for new students to display dualistic thinking than seasonal students; that there was more multiplistic thinking demonstrated in students with master's degrees than those without; and that doctoral training in independent research and analytical thinking facilitated epistemological development (Zhu & Cox, 2015).

Some challenges to the Perry Scheme stated that it is value-laden that implies relativism as the most desirable intellectual stance or even the end in itself (Battaglini & Schenkat, 1987). However, the Perry Scheme holds strong explanatory power regarding how college students make sense of what they learn, such as theories, information, opinions, and experiences in college classrooms (Battaglini & Schenkat, 1987).

Another critique of the Perry Scheme was made by himself that three major limitations of his findings were identified, which were the participants were from a single

institution from 1954-1963; the developmental scheme was created from the annual interviews this group of students took; and the scheme was tested validity using the same group of students who contributed to the formation of the scheme (Knefelkamp, 1974).

In addition, other critiques revolved around the contradictory findings when applying the Perry Scheme. For example, Zhang (2004) reported that the progression of cognitive development of American university students proposed by Perry was not clear and certain after 30 years. There were discrepancies in her studies on the application of the Perry Scheme. Some studies followed the Perry Scheme, whereas others did not show the developmental patterns proposed by Perry (Mak, 2013; Zhang, 2004). One possible explanation might be the changing population and higher vocational interest of students in current higher education in the U.S. (Mak, 2013).

In essence, The Perry Scheme presented a nine-stage cognitive development model consisting of four categories: dualism, multiplicity, relativism, and commitment. The Perry Scheme focuses on cognitive development, moving from simple to complex positions regarding epistemology. It has broad applications and adaptations. It is worth noting that it displays relevance to Chinese students' studying experiences in U.S. host campuses. Some significant critiques of the Perry Scheme include that it is value-laden that believes commitment to relativism is supreme; it has limitations of findings and issues of validation of the scheme; and it has confusing cognitive concepts.

Chinese and American Educational Philosophies and Pedagogies in Contrast

When it comes to American classroom instruction and Chinese classroom instruction, a variety of differences abound. For example, Confucian educational culture and principles generally guide traditional Chinese classroom instruction (Ma & Luke, 2014; Sun et al., 2019). Western educational philosophies, such as pragmatism, especially progressivism, shape modern American classroom instruction (Ma & Luke, 2014; Ross-Gordon et al., 2017).

Influenced by different educational philosophies, China and America thus have different instructional methods. Chinese international students who were used to Chinese instructional methods need adjustments and help in Western higher education institutions. This section reviews and presents different educational philosophies that shape education in China and the United States, the differences in their classroom instructional methods, and Chinese international students.

Historical and Cultural Perspectives on Chinese Pedagogy

Historical and cultural perspectives on Chinese pedagogy include ancient Chinese education philosophies, Confucianism, and contemporary Chinese pedagogy.

Ancient Chinese Education Philosophies

Ancient Chinese education philosophies are summarized as follows: “emphasizing the cumulative process of learning and the importance of basic knowledge; emphasizing the integration of learning and practices; highlighting “practice makes perfect”; and stressing heuristic instruction” (Shao et al., 2012, p. 56). Such educational philosophies are rooted in Confucianism, which influenced traditional Chinese teaching considerably. Ancient Chinese teaching heavily relies on recitation and memorization following the sequence of “lecturing, listening, memorizing, and practicing” (Shao et al., 2012, p. 73). The ancient Chinese teaching process starts with the teacher reading and explaining. Then, students repeatedly review and recite, followed by students asking and checking answers in teachers’ lectures and textbooks (Shao et al., 2012).

The Chinese educational history shows that memorizing has been essential for Chinese students’ learning. It is worth noting the difference between rote learning and repetitive learning for Chinese students, and it is essential to acknowledge the importance of repetitive learning as a learning strategy for Chinese students from ancient to the current time (Turner, 2006). Repetitive learning has been a learning habit for the Chinese population

throughout the history, which a Chinese saying can demonstrate: if you read a book one hundred times, the book's meaning will be understood naturally. Therefore, repetitive learning has been an important learning strategy in Chinese educational history and has contributed to deep learning for Chinese students (Turner, 2006). It does not indicate a lack of criticality (Turner, 2006).

Confucian-Heritage-Culture

Students from mainland China grow up in a culture greatly influenced by Confucian ideals, like harmony, collectivism, family traditions, authority, education, and “filial piety” (Bodycott & Lai, 2012; Sun, 2013, as cited in Sun et al., 2019). In essence, filial piety requires people to obey and respect their parents and take care of them when they are old (Bodycott & Lai, 2012). Generally, Chinese parenting styles are more controlling and authoritarian than Western ones, which are more tolerant and less demanding (Thakkar, 2011). Chinese parents value education highly and invest a lot in their children. Families and parents who send their children to study in Western universities, such as in the U. S., the UK, or Australia, would view such action as an investment for potentially high-paying employment opportunities (Bodycott & Lai, 2012). Therefore, many Chinese international students are studying at American universities (Henze & Zhu, 2012).

Confucian-heritage-culture values diligence, self-efforts, willpower, hard work, and doing one's best in learning and lifelong practice (Sun et al., 2019). Confucius emphasized personal efforts and hard work instead of the innate ability to learn (Thakkar, 2011). China's educators are regarded as respecting authority. Teaching in China can be characterized as apprenticeship, transmission, teacher-centered, text-limited, highly structured, exam-oriented, and didactic (Holmes, 2005; Sun, 2013, as cited in Sun et al., 2019).

Traditional Classrooms Influenced by Confucianism

Influenced by Confucian educational culture, traditional Chinese classrooms usually have a big class size, and information is transmitted through a single instructional method (Yi et al., 2021). In other words, there is little teacher-student interaction in traditional Chinese classrooms, and the teacher is not able to take care of each student, make correct judgments on student learning, or provide timely feedback to students. Thus, students' learning creativity is difficult to achieve (Yi et al., 2021). Teachers teach, disabuse, and propagate ideology and so-called legitimate knowledge (Shao et al., 2012). Teachers are the authority of knowledge (Shao et al., 2012). "On Teachers" by Han Yu (802 A.D.) summarized three roles of a teacher: "to spread truth, to impart knowledge, and to untangle students' puzzlement and confusion" (Ma & Luke, 2014, p. 66). "Reciprocally, the student's roles are also threefold: to be exposed to the truth, to learn knowledge, and to solve their puzzlement and confusion" (Ma, 2008, as cited in Ma & Luke, 2014, p. 66).

In response to the imposed roles, teachers in Confucian culture are expected to be content experts who prepare content comprehensively before the class, lecture the content systematically during the class, and answer students' questions and misunderstandings after the class (Ma & Luke, 2014). Students are expected to preview the text before the class, listen to the lecture attentively but typically without interrupting or questioning the teacher, and ask questions after the class (Ma & Luke, 2014).

A traditional Chinese class is typically characterized as a lecture that follows predictable and pre-determined contents, processes, examples, exercises, and homework, with occasional, if not zero, questioning (Shao et al., 2012). Students mentally engage the content internally but do not externalize the content in many expressive forms, such as hands-on projects, in-class discussions, or debates (Ma & Luke, 2014). Counterintuitively, students from Confucian-heritage-culture, who were trained in an environment that has large class

sizes, is teacher-centered, lecture-based, and memorization-stressed, turn out to be able to outperform their U.S. counterparts who come from learner-centered and constructivist learning background (Watkins & Biggs, 1996, as cited in Ma & Luke, 2014).

The Influence of Confucian-Heritage-Culture on Contemporary Students

It is perceived that students from Asia are passive learners. (Tran, 2013). Chinese learners prefer to listen carefully to the lecture and construct meanings after the whole lecture (Chan, 2019; Thakkar, 2011). Students usually listen to the teacher without questioning or being skeptical (Sun et al., 2019). Moreover, they are reluctant to talk about personal issues or ask questions in class since such behaviors may be viewed as selfish due to their collectivist culture; Furthermore, students show modesty and respect for hierarchy in classrooms where time for collaboration and communication among students is limited (Sun et al., 2019).

Achieving good assessment results is a great motivation and goal for students in China to learn. Thus, surface learning becomes prevalent for such students because of the reproductive assessments in the educational systems (Chan, 2019). Students' rankings in every test are significant for the students and their parents. In other words, it is not exaggerated to say that achieving top rankings in exams is the most important thing for a student in China (Chan, 2019). Confucian culture classrooms value order, hierarchy, obedience, and authoritative yet warm and caring teachers (Chan, 2019). Students memorize rather than understand knowledge; thus, surface and rote learning are common in such classrooms (Tran, 2013).

As stated above, Chinese international students come from a Confucian educational background, so they are unfamiliar with American classroom strategies, such as group interaction, dialogue, and participative learning (Sun et al., 2019). Therefore, they are mistakenly viewed as non-participative and passive learners (Sun et al., 2019). However,

Biggs (1996) contends that Chinese international students are academically competitive and reflective (Sun et al., 2019). And group learning is performed outside of classrooms for Chinese students. Furthermore, current curriculum reform in China adopted neo-liberal policies and practices that cultivate critical and innovative thinking and real-life applications of what students learn (Sun et al., 2019). Tran (2013) stated that if given a chance, such students can adjust to active forms of learning.

Content, Foundations, and Methods of Confucian Education

Confucian education focused on three content areas: moral teaching, religious teaching, and intellectual teaching with individual and social aims (Corcoran, 2014). Confucius believes that men are teachable; that there are five steps of learning: study, inquiry, thinking, discrimination, and earnest practice. He also believes that diligence and humility are two essentials of learning (Corcoran, C, 2014). Consensual decision-making in groups is vital for collectivist Chinese, and seeking approval is important for Chinese people (Corcoran, 2014). Avoiding conflicts and maintaining surface harmony are also Chinese characteristics influenced by Confucian culture (Corcoran, 2014).

There are three central philosophical foundations of Confucian thinking on moral education: the doctrine that human beings are born good, the doctrine that human nature develops through habit, and the doctrine that filial piety is the first among the virtues (Wang, 2020). Further, Wang (2020) presented four principles guiding moral education: cultivating positive moral education from early childhood; preventing bad habits or faults before they happen; proceeding with moral education step by step and orderly, and teaching students according to their aptitude. Moreover, in ancient China, five methods to develop moral education are popular, which are unconscious influence; affective education that caters to the pupil's interest and preference to conduct moral education; development of awareness and insights rather than solely focusing on memorization and recitation; practice; and self-

cultivation by restricting desires, awakening conscience, bringing up one's shame and being strict with oneself when alone (Wang, 2020).

Contemporary Chinese Pedagogic Discourse and Confucian Pedagogic Discourse

Contemporary Chinese pedagogic discourse is influenced by Confucian teachings and Western and other modernization (Cheng & Xu, 2011). For example, emphasizing lecture and practice is the traditional way to teach mathematics in China (Shao et al., 2012), yet, after the open-door policy, Chinese mathematic education has followed Marx's dialectical materialism perspective in classroom instruction:

Three basic abilities have been highlighted (correct and fast computation ability, logical thinking ability, and spatial imagination ability), and the ability to analyze and solve problems has been emphasized. (Shao et al., 2012, p. 78)

It showed that the mathematical educational shift from a pure emphasis on lecture and practice to cultivating abilities and problem-solving.

Furthermore, the modern Chinese language has been Westernized not only in translated words from the West but also in its ways of "doing things with words" (Cheng & Xu, 2011). However, Chinese people might not be consciously aware of the hidden impact of Western discourse but have normalized these practices as their own (Cheng & Xu, 2011). Using "classroom text," differences in the presuppositions regarding knowledge, learning, and teaching of Confucian pedagogy and contemporary pedagogy is as follows:

Confucian pedagogy conceives knowledge as a situated intuitive insight, learning as a modification of self, and teaching as a heart-to-heart encounter. Contemporary pedagogy regards knowledge as a series of propositions about truth, learning as the assimilation of information, and teaching as an enunciation. (Cheng & Xu, 2011, p. 608)

Confucian pedagogy holds that the end goal of learning and education is to cultivate a moralized and virtuous person, so ethical or political knowledge is important, whereas fact-based knowledge about the physical world is deemed less necessary or even worthless (Cheng & Xu, 2011; Murray, 2012). Compared to Confucian teaching, which aims to foster moral people, contemporary pedagogy trains stereotypical attitudes, structured knowledge, and specialized skills for people to become qualified citizens and experts (Cheng & Xu, 2011). Three traditions permeated Chinese people's lives: Mao's establishment of new China, which emphasizes equality; Deng's tradition, which emphasizes free market and economic flourishing; and the Confucian tradition rooted in Chinese culture and influenced the social lives of Chinese people for several-thousand years (Cheng & Xu, 2011).

In modern Chinese history, traditional Confucianism was severely attacked and damaged by the New Culture and May Fourth movements in the early twentieth century and later further demolished by cultural revolution in the 1970s (Murray, 2012). Confucian moral education prohibited socio-political and technological progress and modernization and was thus deemed outdated (Murray, 2012). On the contrary, seeking independence, individuality, equality, freedom, and dignity is common among Chinese youth. Citizenship education is prevalent throughout the education systems in China, yet students have their political views despite the indoctrination of ideology (Tu, 2011).

Confucian Conceptions of Creativity and Critical Thinking

It is well believed that Confucius-heritage societies such as China and Korea are collectivist-oriented and therefore speculated as prohibitive to the development of individual creativity. However, China, a country deeply influenced by Confucian culture, has its characteristic notion of creativity instead of not possessing creativity, which is the myth Westerners hold (Niu, 2012). The Chinese notion of creativity is more contextualized than

Western individualistic creativity, and Chinese creativity may take the form of modification, renovation, adaptation, or re-interpretation (Niu, 2012).

In another study, the Confucian understanding of critical thinking focused on the concept of judgment. It thus refuted the perception that critical thinking is absent from or incompatible with Confucian culture (Tan, 2017). The Confucian ideal of Li (normative behaviors) asks people to make a judgment by applying procedures, norms, and knowledge in Dao (way) to specific scenarios and situations flexibly and wisely. As an instance of Li, a person's judgment should be delimited and circumscribed by the ethical quality of ren (humanity) that proves one's moral character (Tan, 2017).

Chinese Communication Competency

Indicators of strong communication competency from Western culture reflect a linear and mechanical obsession with causal relationships. In contrast, Chinese conceptions of strong communication competency believe in continuous change, transformation, and harmonious interdependent relationships in the communication process (Chen, 1993). Confucian culture deeply influenced the communication styles of the Chinese. Five Confucian concepts build the foundation of communication competence in Chinese: “Bian” (change), “Shih” (time), “Wei” (environment), “Ji” (the trace of movements), and “Chung Tao” (the way of means of appropriateness) (Chen, 1993). Confucian teachings cultivate love, sincerity, honesty, righteousness, and respect for social norms. They believe human communication is an endless cycle where the person, rather than the message or other elements, is the focus (Chen, 1993).

Western Educational Philosophies

A variety of Western educational philosophies influence American educational practices, such as Idealism, Realism, and Pragmatism, to name a few (Ross-Gordon et al., 2017). Specifically, “Idealism means a philosophy that sees reality as mentally constructed”

(Ross-Gordon et al., 2017, p. 147). An idealist holds an ideal conception of knowledge and truth as something timeless and unchanging (Ross-Gordon et al., 2017). Conversely, realism “focuses on the world of things” (Ross-Gordon et al., 2017, p. 148). Truth is not considered an idea or ideal, but something realists can observe (Ross-Gordon et al., 2017). Instead of viewing truth and knowledge as unchanging as idealists, realists recognize that people may only see some aspects of the world, whereas other unobserved aspects exist (Ross-Gordon et al., 2017).

As a reaction to both Realism and Idealism in one sense, Pragmatism is a more modern educational philosophy that “focused on the world of experience” (Ross-Gordon et al., 2017, p. 149). Unlike idealists or realists, pragmatists believe that truth exists in the experience, and that there is no one truth (Ross-Gordon et al., 2017). In other words, Pragmatism emphasizes the connection between thought and action and believes that perceptions can affect experience (Ross-Gordon et al., 2017). As an advocate for Pragmatism, John Dewey thinks that learning is built on learners’ life experiences and individual contexts and that learners should apply what they learn to real-life situations (Ross-Gordon et al., 2017).

Progressivism is one school of educational philosophy intertwined with Pragmatism and a historical, educational movement that promoted “child-centered” educational approaches (Ross-Gordon et al., 2017; Windschitl, 2002). Progressivism advocates that learners must own and construct their learning (Ross-Gordon et al., 2017). Also, there is no unchanging truth; the truth is contingent and changes progressively and slowly (Ross-Gordon et al., 2017).

Progressivism has considerably influenced modern American educational practices (Ross-Gordon et al., 2017). The constructivist learning theory originated from progressive movements in education and functions as a concrete theory guiding American educational

instruction (Windschitl, 2002). As one pioneer of progressive pedagogy, John Dewey (1938) believed that learning experiences should be connected to students' prior experiences and that learning is developing and constructed socially (as cited in Windschitl, 2002). Hence, the constructivist learning theory perceives knowledge as socially embedded and collaboratively constructed (Windschitl, 2002). In school settings, all teaching and learning should revolve around learners and provide learners with hands-on activities to enable them to actively construct knowledge and meaning on their own rather than passively receive transmitted knowledge from teachers (Ma & Luke, 2014). The constructivist learning theory makes up the guiding framework in teaching and learning in the United States, where classrooms provide a platform for learners to construct meanings as active and participatory learners (Ma & Luke, 2014).

On the contrary, traditional Chinese and East Asian education systems are established in an environment where teacher guidance and authoritative content are prevalent and mainstream (Ma & Luke, 2014). Therefore, students from the United States are generally accustomed to participatory dialogues in classrooms. Students in China and other East Asian countries may not be familiar with classroom discussions and oral presentations (Ma & Luke, 2014). However, recent years have brought educational reforms and changes in China. Such reforms have adopted the constructivist learning theory as the primary theoretical basis (Liu et al., 2020). For instance, the integration of network technology and English language teaching in China embraces the constructivist learning theory.

Constructivist learning theory advocates creating a student-centered learning environment with four key elements: situation, collaboration, conversation, and meaning construction (Liu et al., 2020). Nowadays, multimedia and the internet provide learners with abundant learning materials similar to but more attractive than traditional paper textbooks. Such online resources situate learners with rich background knowledge (Liu et al., 2020). The

relationship among students has changed from competition to collaboration under the constructivist learning theory via conversation among learners and between teacher and learners (Liu et al., 2020). Now, learners explore constructing meanings to achieve their education goals (Liu et al., 2020). Despite these recent reforms, traditional Chinese philosophies, culture, and classroom instruction have a far-reaching and deeply-rooted influence on Chinese education and students.

American Teaching and Chinese Teaching

A case of American teachers in China, direct instructional approach, and indirect instructional approach are presented in this section to represent the comparison and contrast of American teaching and Chinese teaching.

Oral English American Teachers in Chinese Rural Elementary Schools

An English-language teacher from the United States who taught at a rural Chinese elementary school shared insights on the American teaching style, according to Frkovich (2015):

They could have sensed my own progressive and “Western”-style teaching and lessons within the first few minutes of my class. I sat at the desk. I kneeled at their side when answering certain questions. I rebuked the platform or lectern. I did not use a microphone or a projector. (Teaching with a microphone is common in large classrooms in China). I sat among them, walked behind them, and taught from the back of the room. I asked what they wanted to learn and needed to know. I never assumed the position of a one-right answer, and I openly eschewed the idea of myself as an authority figure. Instead, I was a facilitator, a guide, and a well-read colleague who partnered with them in educative pursuits. (p.184)

Chinese teachers appreciated this progressive pedagogy and Western teaching style; however, they rarely adopted them in Chinese classrooms, especially in middle or high schools, since

tests dictate all aspects of education in China (Frkovich, 2015). Oral English, which these American teachers taught, is not on the tests. Progressive pedagogy and the Western teaching style are so risky that no school headmasters can afford to implement them since they may not help students get high scores on Chinese tests (Frkovich, 2015). Again, tests dictate education in China.

Another big difference between American and Chinese teaching is having fun in classrooms (Frkovich, 2015). All American teachers want their students to have fun and enjoy themselves in their oral English class and believe that it is necessary to have fun when learning (Frkovich, 2015). Chinese and American teachers perceive having fun in class as a “Western” style of instruction and sometimes missing in Chinese classrooms (Frkovich, 2015). According to Chinese social customs, asking adult Chinese teachers to do childlike activities and games is not learning but humiliating (Frkovich, 2015). Even though some Chinese teachers found some games and activities taught by American teachers to be useful, they still will not use them in their instruction due to large class sizes, limited time, and a test-driven curriculum (Frkovich, 2015).

In addition, a lot of American teachers doubt that Chinese students want to have fun. Instead, Chinese students expected more notes, recitations, and tests to demonstrate their memorization of the materials learned (Frkovich, 2015). Having fun while learning is contrary to the Chinese idea of learning, which believes that learning is a hardship and the outcome of learning is proportional to the hardship endured in learning (Frkovich, 2015). Therefore, praise goes to the most hardworking students rather than the most intelligent ones (Frkovich, 2015). Regardless of different teaching styles, American teachers indeed understand that there is less fun in the Chinese style of teaching due to the expectations of Chinese students regarding what is of most use in terms of instruction and curriculum (Frkovich, 2015).

Furthermore, the formality in classrooms differs between the United States and China. Some American teachers advocate the importance of making personal connections in classes, whereas Chinese teachers find little worth using personal interests, stories, pictures, and anecdotes in classes (Frkovich, 2015). American teachers enjoy making personal connections with students in classrooms and have many interactions with students in classrooms (Frkovich, 2015). In contrast, Chinese teachers remain formal in classrooms but have personal connections with students outside classrooms (Frkovich, 2015). Interestingly, American teachers generally do not retain personal relationships with students outside classrooms due to fear of misconduct (Frkovich, 2015).

In summary, this case of American teachers in China displayed some exciting differences in teaching styles. For instance, the American style reflects less power disparity between teacher and student, whereas the Chinese style manifests a higher hierarchical teacher-student relationship. Another interesting difference is the perception of fun in learning: American educators embrace the fun in learning, whereas Chinese educators and students value hardship and effort in learning. Furthermore, American educators are more casual in classrooms than Chinese educators. However, Chinese educators form informal and close relationships with students outside classrooms. In contrast, American educators shy away from developing close personal relationships with students outside of classrooms due to the fear of misconduct and unprofessionalism.

Direct Instructional Approach

The traditional Chinese model of teaching embraces the direct instructional approach, which builds on the idea that a highly structured presentation of knowledge enables maximum learning for students (Ma & Luke, 2014; Shao et al., 2012). Specifically, first, the teacher presents a concept; second, the teacher shows examples or illustrations to examine if the concept stands; and third, the teacher directs students to practice the concept until concept

mastery, during which students receive feedback from the teacher, apply the concept, and find examples of the concept (Ma & Luke, 2014).

Deeply rooted in Confucian culture, traditional Chinese teaching adopts a knowledge transmission method and views students as empty vessels waiting to be filled by information transmitted by the teacher (Ma & Luke, 2014). The teacher is considered a content expert and authority figure whom students usually do not question or challenge (Ma & Luke, 2014).

Chinese teachers have three expected roles: a role model to conduct socially preferred behaviors for their students, the role of parents or mentors, and the role of a teacher to ensure the desired progression of every student (Hu, 2002, as cited in Ma & Luke, 2014).

All these roles put the teacher in the directive seat in deciding what to teach and how to teach. Thus, they always remain in complete control over the class to guarantee the smooth transmission of planned content (Tang & Absalom, 1998, as cited in Ma & Luke, 2014). The information of knowledge in the traditional Chinese direct instructional approach relies on imitation and repetition to help students achieve mastery of content (Paine, 1992; Tang & Absalom, 1998, as cited in Ma & Luke, 2014). The classroom instruction is highly structured and regulated, following the national curriculum for each grade level (Ma & Luke, 2014).

The method of transmission of knowledge aligns with the Chinese value of the importance of solid and comprehensive foundational knowledge that students should establish and accumulate a knowledge base before they apply or create (Ma & Luke, 2014). Thus, learning focuses not on how knowledge is constructed or made but on how the authoritative knowledge is transmitted to and internalized by students most effectively and efficiently (Ma & Luke, 2014).

Indirect Instructional Approach

Strikingly different from the direct instructional approach is the indirect one that builds on the constructivist framework, which believes that knowledge is constructed by the

learner rather than transmitted to the learner (Ma & Luke, 2014). American classroom instruction mainly adopts this indirect instructional approach. The indirect instructional approach cultivates learners to become self-learners (Ma & Luke, 2014). Instructors use cases to help students infer a general principle or a concept, and learners search for patterns, form questions, or make generalizations (Ma & Luke, 2014). The role of the instructor is not the authoritative figure as in the direct instructional approach; instead, the instructor serves as the facilitator who provides a context for students to make generalizations appropriately (Ma & Luke, 2014).

Three features characterize the indirect instructional approach. First, it is the students' responsibility to learn instead of the teachers'; second, learning occurs when new information is connected to previous knowledge and belief; and third, active learning is achieved via discussions, and collaborative learning in groups are ways for students to solve problems (Prince & Felder, 2006, as cited in Ma & Luke, 2014).

However, some drawbacks of the indirect instructional approach include interpersonal conflicts in teamwork and sometimes more student resistance (Ma & Luke, 2014). Nevertheless, as stated by Prince and Felder (2007), "neither teaching nor learning is purely indirect or direct" (Ma & Luke, 2014, p. 101). In practice, most teaching and learning include both approaches, even though one approach may outweigh the other.

Reforms of Classrooms in China

Traditional classroom instruction has caused some problems in China. For instance, standard English as a Foreign Language (EFL) classes in China have issues such as strict teacher-student relationships, which leads to low in-class discussions (Lu, 2014, as cited in Zhou, 2020) and a lack of opportunities to cultivate critical thinking (Zhang et al., 2015, as cited in Zhou, 2020). Specifically, the instructional design and procedure in a traditional Chinese EFL class start with the teacher previewing the topic in the textbook; then explaining

the new words, sentences, and grammar; requesting students to do exercises individually or in groups; evaluating students' performance; and finally providing feedback and comments (Liu et al., 2020).

China has recently conducted educational reforms in response to such problems. The College English Curriculum Requirements in 2007, released by the Ministry of Education (MOE) of China, proposed new blended teaching models that are computer-based and classroom-based (MOE, 2007, as cited in Zhou, 2020). Information and Communication Technology (ICT) helped remold the traditional teacher-centered learning model through a new pedagogy called the “flipped classroom,” which is an ICT-supported hybrid learning model that reverses the traditional in-class and out-of-class components of learning (Jenkins et al., 2017; MOE, 2015, as cited in Zhou, 2020). The “flipped classroom” pedagogy adopts teaching methods that are task-based, case-based, inquiry-based, and project-based (MOE, 2015, as cited in Zhou, 2020). Specifically, three stages are completed in the flipped classroom teaching model: lecture videos as the core for preview before class, task-driven and inquiry-based interactions in class, and diversified comments and reflections after class (Xie & Xu, 2015; as cited in Zhou, 2020).

There are many positive effects of flipped classrooms; for instance, it offers out-of-classroom assignments that are more engaging and less awkward (Qiang et al., 2015, as cited in Zhou, 2020). It also broadens the borderline of the classroom (Chen & He, 2015, as cited in Zhou, 2020). It enables students to explore different assignments, such as recording an oral response to a video, collaboratively writing an essay online, and cooperating with group members to create a video (Zhang et al., 2015, as cited in Zhou, 2020).

However, such flipped classrooms are not without problems. Some students complain that they have insufficient out-of-classroom time and lack technological skills and access to online resources (Han, 2015; Kang, 2015; Webb & Doman, 2016, as cited in Zhou, 2020). It

is worth noting that students point out that they feel unaccustomed to learner-centered instruction (Yu, 2015, as cited in Zhou, 2020).

Similarly, instructors also complain about some challenges they face when practicing flipped classroom designs, such as instructional design problems, technology problems, and ICT implementation (Chen et al., 2014; Zhang, 2017, as cited in Zhou, 2020). Another reform in one college English classroom in China is that it changed from the traditional teacher-spoon-feed-student instruction to student-self-instruction to cultivate autonomous learners (Wang, 2012). Teacher questioning and in-class limited-time English usage proved to be effective classroom activities for developing active and autonomous learners (Wang, 2012).

More reforms have been done in college English classrooms in China. To change the criticism of English-major education in China that is deficient in cultivating real-life use of the English language, critical thinking, and problem-solving, instructors in Chinese college English classes became the change agent. They tried different classroom instruction from the traditional one that students experienced in previous learning in high schools, which is teacher-governed instruction (Ruan & Toom, 2020). For instance, one instructor who received education in the UK adopted student-centered instruction. After initial resistance and unadjusted student reactions, they effectively transformed students into active class participants (Ruan & Toom, 2020). Another instructor used innovative instruction to adapt a famous Korean TV show *Running Man*, as a classroom activity in an English academic writing class and succeeded in developing students' problem-solving, critical thinking, and collaborative learning (Ruan & Toom, 2020).

Mathematics classrooms in China also have experienced reforms. It is worth noting that from a historical perspective, Chinese mathematics classroom instruction has been influenced by both Eastern culture and Western cultures. Thus, it is a unique form of

instruction (Zheng, 2006, as cited in Shao et al., 2012). Yet, the reform of Mathematics classroom instruction incorporated Western instruction notions into traditional Eastern instruction notions to create a balance (Shao et al., 2012). Specifically, five balances are expected to achieve in mathematics classroom instruction, which are “extensive practice” and understanding; variant embodiments and invariant “essence;” guidance and self-exploration; explanative analysis and exploratory exercise; and logical induction and inductive synthesis” (Gu et al., 2003, as cited in Shao et al., 2012, p. 81).

In Eastern culture, practice is a way toward understanding, whereas, in Western culture, practice is only meaningful after understanding the concepts. Therefore, understanding concepts and extensive practice should be balanced (Shao et al., 2012). The reform also follows the framework of constructivist learning that eschews the traditional Chinese instruction that is teacher-controlled and shifts toward student-centered and student-exploration instruction that respects students as knowledge generators instead of passive receivers (Shao et al., 2012). The reformed classroom instruction has more teacher-student interactions and students’ problem-solving time (Shao et al., 2012). The traditional Chinese mathematics classroom instruction is characterized as whole-class instruction that starts with a teacher’s lecture, then student questioning, and finally extensive practice that takes up more than half of the class time (Jiang, 1963, as cited in Shao et al., 2012).

However, after incorporating some Western instruction, the new teaching model assigns more time to concept formulation and exploration of different problem-solving methods (Shao et al., 2012). Cultivating an individual learner’s personality is a priority in Western culture; Chinese instruction emphasizes the importance of establishing a solid foundation for all students (Shao et al., 2012). A balanced combination of building a sound foundation for all students and developing students’ higher-order thinking and creative

thinking from both Eastern and Western traditions is desired in mathematics classroom instruction (Leung, 2001, as cited in Shao et al., 2012).

World Culture Theory

Despite cultural differences in America and China, it is crucial to consider the world culture theory that indicates cultural convergence because of globalization in the current age. Specifically, world culture theory is a grand sociological theory that states that with globalization, modern states are becoming increasingly converging and similar (Anderson-Levitt, 2003; Frkovich, 2015). This does not necessarily translate to all educational systems and schooling in different countries being reformed and unified to be lasting and permanent the same systems, yet it does suggest that educational systems in China and the United States are becoming more alike (Anderson-Levitt, 2003; Frkovich, 2015).

Challenges Chinese International Students Face

Due to the cultural and instructional differences between the two countries, Chinese international students have encountered challenges while studying in U.S. higher education and sought ways to resolve these challenges. The following sections will present the challenges Chinese international students face, their strengths, and their strategies to resolve the challenges.

Because of these cultural and instructional differences presented above, Chinese students have encountered various challenges when studying in Western universities. Such challenges include language incompetency, cultural intricacies, academic unfamiliarity, and financial struggles (Feng, 1991; Liu & Vogel, 2016; Ma & Luke, 2014; Sharif & Osterling, 2011; Tang, Collier, & Witt, 2018; Tung, 2016; Zhang, 2016).

Language Incompetency

Language incompetency, by no surprise, is the most prevalent challenge for Chinese international students in the West (Ma & Luke, 2014). Language difficulty was mentioned as

the biggest challenge Chinese international graduate students encountered in the U.S. for both new and experienced Chinese international graduate students (Moon et al., 2020). Although Chinese international students took language tests before they came to the U.S., they were still not able to express themselves well in English in real life; they had strong accents; they could not understand slang, and they could not proficiently write academically (Liu & Vogel, 2016; Sharif & Osterling, 2011; Tang, Collier, & Witt, 2018; Tung, 2016; Zhang, 2016). A study on Chinese international students in New Zealand reported five English language challenges they face, which are doing oral presentations, taking tests, expressing themselves in English, doing written assignments, and expressing their thoughts to teachers (Ward & Masgoret, 2004, as cited in Ma & Luke, 2014).

This incompetency in the English language and the lack of confidence in using English has become a massive barrier for Chinese students to effectively communicate with teachers and peers; understand and follow directions; comprehend lectures; examine procedures and rubrics; finish assignments; accomplish exams; and to socialize with local students (Campbell & Li, 2008). Language incompetency negatively affects Chinese international students' adjustment and transition to Western academic institutions. This point of view is substantiated by a study conducted on Chinese international undergraduate students living on campus in the United States. The study found that English language skills correlate to students' sense of belonging in the residence hall (Yao, 2016). It reinforced the literature on transitioning to U.S. higher education from Chinese education that students who feel comfortable using English have more effortless adjustment and better experience in the U.S.

However, overcoming language incompetency takes a lot of effort and time. To achieve foreign language mastery, primarily academic English proficiency, adult learners are

required a complex, long-time study and high linguistic ability; and to learn extensive knowledge of the host culture (Takahashi, 1989, as cited in Ma & Luke, 2014).

Cultural Intricacies

Even though young Chinese generations got influenced by Western modernized culture and education system since the opening-up policy in China, cultural norms in China still have so many differences from those of the United States. For instance, China is a collectivist country, whereas the United States values individualism (Tung, 2016). Chinese education has different structuring of classes, curriculum and administration materials, teaching styles, and student expectations (Sharif & Osterling, 2011). Chinese people have hierarchical relationships, and American education values critical thinking rather than rote learning and conformity (Sharif & Osterling, 2011; Tung, 2016). Such differences brought many struggles to Chinese international students transitioning to U.S. academic institutions.

Most Chinese international students experience cultural adjustment difficulties when encountering acculturative stress. They have trouble with social integration because they lack social skills suited to American society and feel exclusive and lonely (Liu & Vogel, 2016; Sharif & Osterling, 2011; Tang, Collier, & Witt, 2018; Tung, 2016; Zhang, 2016). They reported feeling lonely being alone in a foreign country (Ma & Luke, 2014). Due to language barriers and a lack of common interests and backgrounds, it is difficult for Chinese international students to make local friends (Ma & Luke, 2014). Some Chinese students prefer to build personal friendships with other Chinese peers than local American students because they think that Chinese peers work harder than local Americans and that affiliating with Americans is viewed as disloyal to fellow Chinese (Ma & Luke, 2014).

Another reason lies in the differences in how friendship is perceived by Chinese and Americans. Chinese emphasize personal friendships and expect a big exchange of favors once the friendship is built, whereas Americans value individuality and friendship usually

made because of shared interests (Holmes, 2005; Ma & Luke, 2014; Tan & Goh, 2006).

Thus, Chinese students view friendships with local Americans as artificial and prefer to stay within their Chinese circles (Ma & Luke, 2014).

Cultural difficulty Chinese international students experience is the unstructured and loose learning environment in Western universities that contradict China's highly competitively and ranked learning environment while they were growing up (Ma & Luke, 2014). Chinese people consider it a great honor to be ranked high on school tests, not just for themselves but for their extended family (Ma & Luke, 2014). And they believe that high scores result from great efforts instead of innate abilities (Ma & Luke, 2014). Competition and ranking thus motivate them to study hard (Ma & Luke, 2014). That is why many Chinese international students feel dissatisfied and less motivated by the loose learning environment in Western culture (Campbell & Li, 2008; Ma & Luke, 2014).

Discussion and group assignments in Western universities have brought Chinese international students another big challenge due to different learning cultures (Campbell & Li, 2008; Ma & Luke, 2014). Chinese international graduate students encountered difficulties in group discussion, group work, writing assignments, and content knowledge because of differences between previous and current learning in the two countries (Moon et al., 2020). Chinese international students confessed that they did not know how to participate in classroom group discussions. They feared their input was not valued, for discussing with teachers and classmates in class is not typical in traditional Chinese classroom learning (Holmes, 2005).

On the other hand, Chinese international students consider group assignments as unpleasant and frustrating since, in their expectations, group assignments should include all members' concerns in an interdependent working process, whereas, in Western culture, group assignments are divided into separate parts for each group member and then compiled as a

whole project (Holmes, 2005; Ma & Luke, 2014). Therefore, some hard-working Chinese international students even view group assignments as unfair since every group member gets the same score regardless of differences in individual efforts, work, and input (Campbell & Li, 2008; Holmes, 2005).

Some other negative cultural experiences include that some faculties are culturally insensitive; some faculties have unfavorable perceptions of Chinese students, such as cheating and unwillingness to participate in class; some American students feel hesitant to approach Chinese international students due to fear of the unknown and are impatient to wait for answers from Chinese international students in class; Chinese international students are treated as invisible since a new academic environment keeps them quiet in class; and Chinese international students do not receive enough support and help from schools as ESL learners (Heng, 2017; Liu & Vogel, 2016; Sharif & Osterling, 2011; Tang, Collier, & Witt, 2018; Tung, 2016; Valdez, 2015; Will, 2016; Zhang, 2016).

Chinese international graduate students shared how insufficient the writing center was: the writing center only focused on helping with grammar and expression but lacked tutors who were familiar with different subject matters and content requirements; thus, they failed to provide effective instructions on things like creating a good flow of structure or guidance on different academic conventions for writing essays, assignments, citation, literature review, and reporting tables or diagrams (Moon et al., 2020). Similarly, the ISS office was slow and inefficient in helping international graduate students. Officers may not be knowledgeable about the required documents for different problems (Moon et al., 2020).

Despite difficulties and challenges caused by cultural intricacies, Chinese international students have gained some positive cultural experiences that they enjoy peer collaboration in American classroom learning, freedom in the American academic

environment, and high-quality education in the U.S.; and they have become more culturally aware and tolerant with differences (Heng, 2017; Valdez, 2015; Will, 2016).

Academic Unfamiliarity

Even though many Chinese international students got high scores on language tests, it does not necessarily mean that these students are academically well prepared for Western universities (Ma & Luke, 2014). Because learning is context-dependent and value-laden, these students lack the cultural background and Western academic experience; therefore, they are viewed as *academic illiterate*, a term coined by Campbell and Li to indicate the lack of knowledge of academic conventions and norms (Campbell & Li, 2008; Ma & Luke, 2014).

One academic unfamiliarity is reflected by how Chinese international students do not understand why plagiarism is such a severe issue in the Western academic environment because, in Chinese academic culture, these Chinese students were trained to quote, interpret, and recognize the classics without recognizing the well-known references (Ma & Luke, 2014; Simpson, 2008). Another big challenge caused by academic unfamiliarity is academic writing, which many Chinese international students find the most difficult (Campbell & Li, 2008; Ma & Luke, 2014). These students disclosed that they were ill-prepared to write essays, literature reviews, research proposals, and references (Campbell & Li, 2008; Ma & Luke, 2014).

Financial Struggles

Financial difficulty was reported as one of the striking difficulties for early groups of Chinese students studying in Western countries historically. Feng (1991) looked at Chinese international students in American academic culture. The study participants were 52 international students from the People's Republic of China, aged 19 to 43 (Feng, 1991). Except for one undergraduate student and five non-degree students, the rest of the students

were pursuing graduate degrees (14 doctorates; 32 master's). And most of them majored in sciences and mathematics.

At that time, China was still relatively poor and did not have so many international students in the U.S.; whereas now that China has become the second world economy and has the most international students in the U.S. Despite all other challenges including language incompetency, cultural conflicts, and academic unfamiliarity, Feng (1991) found that Chinese students faced a lot of financial struggles that they struggled to survive and had to work illegally off-campus to earn money. And financial aid was the most important standard for them to choose institutions. Due to poor economic status, these Chinese international students were negatively impacted in the aspects of participation in social activities, academic achievements, social interaction, and improvement of English language skills (Feng, 1991).

In the 21st century, many changes happened in China, and most Chinese international students in the U.S. come from middle-class or upper-class families. They generally do not face financial problems anymore. However, these Chinese international students still face significant problems with the English language, Western academic requirements, and the Western cultural environment, as presented above (Liu & Vogel, 2016; Ma & Luke, 2014; Sharif & Osterling, 2011; Tang, Collier, & Witt, 2018; Tung, 2016; Zhang, 2016).

Strengths Chinese International Students Hold

Unlike most studies on Chinese international students who adjusted and adapted to American university settings focused on challenges and problems, some studies focused on the strengths these students have that they could leverage to achieve success in transition (He & Hutson, 2018; Sharif & Osterling, 2011). A study on early groups of Chinese international students showed that despite the initial academic problems, these groups of Chinese people were outstanding and competitive to be sent abroad in the first place. After their adjustment, most were capable academically (Feng, 1991). Especially natural sciences students adapted

better than social science students since cultural and language differences did not affect their academic success much (Feng, 1991).

Still, other research showed that Chinese international students have strong familial support; and support from friends, community, and networks (He & Hutson, 2018; Sharif & Osterling, 2011). They are highly motivated to study in the U.S. and get a degree (He & Hutson, 2018). Although they reported discomfort with food, transportation, and language, they had become more independent and better at time management after studying in the U.S. (He & Hutson, 2018). Additionally, they have an excellent foundational knowledge of English, the capability to learn proficiently, awareness of course requirements and time constraints, strong determination to adapt, and a tendency to work hard (Sharif & Osterling, 2011). However, when asked about their strengths, Chinese international students showed a lack of reflection on their strengths. They were deficient in critically examining and accepting feedback, which could signify conformity and a lack of critical thinking (He & Hutson, 2018).

Strategies to Resolve Challenges

Chinese international students have used some strategies to resolve these challenges they have encountered when studying in the U.S. In one research that included participants pursuing undergraduate degrees and graduate degrees and half of the participants coming from Chinese backgrounds, Wu et al. (2015) presented strategies international students use to solve challenges they face in U.S. higher education: using school resources, campus activities and dormitory, language support, campus counseling service, and students' organizations. Specifically, school services such as writing centers, student associations, libraries, counseling centers, student organizations, and school recreation play important roles in helping Chinese international students adapt to the U.S. academic environment (Wu et al., 2015).

Chinese international students took an active role in socializing and exploring the new culture by finding local roommates in dormitories and engaging in various campus activities (Wu et al., 2015). Moreover, Chinese international students have more training and experience in English writing and reading in their home countries but rare, if not at all, speaking practice before coming to the U.S. to study; thus, they experience more challenges in oral English communication and find that using conversation partners or talking to tutors in writing centers can help them practice speaking in English (Wu et al., 2015).

Furthermore, they agreed that orientation for international students could improve their readiness to study and live in the U.S. since their former learning and living environments are quite different from those in the U.S. (Wu et al., 2015). In addition, the campus counseling service helped Chinese international students adjust the acculturation stress and mental problems such as loneliness (Wu et al., 2015). Lastly, joining various campus students' clubs and associations allowed Chinese international students to connect with local students and learn about culture and communication, thus better adjusting to American culture (Wu et al., 2015).

Other strategies that overlap with yet are slightly different from those listed above are five strategies Li (1993) summarized: increase reading, observe other American students, avoid potential problems, use academic strengths, and build personal relationships with faculty (as cited in Greer, 2005). When dealing with English language incompetency, Chinese international students avoided using complicated English when answering questions or speaking up in American classrooms (Wan, 2001, as cited in Greer, 2005). Other strategies to tackle language difficulties include a take-it-easy attitude toward it, reading textbooks after lectures to fill in the missing part when hearing the lecture in class, watching TV to improve English language skills, listening to tapes about English novels, and joining language conversation programs to enhance spoken English (Xu, 2002, as cited in Greer, 2005).

Other than these strategies, different strategies Chinese international students use to solve academic and cultural challenges are that they ask the professor questions in or after class to comprehend the lecture content better; they turned to other Chinese students for help when academic difficulties arise; they talked to American students to learn more about American society; they read the syllabus and strictly followed the requirements on it to ensure good academic performance; they participated in local host family program to immerse in American culture and environment; and they joined a program that enabled them to contact local American children weekly to practice English (Xu, 2002, as cited in Greer, 2005).

Research on Chinese international graduate students in the U.S. also reported differences between students doing social science majors and physical science majors that physical sciences do not require high-level English language skills, and students have to demonstrate mastery of knowledge and do the practical work; whereas social sciences use verbal and written communication in English as vital tools; thus, students in social sciences are required to have high English proficiency to achieve academic success in the U.S. (Greer, 2005).

Education in the U.S. and China displays a variety of differences, such as educational philosophies in teaching and learning, approaches to classroom instruction, educational culture, and values, etc. This section specifically discusses the following: Confucianism as a guiding framework for Chinese education, pragmatism or progressivism as modern American educational philosophy, constructivist learning theory as a concrete guiding framework for American classroom instruction, direct instruction that is usually used in Chinese classrooms, indirect instruction that is commonly utilized in American classrooms, educational reforms in China in multiple levels of schooling and different subject matters, and world culture theory that upholds the converging nature of education worldwide. Chinese teaching and learning

are still drastically different from American teaching and learning despite recent Chinese educational reforms and globalization efforts.

Deeply rooted in rote learning, memorization, and exam-oriented nature, students from China, need more help in preparation for studying in Western academic culture. Chinese international students face major challenges: language and cultural differences, academic unfamiliarity, and financial struggles. The presented strategies, such as using various campus resources, changing mindsets, and other approaches listed in this paper, can serve as tools to solve the challenges for Chinese international students. Finally, being educated on all these differences, similarities, and changes in Chinese and American education and instruction and insider situations of Chinese international students, faculties, staff, administration, international student affairs offices, and host students can better understand and help Chinese international students achieve academic success in U.S. higher education institutions.

Chapter Summary

Chapter Two included a literature review on adult learners, critical thinking, transformative learning, Perry's intellectual and ethical development scheme, Chinese education, Chinese and American teaching, and Chinese international students. This chapter began with an introduction to adult learners. Then, I did a presentation on the historical origin and development of critical thinking, definitions of critical thinking, whether critical thinking is general or specific, teaching critical thinking in higher education, and critical thinking and Chinese students. Then, I reviewed the literature about the transformative learning theory. Then, I reviewed the literature regarding Perry's intellectual and ethical development scheme. Finally, I presented the Chinese Confucian educational culture, contemporary Chinese pedagogy, American and Chinese teaching, and classroom instruction, and challenges and strategies Chinese international students have in Western universities. This review of relevant

literature laid a comprehensive theoretical foundation for this study. The next chapter will address the methodology for this study.

Specifically, Chapter Three will discuss the study methodology, including the following major areas: qualitative research, narrative inquiry, data collection, data analysis, trustworthiness, and subjectivity. I will also present my subjectivity statement in Chapter Three.

CHAPTER THREE METHODOLOGY

This dissertation study aimed to explore and understand how Chinese international doctoral students present and develop critical thinking in US higher education institutions. Through narrative inquiry approach, their critical thinking experiences were investigated, including their awareness, understanding, and conceptualizations of critical thinking and their perspectives on critical thinking development processes.

Research Questions and Research Design

The following research questions guided this study:

- 1) How do Chinese international doctoral students understand and conceptualize critical thinking?
- 2) How have Chinese international doctoral students developed critical thinking during their doctoral studies in the U.S.?

Based on the purpose of the study and research questions, I applied qualitative research design to understand people's experiences, perceptions, and meanings and to explore Chinese students' perceptions and perspectives of their educational experiences. Specifically, narrative inquiry was used as a qualitative research methodology. The chapter discussed the researcher's epistemological/ontological assumptions, characteristics of qualitative research, the rationale for selecting narrative inquiry, elements of narrative inquiry, trustworthiness, and subjectivity.

Epistemological/Ontological Assumptions

Epistemology, hermeneutics, and worldview consist of three fundamental aspects of philosophy in research (Mertova & Webster, 2020). Epistemology deals with the issue of knowledge itself and explores how we know what we know and what is truth (Given, 2016; Mertova & Webster, 2020). Hermeneutics is "the art and science of interpretation," which "expands on the notions of epistemology and truth in providing a broader framework from

which we can view the dimensions of truth as they relate to current research issues” (Mertova & Webster, 2020, p. 5). Hermeneutics gives two frameworks: modernism and postmodernism (Mertova & Webster, 2020). Modernism believes objective truth exists and is external to be obtained, whereas postmodernism holds that multiple truths exist and values the internal and subjective truth (Clandinin, 2007; Mertova & Webster, 2020). Worldview is understood as “one’s view of the world,” the philosophical orientation of the research and the world, and the “overarching perception of reality” (Creswell & Creswell, 2018, p. 5; Mertova & Webster, 2020).

Constructivism is the worldview I, as a researcher, hold (Cranton & Merriam, 2015; Creswell & Creswell, 2018; Flick, 2014). In many cases, the term ‘worldviews,’ ‘paradigms,’ ‘epistemologies and ontologies’ could be used interchangeably (Creswell & Creswell, 2018, p. 5). Constructivism or social constructivism (usually combined with interpretivism) believes reality is constructed through individuals’ interaction with their social worlds and that researchers in this paradigm are concerned with how people make their worlds, how people understand their experiences, and what meanings they ascribe to their experiences (Cranton & Merriam, 2015; Creswell & Creswell, 2018).

Therefore, the overall objectives of research in the constructivism-interpretivism paradigm are to reach an understanding of how individuals make meaning of their experiences, to describe the process of sense-making instead of the product or outcome, and to depict how people understand their experiences or how people interpret their meanings of experiences (Cranton & Merriam, 2015; Creswell & Creswell, 2018). There is no one absolute and measurable truth waiting to be investigated, but rather, multiple and subjective truths exist because people construct their realities through their own personal and social perspectives (Cranton & Merriam, 2015; Creswell & Creswell, 2018).

Characteristics of Qualitative Research

Qualitative research is an approach to understanding social or human problems through the meanings people give them (Merriam & Tisdell, 2015). Specifically, qualitative research is a human and social-focused research design that intends to explore and understand people's perceptions, experiences, beliefs, behaviors, and meanings ascribed to social or human problems (Given, 2016). Using qualitative research, researchers can gather rich data reflecting the complexity and nuances of people's experiences.

Qualitative research has specific characteristics. For example, qualitative researchers focus on participants' meanings, thoughts, processes, and experiences about research problems or issues (Merriam & Tisdell, 2015). Qualitative research would be appropriate to explore Chinese students' thoughts on their development of critical thinking for this study. Further, qualitative researchers emphasize a holistic account where the complexity of the problem or issues, such as multiple factors, multiple perspectives, actions, beliefs, and emotions, is represented so that this holistic account could mirror real-life operations (Given, 2016). The research questions for this study are complex, and only qualitative research methods can ensure the inclusion of the multiple perspectives, factors, and emotions embedded in them.

Moreover, qualitative researchers are key instruments in that they collect data by observing behavior, interviewing participants, and examining documents (Creswell & Creswell, 2018; Given, 2016). This provides flexibility in the data collection process so that researchers can make necessary changes when conducting interviews based on participants' responses, like probing for more details and clarification or changing some of the original interview questions and adding new research directions.

Furthermore, qualitative researchers typically use an inductive design where categories, themes, and patterns are established from the bottom up (Merriam & Tisdell,

2015). This study used an inductive design where the data collected established categories, themes, and patterns. Additionally, qualitative researchers usually use an emergent design where parts or even the whole process may shift or change after researchers start to collect data (Given, 2016). This study was emergent, where the original research design was not fixed but rather was open to change according to the data collected in the field. For example, the data collected may expose some new questions related to the research questions that researchers previously neglected. Then, the newly found questions will be added to the interview questions. Because of the flexible nature of semi-structure narrative interviews, I added some new questions according to participants' responses such as what strategies you used to help grow critical thinking and have your perspectives on teachers and knowledge changed. In addition, qualitative researchers embrace subjective ways of knowing, and a constructivist view of reality is common for qualitative researchers (Merriam & Tisdell, 2015). This study believes in a subjective and constructivist view of reality that the perspectives of participants and co-constructed narratives of both the researcher and participants will be the focus. Last, qualitative researchers conduct an interpretive approach in data analysis and write-up that reflexivity is an essential aspect of the qualitative method so that how biases, values, and background of the researchers shape the direction of the study is shown (Given, 2016). This study included the subjectivity statement to inform readers of how the researcher's biases, values, and background affect the data collection, analysis, and write-up.

These characteristics of qualitative research make it a perfect research methodology for this dissertation study. Specifically, narrative inquiry is the selected qualitative research methodology for the dissertation according to the nature of my study, research purpose, and research questions. Rationales for using narrative inquiry are discussed below.

“Narratives are stories” (Merriam & Baumgartner, 2020, p. 257). Narrative is “the oldest and most natural form of sense-making” (Jonassen & Hernandez-Serrano, 2002, p. 66, as cited in Merriam & Baumgartner, 2020, p. 257). Narratives help us make sense of our lives and have an important place in adult learning, as adult learning is all about making sense of experiences (Merriam & Baumgartner, 2020). Adults can all relate to “stories that surround us, that define us, that we can construct, analyze, reflect upon, and learn from” (Merriam & Baumgartner, 2020, p. 266). Further, in today’s multicultural classrooms, where different perspectives and viewpoints are prevalent, the authenticity and immediacy of life story sharing can remove the resistance to different ideas, broadening and deepening all participants’ perspectives (Merriam & Baumgartner, 2020).

Three rationales for using narrative inquiry are narrative report, self-construction, and narrative use (Daiute, 2014). Narrative reports and self-construction are the rationales for this study. First, a narrative report represents “a common rationale for using narrative in research projects is to gather information about personal experiences, memories, feelings, and knowledge” (Daiute, 2014, p.10). It is assumed that people’s narration reveals their true insights about the group, the individual, and the individual’s understanding of the topic; that people have access to the story in their memory; and that they recount those experiences as how they happened (Daiute, 2014). This study used participants’ narratives to collect data about their educational experiences, feelings, perspectives, knowledge, and perceptions of critical thinking.

The second rationale proposed is that narrating is a developmental process in which people become the stories they tell. Or in other words, the constructive nature of narrative enables people to make meaning of and create a sense of their identity (Daiute, 2014). Because narratives help us to make sense of meanings and experiences, they have become “windows into development and transformational learning” (Merriam & Baumgartner, 2020,

p. 266). In this study, narratives was co-constructed by the researcher and participants to make sense of meanings collaboratively. Through co-constructed narratives, participants' transformative learning journey was displayed.

The next section discussed the narrative inquiry, including its definitions, development, and approaches.

Narrative Inquiry

Narrative inquiry is a qualitative research method. It starts with the biography component of C. Wright Mills' (1959) trilogy of history, society, and biography (Chase, 2013). Narrative researchers view narrated lives as the focus when using narrative inquiry to research and learn anything (Chase, 2013). The term *narrative inquiry* was first used in 1990 when describing an already developing approach in teacher education to illustrate that we learn from telling each other stories of educational experiences (Mertova & Webster, 2020).

Hence, narrative inquiry is concerned with analyzing and critiquing stories we hear, read, or tell (Mertova & Webster, 2020). As Mertova and Webster (2020) wrote, "Narrative inquiry is set in human stories of experience. It provides researchers with a rich framework through which they can investigate the ways humans experience the world depicted through their stories" (p. 1). In other words, "narrative inquiry relies on stories as they are lived and told in order to understand experience" (Cranton & Merriam, 2015, p. 63). Typically, narrative inquiry focuses on the subjective perspectives and understandings people have about their experiences and the meanings of their experiences, either in their imagination or in real life, rather than the objective reality (Daiute, 2014).

Narrative research is human-centered by using stories to reflect the complexities of human nature (Clandinin, 2007; Mertova & Webster, 2020). In other words, narratives could address well the subtleties and complexities of human teaching and learning experiences (Mertova & Webster, 2020). Also, narrative research pays attention to the culture and context

when analyzing people's stories (Clandinin, 2007; Mertova & Webster, 2020). Moreover, the narrative inquiry could be messy, ambiguous, and subjective, and it is sometimes open to criticisms of being over-complex and vague (Clandinin, 2007; Mertova & Webster, 2020; Squire, 2008).

Definitions of Narrative

Daiute (2014) defined narratives as “accounts of daily life, stories that spring from the imagination, vignettes of daily life, a news report of events of public interest, histories, gossip, and other oral and written accounts in past, present, and future time” (p. 2). It shows that narratives could happen anytime and anywhere. According to Daiute (2014), the narrative includes various elements, such as settings, characters, plots, actions, and consciousness. Some agents of narratives are characters (people or otherwise), spatial context (location of the narrative), temporal context (the beginning, the middle, and the end of the narrative), and the interaction of contexts and expressions (Daiute, 2014).

Another definition of narrative came from Chase (2013):

Narrative is a distinct form of discourse: meaning making through the shaping or ordering of experience, a way of understanding one's own or other's actions, of organizing events and objects into a meaningful whole, of connecting and seeing the consequences of actions and events over time. (p. 56)

This definition stresses the meaning-making sense of narrative. Usually, the use of terms story and narrative is interchangeable.

Development of Narrative Inquiry

When the social sciences emerged and began to develop, early social scientists tried to imitate and adopt similar methodologies as hard sciences using empirical, positivist, and post-positivist methods (Clandinin, 2007). However, in the 1960s, there was a turn from empirical methods to narrative methods to do educational research, one field of social science

research (Clandinin, 2007). The “biographical turn” or “narrative turn” in qualitative research honors people’s stories as data that can stand on its own to describe and represent human experiences (Patton, 2002).

Pinnegar and Daynes (2012) presented the history of how narrative inquiry as a methodology got accepted and adopted in the academy: basically, there are four turns toward narrative, which are a change in the relationship between the researcher and the researched; a change from using numbers as data to words as data; a change from centering on the universal and general to the specific and local; and a change in the epistemology to include and accept alternative and a wider range of epistemologies besides positivism. *Turn* indicates a shift in direction from one way of acting or thinking toward another (Pinnegar & Daynes, 2012).

The turn of the relationship between researchers and researched stands for the shift from the position of positivist objectivity toward the focus on understanding and interpreting the meaning when doing social science research (Pinnegar & Daynes, 2012). In the late 19th century, social scientists believed that they could adopt the same methodology in physical sciences to study human interactions assuming social objects exist independently and invariantly as “facts” in the physical world (Pinnegar & Daynes, 2012). Therefore, social science researchers, like physical science researchers, could control cause-and-effect in social relations and predict social relations accurately (Smith, 1983, as cited in Pinnegar & Daynes, 2012). And the objects of study in the social science research were treated as physical things that are invariant and atemporal (Pinnegar & Daynes, 2012).

Researchers stand far from the researched to maintain an unbiased and neutral position (Pinnegar & Daynes, 2012). The change from an objective relationship between researchers and the researched to a relational one revolved around the new status of the researched as participants instead of solely subjects (Pinnegar & Daynes, 2012). Also,

researchers realized that context, time, culture, and researcher-researched interactions all affected the understanding and interpretation of the research and sought to understand and interpret meanings through interactions with participants (Pinnegar & Daynes, 2012).

The next turn is the movement of social science research from using numbers to words as data (Pinnegar & Daynes, 2012). It is not that researchers rejected numbers and quantitative data; instead, they realized that numbers only were not sufficient or enough to represent participants' experiences (Pinnegar & Daynes, 2012). Researchers began to doubt that numbers collected through standardized instruments could reflect rich and deep understandings of human interaction, and in turn, became more interested in stories that emerged from participants since the stories provided more nuanced, complicated, comprehensive, and relational ways of understanding meanings than numbers (Pinnegar & Daynes, 2012).

The next turn focuses on the change of context from universal, global, and general to regional, local, and specific. Generalizability has been a desirable and valuable criterion for worthy qualitative research for a long time. Qualitative researchers have strived for grand narratives, namely, theories about the social world that could be applied generally and universally, regardless of specific circumstances (Pinnegar & Daynes, 2012).

The women's and black civil rights movements in American history influenced the social sciences considerably (Pinnegar & Daynes, 2012). Storytelling and personal stories of women and blacks displayed strong persuasive power, further proving the power and legitimacy of using local and specific stories in narrative inquiry (Pinnegar & Daynes, 2012). Thus, social science researchers admitted that the particular deserves as much worth and attention as the general and studied the specific cases in specific settings at specific times (Pinnegar & Daynes, 2012).

The final turn toward narrative inquiry focuses on accepting alternative epistemologies and ways of knowing (Pinnegar & Daynes, 2012). Traditionally in social sciences, researchers strived to attain validity in their research using numbers, proving “facts,” and holding positivistic or post-positivistic epistemologies (Pinnegar & Daynes, 2012). The alternative epistemologies establish findings through resonance, authenticity, or trustworthiness to accept multiple ways of knowing rather than asserting a certain way of viewing the world (Clandinin & Connelly, 2000; Denzin & Lincoln, 1994; Pinnegar & Daynes, 2012). Historically, except for sociology, which emerged as a positivist discipline, other social science disciplines were born in narratives; however, as these disciplines grew professionalized, narratives became less legitimate. Instead, the rhetoric of objectivity was embraced and celebrated (Pinnegar & Daynes, 2012).

The resurgence of narrative inquiry in social sciences was triggered by problems and challenges that positivistic knowing faces, such as the doubt of certainties and the rational nature of things (Pinnegar & Daynes, 2012). Researchers acknowledged the vital role of culture, context, and different frames of reference when understanding knowledge and the social world instead of seeking the certain and single correct answer (Clandinin & Connelly, 2000; Pinnegar & Daynes, 2012). Pinnegar and Daynes (2012) also noticed that this turn away from scientific objectivity toward narratives happened not just within the academy but in the broader culture as well: for example, stories were widely used in reality television shows, blogs, memoirs, and creative writing in popular publishing and so on. The alternative and blurred ways of knowing provided narrative inquiry as a research methodology and a shining place to help humans study and understand our social world (Pinnegar & Daynes, 2012).

Approaches to Narrative Inquiry

Because of different research interests, narrative researchers use several approaches within contemporary narrative inquiry (Chase, 2013). There is a pragmatic or applied approach in contemporary narrative inquiry that emphasizes the relationship between the quality of people's everyday life experiences and their life stories (Chase, 2013). D. Jean Clandinin and Jerry Rosiek (2007) argued that daily experience itself is where narrative inquiry should begin and end and that researchers should help participants spot new possibilities within their experiences.

The objective of this narrative approach is not to impose certain concepts on the life stories or to generalize the stories to a broader context; rather, researchers ought to work collaboratively with research participants to improve the quality of life experiences (Chase, 2013; Clandinin & Rosiek, 2007). Similarly, psychologists use this narrative approach to study identity development and personal well-being (Chase, 2013).

Another narrative approach is studying narrative as lived experience (Chase, 2013). The content of stories and how stories are told are important for researchers (Chase, 2013). Storytelling and narrating are the practice of constructing realities, selves, and identities in this narrative approach (Chase, 2013). In-depth interviews and detailed transcripts are commonly used in this approach (Chase, 2013).

Researchers are interested in how narrators make sense of personal experiences concerning cultural discourses and believe that people are constrained but not determined by such cultural discourses. Unlike the pragmatic approach presented above, this narrative approach strives for theoretical abstraction as a worthy goal of narrative inquiry; specifically, identifying oppressive discourses and how people disrupt them in their narration are desired as the goal (Chase, 2013).

Some narrative researchers are interested in the relationship between people's narrative practices and their narrative environment (Chase, 2013). This relationship was coined as *reflexive interplay*, meaning that the narrative environment shapes and are shaped by narrative practices (Gubrium & Holstein, 2009). In this narrative approach, stories on their own are not as important as the local contexts and interactional circumstances (Chase, 2013; Gubrium & Holstein, 2009). To understand such local contexts and interactional circumstances, researchers are required to have "ethnographic sensibilities," which are systematic considerations of "the communicative mechanisms, circumstances, purposes, strategies, and resources that shape narrative production" (Gubrium & Holstein, 2009, pp. vii-viii). Comparative ethnography is one application of this narrative approach where how narratives differ among different places and times are studied (Chase, 2013).

The final contemporary narrative approach discussed here is the one that emphasizes stories about life experiences as the focus of narrative inquiry (Chase, 2013). The goal of this narrative approach is either to include the researcher's experiences to produce richer findings or to establish an equitable relationship between the researcher and the researched by viewing both the researcher and the researched via an analytic lens (Chase, 2013). Autoethnography represents this narrative approach well, as autoethnography analyze inward themselves when writing, constructing, interpreting, and analyzing narratives about their significant cultural experiences (Chase, 2013).

Approaches to Narrative Analysis

Frequently used narrative analysis approaches include thematic, structural, and dialogic/performance analysis (Riessman, 2008; Squire, 2008). The narrative thematic analysis focuses on content and experience narratives; the narrative structural analysis focuses on event narratives and syntax or structure; and the dialogic/performance analysis focuses on contexts, "who" a narrative may be directed to, "when," "why," and for what

purpose (Riessman, 2008; Squire, 2008). For this study, narrative thematic analysis was used. Yet, narrative thematic and structural analysis are the mostly used approached and will be discussed below (Squire, 2008).

Narrative structural analysis is the most exclusively syntactic narrative analysis that concentrates on event narratives (Squire, 2008). Although the context is mentioned, the structural focus is the primary (Squire, 2008). Sociolinguist William Labov (Labov & Waletzky, 1967) said that event narratives have “a general structure that includes abstract, orientation, complicating action, evaluation, resolution, and coda” (As cited in Squire, 2008, p. 10). The abstract, which could sometimes be more than one, usually tells what the story is about; the orientation sets the scene; the complicating action describes what happens next; the evaluation tells the human consequences of the event; the resolution tells an ending; and the coda links the story back to the present (Squire, 2008).

Labov provided an example of structural analysis by studying African American informants to show the subtlety and sophistication of African American English (Squire, 2008). He made some general manifestations, such as the more extensive evaluations produced by older speakers and by black than white pre-adolescents when telling stories (Squire, 2008). Kavar et al. (2019) adopted Labov’s categories and conducted a narrative structural analysis. They investigated oral personal narratives from Arabic-speaking adolescents with and without hearing loss. They focused on “macrostructure, microstructure, and Modern Standard Arabic (MSA).

For macrostructure, narratives were examined for structural components (abstract, orientation, complication, evaluation, resolution, and coda) and narrative patterns: classic (a high point followed by a resolution), high point ending, chronological, and leapfrogging (jumps from one event to another). Microstructure included morpho-syntactic errors and complex sentences. MSA features were lexis and syntax” (p. 255) (Kavar et al., 2019). The

research included large populations and used statistics to analyze, which shared some similarities with the quantitative research method, except that it is the analysis of language and structure rather than numbers (Kawar et al., 2019).

Narrative thematic analysis exclusively focuses on the content and the “what” of the narrative, such as what is said, written, or visually presented (Riessman, 2008). It is appealing for novice narrative researchers but could be methodical and exhaustive (Riessman, 2008). Many scholars used narrative thematic analysis in their research. For example, Lucas (2018) conducted a narrative-case study on Chinese graduate students’ understanding and struggles with critical thinking and adopted narrative thematic analysis. Lucas (2018) focused on the content of what participants said.

Narrative thematic analysis ensured the exploration of common understandings of and struggles with critical thinking among those Chinese graduate students (Clandinin, 2007; Lucas, 2018). Due to the difficulties and no consensus on defining critical thinking, the researcher adopted preexisting codes from Facione’s (1990) conception of critical thinking (Lucas, 2018). Besides the prefigured coding scheme, the researcher added additional codes that emerged through open coding (Lucas, 2018). In the end, the researcher presented three definitions of critical thinking and two other themes: struggles with critical thinking and educational differences (Lucas, 2018).

Additionally, Fan and Jong (2019) conducted a narrative case study of one nonnative-English-speaking teacher in the United States because narrative inquiry could help capture the multidimensional aspects of the language teacher’s identity. When analyzing the data, the researchers first read all the original narratives and paid attention to interesting points in the narratives to form a first impression of the participant’s experience. The second step was to thematically analyze and code. The next step was to adopt the deductive method by categorizing the themes into existing perspectives. The final step was telling, retelling, living,

and reliving the stories (Clandinin & Connelly, 2000; Fan & Jong, 2019). The researcher used open and axial coding. During the process, 35 specific codes, such as authoritative role and career imagination, and four broader themes, such as changes in teaching philosophies, were identified and created (Fan & Jong, 2019).

Besides, Braun and Clarke's (2006) six-phase thematic analysis is one commonly-used narrative thematic analysis: "phase 1: familiarizing yourself with your data" (p. 16); "phase 2: generating initial codes" (p. 18); "phase 3: searching for themes" (p. 19); "phase 4: reviewing themes" (p. 20); "phase 5: defining and naming themes" (p. 22); and "phase 6: producing the report" (p. 23).

Participants and Sample Description

Participants for this study are Chinese international doctoral students in the United States of America. To comply with the IRB requirement, adult learners must surpass the biological age of 18 to participate in this dissertation study. Also, since adult learners' self-perception is essential to their learning, participants must self-identify as adults. Hence, Chinese international doctoral students over 18 years old and self-identifying as adults are qualified participants.

The recruitment methods include purposeful and snowball sampling (Patton, 2002). Purposeful sampling and purposive or judgment sampling sometimes are used interchangeably (Patton, 2002). Because qualitative research cares about in-depth and rich information about small samples or sometimes even single cases, qualitative researchers select participants purposefully to serve the purpose of the inquiry (Patton, 2002).

This study targets adult Chinese international doctoral students and their experience with critical thinking; thus, purposeful sampling is used to select participants who can serve the purpose of the study. I recruited participants who could serve the purpose of my study from my network first. I contacted potential participants on WeChat, a popular social media

tool among the Chinese population (See Appendix A). In addition to purposeful sampling, snowball sampling is used to invite more participants who meet the selection criteria, which is adult Chinese international doctoral students. Snowball sampling is an approach for accumulating new information-rich cases by asking participants whom the researcher should talk to beside them (Patton, 2002). I asked each participant I recruited through purposeful sampling whom I can talk to beside them and recruited more participants.

There are no set rules for qualitative research sample size; however, some factors dictate sample size, which is what the researcher wants to know, what can be achieved due to limited time and resources, what is the research purpose, and what will be useful, and what is credible (Patton, 2002). Logistics and infrastructure may be important factors that hinder a large sample size since researchers may not be able to afford traveling costs or researchers must accomplish research within a certain time limit, which may lead to a less than ideal sample size (Given, 2016).

It is worth noting that saturation of themes is one crucial factor to consider when deciding on sample size: when collecting new data fails to provide new themes or leads to repetitive themes from existing themes, it is time to stop increasing sample size or, in other words, research has reached an ideal sample size (Given, 2016). This study used cyclical analysis after each participant to determine when theme saturation is achieved. The study required eight participants to achieve theme saturation.

Data Collection Process and Procedures

For this research, semi-structured narrative interviews are employed to collect data. Compared to narrative interviews, semi-structured interviews have some limitations that even conducting flexibly, they still suppress the narratives emergent spontaneously or unexpectedly during the interview (Flick, 2014). On the other hand, narrative interviews have three characteristics, namely constraint of closing gestalt, in which narrators could bring the

narration to an end; the constraint of condensing, in which the narrator chooses what is necessary to narrate for the listener to understand; and the constraint of detailing, which narrator tells as many as possible the background details and relationships necessary for understanding the story (Flick, 2014).

Through these characteristics, it is more likely that the interviewees will share more genuine stories, which, in other interviews, they would withhold to share out of awareness of guilt, shame, or entanglement of interests (Flick, 2014). Therefore, semi-structured narrative interviews can eliminate the limitations of solely semi-structured interviews to allow full freedom of narration from participants. Moreover, it is natural and ubiquitous for participants to narrate, if not suppressed by interviewers when answering questions, due to the narrative impulse and the storytelling nature of humans (Riessman, 2008).

Furthermore, narrative interviews reduce the degree of power disparity between interviewer and interviewee in traditional interviews via free narration from interviewees; thus, genuine discoveries of phenomenon can occur from power-sharing (Riessman, 2008). In addition, the narrative interview's fundamental principle to collect data is to ask the interviewee to present the history of an area of interest and tell a consistent story with all relevant events from its beginning to its end, which fits the objective of this research that participants are required to remember and recount their experiences with critical thinking development process (Hermanns 1995, as cited in Flick, 2014). In other words, because the research is on the development process of critical thinking, narrative interviews would be appropriate for these students to elicit a comprehensive story of such a process (Flick, 2014).

Moreover, narrative interviews enable interviewers and participants to co-construct narrative and meaning collaboratively in such conversation-style of interviews instead of question-response type interviews where interviewers ask questions and interviewees respond (Riessman, 2008). Therefore, detailed accounts and storytelling are elicited and provided via

narrative interviews (Riessman, 2008). The list of questions used for semi-structured narrative interviews is worded flexibly to elicit narration and warrant further discussions to capture a more comprehensive understanding of participants' experience and meaning-making.

Conversation tools such as “turn-taking, relevance, and entrance and exit talk (where a speaker transitions into, and returns from, the past time story world)” apply to narrative interviews (Riessman, 2008, p. 24). Eliciting narratives demands longer turns than daily dialogues, and narrative interviewers should explore how participants connect stories if topics shift (Riessman, 2008). Typically, open and straightforward questions are conducive to generating long narratives (Riessman, 2008). For instance, a question as “Tell me what happened” encourages a general description and long narrative; a probing question after the general description as “Can you remember a particular time when...?” is useful because it is easier for participants to talk about a particular time, place, and incident than broad timespan; and further probing question as “Tell me why that particular moment stands out?” may be helpful to dig into details and complexities of the experience (Riessman, 2008, p. 25). When exploring experiences, general descriptions, specific incidents, and turning points are all essential details in narratives (Riessman, 2008).

Prior to the official narrative interviews, I practiced my consent form and interview questions with a colleague who is knowledgeable about qualitative interviews and good at reflexivity. I got familiar with the interview process through this practice. I went back to the reflections of both my colleague and I on the interview, consulted books and literature, and made some adjustments to the interview questions. This carefully created finalized interview questions were approved by IRB and used for the official narrative interviews for this dissertation study (See Appendix D).

I sent out the recruitment message to potential participants on WeChat, a popular Chinese social media tool (See Appendix A). After I recruited the first group of participants using this purposeful sampling method, I asked each participant whom they knew may be interested in my research and thus recruited more participants utilizing this snowball sampling method. In addition, I offered two options for the participants that they can take the interview either in person or online through Zoom. Five participants chose in-person interviews whereas the rest three chose Zoom interviews. The in-person interviews were audio recorded using Audacity software. The Zoom interviews were recorded using Zoom recording function and only the audio files were used. Besides, I followed participants' preference of location to conduct in-person interviews. Four in-person interviews were conducted in a library study room which ensured the privacy and quality of recording. One in-person interview was conducted in the participant's office which made the participant feel at ease and convenient. All Zoom interviews were conducted at my home with only me and the participant at the other end of computer. Privacy was ensured.

Right before the interview, I introduced and explained the research project and made sure the participants understand the consent form (See Appendix C). Then, I asked the participant to fill in the demographic information form (See Appendix B). Pseudo-names were assigned at the participants' preference. Since the participants are doctoral students who are in English speaking institutions, they have capabilities to fully comprehend English reading materials. Thus, the consent form was provided in English.

After the participants understood the consent form and agreed to participate in the study, I begin the interviews. The interviews were conducted in the preferred language by the participants, either in English or in Chinese. All eight participants chose Chinese. As a Chinese international doctoral student myself, I have the advantage of speaking the native language of my target population, which allowed my participants to use Chinese to express

their feelings, perspectives, and experiences more fully, at ease, and comfortably. Due to my professional experiences with both English and Chinese as a translator, interpreter, and teacher for many years, I was able to transcribe the interviews in Chinese, analyze the Chinese transcripts, and then translate the participants' words to English.

The interviews followed a semi-structured format but ensured free narration of participants. I attentively listened to the participants and did not interrupt when the participants narrated. After the narration finished, I asked follow-up questions to clarify the unclear areas or develop further from the narration. During the interview, I took field notes and reflective memos, and audio recorded the meetings to facilitate the accurate analysis of the data. I also wrote reflective journal after the interviews.

I adopted the conversation tools and strategies I mentioned previously to better elicit and facilitate participants' narration when I did the interviews (Riessman, 2008). For example, in the beginning, I asked participants to tell me about their life story and educational story to gain an understanding of their background and multidimensional identity. I asked open-ended questions as "Please tell me the story of your life?" and "Please tell me the story of your educational experiences?" to elicit their long narration. Then, I provided a prompt with information about critical thinking to facilitate their descriptions of their perspectives on critical thinking. I asked if participants had a particular time when they became aware of critical thinking because it is easier for participants to talk about a particular time and incident than broad timespan as suggested by Riessman (2008). The entire interview, I used open and straightforward questions to elicit general descriptions and long narration. Then, I asked a lot of probing questions to dig into details and complexities of participants' experiences and perspectives. The interviews followed the conversation style and the flexible nature of narrative interviews. The participants provided rich narration of

their experiences and perspectives. The detailed interview questions and process can be found in the Interview Guide (See Appendix D).

After the official interviews, the participants and I collectively reflected on the interview experience. All eight participants provided rich narration at their first interviews. Therefore, one narrative interview was sufficient for each individual participant and no further interviews were scheduled.

Data Analysis Process and Procedures

One of the vital elements in narrative inquiry is the employment of participants' narratives or stories to describe human behaviors (Clandinin & Connelly, 2000; Polkinghorne, 1995). Narrative and story are commonly used interchangeably in narrative inquiry (Clandinin & Connelly, 2000; Riessman, 2008).

One narrative conceptualization adopted in this study is that "narrative refers to a discourse form in which events and happenings are configured into a temporal unity by means of a plot" (Polkinghorne, 1995, p. 5). According to Polkinghorne (1995), narrative thematic analysis should place narratives in a sequence of beginning, middle, and end. Polkinghorne (1995) differentiated two types of analysis: analysis of narratives and narrative analysis, which correspondingly align with paradigmatic cognition and narrative cognition. Specifically, an analysis of the narrative will be employed for this study. Analysis of narratives, which utilizes paradigmatic analysis— "examination of the data to identify particulars as instances of general notions of concepts"— "seeks to locate common themes or conceptual manifestations among the stories collected as data" (Polkinghorne, 1995, p. 13). One drawback of this analysis is the underplay of each unique individual story, which will be compensated by another conceptualization of the story proposed by Clandinin and Connelly (2000).

Three-dimensional narrative space-temporality, place, and personal and social serve as another conceptualization of the story for this study (Clandinin & Connelly, 2000). Specifically, temporality focuses on the fluidity of time that narratives invoke: the past, the present, or the future narratives. It is more about people becoming than being in this sense because people are still becoming while the narratives are happening. Space refers to the situation where the story is placed. Lastly, this three-dimensional narrative space emphasizes stories' personal and social interactions. In many cases, stories have personal meanings to the narrator and social meanings to a larger population or issue. In other words, narrators often reflect inwardly and outwardly when narrating.

The combination of Polkinghorne's (1995) conceptualization of the plot and analysis of narratives, and Clandinin and Connelly's (2000) "three-dimensional space" serves as the prior theory to guide the narrative thematic analysis for this study. Individual stories of participants were created considering the elements of plot and "three-dimensional space". Generated themes across the participants followed the Polkinghorne's (1995) conceptualization of analysis of narratives.

The data analysis process began when I did the data collection to catch emergent field-based analytical insights (Patton, 2002). This way, the authenticity of these insights will have the opportunity to be tested while still in the field (Patton, 2002). I had both the conceptual-phase questions and the emergent insights from data collection as essential sources for organizing the analysis (Patton, 2002). For instance, one emergent insight I gained through data collection was that I found that participants tend to bring up the strategies to develop and improve critical thinking when they narrated their critical thinking development. Thus, I paid attention to this section of strategies to develop and improve critical thinking when participants narrated. Further, when organizing the data, voluminous data emerged from qualitative data collection and to manage this giant, I first checked what I

have and got a sense of the whole (Patton, 2002). Then, the recorded interviews were transcribed. The mp3 format audio files of the interviews from the Audacity software and Zoom were transcribed in Sonix transcription software, which can transcribe Chinese language audio files. Oliver, Serovich, and Mason (2005) proposed a range of transcription practices with naturalism at one end and denaturalism at the other. Denaturalism is a practice where “stutters, pauses, nonverbal and involuntary vocalizations are removed” (Oliver et al., 2005, pp. 1273-1274). I used denaturalism when transcribing the interviews to focus more on the content of the narrative.

Narrative thematic analysis was adopted for the data analysis (Riessman, 2008). I employed a cyclical analysis approach, wherein I examined the data following each conducted interview. After analyzing one interview, I proceeded to conduct the subsequent interview. Subsequently, I analyzed the newly gathered interview data before moving on to the next interview. This iterative process continued until repetitive themes emerged and ceased to reveal new themes. Data saturation was reached after involving eight participants in the study.

Specifically, two coding cycles were implemented where the first cycle generated the initial codes from the data units, and the second cycle worked on the generated first cycle codes themselves (Miles et al., 2014; Saldaña, 2016). In the first coding cycle, I conducted In Vivo coding, where the participants’ languages were used as codes; open coding, where loose and tentative descriptions, definitions, categories, and labels were provided; descriptive coding, where a word or noun is used to capture the content into a description; and structural coding, where text was divided by categorized sections according to a specific structure with the goal of further analyzing within these structures (Miles et al., 2014; Saldaña, 2016). In the second coding cycle, called pattern coding, I grouped the initial codes that emerged from the first coding cycle into more meaningful units of analysis as meta-codes or as categories or

themes (Miles et al., 2014; Saldaña, 2016). Or in other words, one overarching code was formed from similarly coded excerpts from the first coding cycle to describe a pattern (Miles et al., 2004). Then, I organized and grouped the codes into themes that were relevant to the research questions and collated all relevant data extracts in corresponding identified themes (Braun & Clarke, 2006). During this process, I used visualization on my paper to help sort the codes into themes, using thematic maps and tables, through which I could think about relationships among codes and themes to identify the different levels of themes, such as main overarching themes and sub-themes within them (Braun & Clarke, 2006). The whole coding process was very time and energy consuming since the data was messy and voluminous. I spent more than two months on coding and data analyzing. In total, data collection and data analysis costed me more than three months. Table 1 illustrated some examples of the coding process.

In addition, I utilized narrative analytical technique called RITES (read, interrogate, thematize, expand, and summarize) for interpreting the narratives (Leggo, 2011). Specifically, I first read the whole narratives to get a general sense of the story. Then, I asked questions like who? What? Where? Why? When? How? So what? Third, I thematized the whole narratives and identified the parts that were related to the themes. Fourth, I expanded on the themes, drew connected, and came up with potential meanings. Last, I summarized the themes and presented what I learned from the narratives.

Trustworthiness

Trustworthiness in qualitative research means that the findings accomplish plausibility, verisimilitude, persuasiveness, dependability, and a sense of reality (Tracy, 2010). In other words, readers should feel the research reports are trustworthy enough to act on and make decisions accordingly (Tracy, 2010). Trustworthy qualitative projects should have a congruent methodology and methods designs (Given, 2016). They should also have

Table 1

Examples of Coding Process

Codes	Categories	Themes
i) first awareness when doctoral advisor mentioned it; first awareness during first semester of doctoral studies ii) gained awareness when answering reviewers' questions to argue for novelty; first time awareness in undergraduate courses	a) Awareness of critical thinking in Western contexts b) Awareness of critical thinking in Chinese contexts	1) Awareness of critical thinking in Western contexts VS Chinese contexts
i) critical thinking is default in subjects like physics and mathematics; critical thinking is extremely important for scientific research ii) logical reasoning; reasonableness or rationality iii) detailed and logical analysis of the pros and cons when making decisions; make judgment based on rationality iiii) curiosity and motivation; ability to discern reliable or not iiiii) age; culture	a) Importance of critical thinking b) Rational thinking and logical reasoning c) Decision making, analysis, and judgment d) Traits and skills e) Societal and cultural factors	2) Sufficient understanding of critical thinking
i) initial struggles and frustration; definitely transformed ii) it's amplification; not much critical thinking changes	a) Transformation b) Amplification	3) Transformation VS Amplification
i) conducting research; self-study ii) communicating and engaging with others; seeking guidance and feedback from advisors or mentors	a) self b) others	4) Developing critical thinking relied on self as well as others

neutral yet flexible research questions that provide boundaries and emergent and exploratory design (Given, 2016). Further, appropriate triangulation of approaches should be used (Given, 2016).

Moreover, trustworthy qualitative projects should have effective sampling strategies to ensure relevant and sufficient data for theme saturation (Given, 2016). Besides, they must maintain integrity during data collection and analysis by using an appropriate strategy to manage tracking and review data throughout the whole process of project implementation (Given, 2016). Last, they should use materials, such as field notes, data recordings, descriptive codebooks, and other tools, to record the systematic process of data gathering, documenting, and analysis (Given, 2016).

Specifically, trustworthiness is achieved in this study through different avenues consisting of thick description, triangulation, member checking and member reflections, and my subjectivity statement (Tracy, 2010).

Thick Description

A “Thick, detailed description provides the foundation for qualitative analysis and reporting” (Patton, 2002, p. 437), and it is one of the most important ways of accomplishing trustworthiness (Tracy, 2010). By explicating the complexity and specificity of the data, researchers show the data to the reader rather than tell the reader what to think (Tracy, 2010). Another merit of thick description is that it can “ascertain *tacit knowledge*,” embedded cultural assumptions and meanings that generally do not come to consciousness (Tracy, 2010, p. 843). I used field notes and researcher’s journal to keep a record of every step of the research in as much detail as possible. I included thick description of each participant in their introduction and individual story to show the readers rather than tell the readers.

Triangulation

Another means to achieve trustworthiness in qualitative research is triangulation (Tracy, 2010). Triangulation is proving the credibility of the conclusion by two or more theoretical frameworks, data sources, types of data collected, and researchers (Denzin, 1978, as cited in Tracy, 2010). “Triangulation may involve the use of multiple methods, different sites, a variety of participant types, or a mix of other variables deemed relevant to the project” (Given, 2016, p. 71). It is worth noting that critical, interpretive, or post-modern researchers may doubt the means of triangulation to enhance trustworthiness because different researchers, methods, and data should generate different results considering that specificity and circumstantiality shape findings (Tracy, 2010). For example, interviews and contextual interactions may collect different, equally “true” data (Tracy, 2010).

However, even though it is critiqued that triangulation can increase the accuracy of the data, it is still valuable to include different sources of data, methods, theoretical frameworks, and researcher views to tackle various aspects of problems, broaden the scope, deepen understanding, and advocate consistent interpretations or reinterpretations (Tracy, 2010). “Triangulation allows a researcher to investigate the research problem from various angles and perspectives” (Given, 2016, p. 71).

In narrative inquiry, researchers can employ a variety of field texts to enhance trustworthiness, such as journal writing, field notes, interviews, and so forth (Clandinin & Connelly, 2000). The researcher’s journal, field notes, and semi-structured narrative interviews were utilized as triangulation tools for this narrative study.

Specifically, a researcher’s journal is a journal written by the researcher to document their experiences as the researcher (Cranton & Merriam, 2015). Clandinin and Connelly (2000) stated, “journals are a powerful way for individuals to give accounts of their experience” (p. 102). Through the researcher’s journal, multiple elements of experiences can

show, such as the researcher's reflexivity. The researcher's reflexivity is important for qualitative research because of its interpretive nature; thus, the researcher's journal can be a tool to include the reflexivity so that audience can be informed of how biases, values, culture, background, and other experiences of the researcher influence the research (Ahern, 1999; Given, 2016). The subjectivity statement was included in my researcher's journal to display my biases, background, culture, and values.

Reflexivity is "the capacity of any system of signification to turn back upon itself, to make itself its object by referring to itself" (Myerhoff & Ruby, 1992, p. 307, as cited in Ahern, 1999, p. 408). The researcher's journal functions as a reflexive diary that arises from "an iterative, reflexive journey that entails preparation, action, evaluation, and systematic feedback about the effectiveness of the process" (Ahern, 1999, p. 408). In the preparation stage, the researcher may write down interests and assumptions taken for granted and subjective personal beliefs and values, to name but a few (Ahern, 1999). I wrote on my researcher's journal prior to each interview. Even after the completion of the analysis, the researcher can write down reflections on how they wrote up the account, for example, if one respondent quoted more than the others (Ahern, 1999). After each interview, I wrote my reflections on the researcher's journal as well as after the analysis of each interview data. In the stage of feedback, the researcher can contemplate and examine if analytic blindness exists and if the certain analytical conclusion is overlooked due to biases because even if biases and assumptions are acknowledged, they are quickly abandoned (Ahern, 1999). In my researcher's journal, I acknowledged that my way of analyzing the data was just one approach instead of the only feasible approach to analyze the data. I saw other possible ways to organize and thematize the data as well. Qualitative data can be analyzed in multiple approaches and angles based on researcher's lenses because researchers are the instruments for qualitative research. Therefore, writing these concerns down in my researcher's journal is

necessary. I kept record of my researcher's journey on my researcher's journal throughout the whole process of conducting this study as much as I deem necessary.

Field notes are "notes written by researchers or participants to describe the research process" (Cranton & Merriam, 2015). I kept field notes the whole research process to have a thick description. For example, I took notes when I conducted interviews to record participants' non-verbal reactions, the site, reflections on the interview, and other situations.

The last triangulation tool is semi-structured narrative interviews with participants, which was discussed in detail in data collection previously.

Member Checking and Member Reflections

The third means of achieving trustworthiness is member checking and member reflections. After the narrative interviews with participants, the transcripts of the interviews were sent to the participants to verify the accuracy of the transcripts. The participants can confirm the accuracy of the transcript by replying. Also, it will be communicated to the participants that if no reply after two weeks of receiving the transcript, it is automatically believed that they agree with the accuracy of the transcript. I got email replies with confirmation of transcripts from six out of eight participants with the rest two participants not replying.

Additionally, member reflection is a strategy to enhance the collaboration between researchers and participants by enabling the participants to evaluate if they find the researcher's insights meaningful or even eliciting participants to contribute their insights (Tracy, 2010). Member reflections include sharing and discussing the research findings with participants to see if they have any comments, affirmations, questions, critiques, feedback, and collaboration (Tracy, 2010). Member reflections allow for potential additional data and elaboration, thus enhancing the trustworthiness of qualitative analysis (Tracy, 2010). I utilized member reflections to ask participants to view my write-up, ask questions, share

thoughts and insights, offer feedback and critique, and elicit elaboration and additional data if any. Individual story of participants were sent to participants to elicit their comments, affirmations, corrections, critiques, feedbacks, collaborations, additions, and questions. It was stated in my email that no reply within two weeks would be taken as confirmation of story. I got six replies out of eight participants. Five participants confirmed their stories. One participant provided some corrections. I edited the parts where he made corrections and got confirmation of the edited story from him.

Besides, as mentioned above, in my researcher's journal, I wrote down my subjectivity statement since presenting the researcher's subjectivity statement can enhance trustworthiness by showing reflexivity.

My Subjectivity Statement

I was born and raised in mainland China and received my education, from kindergarten to undergraduate, in a system that relied heavily on teacher lectures. I came to Philadelphia to pursue my Master's degree and stayed there for over three years, which was my first time coming to the United States. During my initial years of studying in American classrooms, I felt like I was being entertained by various fun activities that my professors designed for my classes. For instance, in one of my business classes, I participated in a negotiation simulation where each of us was assigned a role, dressed in business attire, and negotiated as if it were a real-life business negotiation. At that time, I only found it fun because it felt like a role-playing game we played in childhood. However, I only observed the differences in classroom activities between the two countries, which was just a surface level comparison and not a deep reflection on the differences between American and Chinese education.

While pursuing my doctoral degree in the US, I couldn't help but notice the stark differences in the educational systems between China and America. As I immersed myself in

American education and accumulated educational experiences through doctoral courses, I began to ponder over the dissimilarities between the two systems. It was then that I realized the immense importance of critical thinking in American education, which was missing in Chinese education. I had never come across this concept in my educational experiences in China. This realization sparked my interest in this highly controversial and crucial concept of critical thinking.

I am interested in exploring how Chinese international students from different educational programs experience critical thinking in American education. Mainly, I target Chinese international doctoral students based on the existing literature and the fact that my awareness of critical thinking happened during my doctoral study.

I am a Chinese international doctoral student in a U.S. higher education institution, the same as my research participants. This similar background would give me a connection to and understanding of my participants and their struggles. However, this advantage might also, in turn, bring some biases. For instance, my positionality as a Chinese international doctoral student in the U.S. might be a contaminant. My trajectory of developing critical thinking while studying in the U.S. will subconsciously affect my understanding of my participants' experiences. I might automatically and unconsciously assume that they share similar experiences with me.

Also, as an insider, I am familiar with everything they share with me regarding cultural and political factors in both China and the U.S. However, similar to the fish in the water scenario, I, as an insider, will have some blind spots without realization. In addition, I am still on the path of developing critical thinking. I might not necessarily be more advanced on the path of developing critical thinking than my participants. Thus, I might not be entirely competent to understand their journey fully. It depends on the case.

Chapter Summary

Narrative inquiry is the methodology for this dissertation study. The study used participants' narratives to collect data about their educational experiences, memories, feelings, perspectives, perceptions, and knowledge of critical thinking. Besides, the co-constructed nature of narratives enables participants to make sense of their transformative learning. Specifically, semi-structured narrative interviews were conducted. The combination of Polkinghorne's (1995) conceptualization of the plot and analysis of narratives, and Clandinin and Connelly's (2000) "three-dimensional space" guided the narrative thematic analysis. Two cycles of coding were employed as well as the advanced narrative analytical technique RITES. The study used a thick and rich description, triangulation, member checking and member reflections, and my subjectivity statement to ensure trustworthiness. Using narrative inquiry as the methodology, this study generated rich findings in the next chapter. Specifically, Chapter Four presents the findings generated from the co-constructed narrative, including the individual stories of each participant, and categories and themes across participants.

CHAPTER FOUR FINDINGS

This dissertation study aimed to explore and understand how Chinese international doctoral students present and develop critical thinking in US higher education institutions. Through narrative inquiry approach, their critical thinking experiences were investigated, including their awareness, understanding, and conceptualizations of critical thinking and their perspectives on critical thinking development processes. The two research questions that guided this study are: (1) How do Chinese international doctoral students understand and conceptualize critical thinking? and (2) How have Chinese international doctoral students developed critical thinking during their doctoral studies in the U.S.? This chapter presented the story and themes of each participant and themes from the study. Each individual story was presented in the form of a vignette along with a table with themes generated from the individual story. Through data analysis, four themes were identified across participants: awareness of critical thinking in Western contexts VS Chinese context; sufficient understanding of critical thinking; transformation VS amplification; and developing critical thinking relied on self as well as others.

This study included eight participants, as displayed in Table 2. The participants were recruited using purposeful and snowball sampling methods (Given, 2016). All eight participants were originally from mainland China. There were six male and two female participants. Five of them were from STEM fields. Two were from business fields. One was from the education field. Their ages ranged from 27 to 36 years. Three of them received master's degree as their first U.S. degree whereas the first U.S. degree for the rest five participants were Ph.D. This table shows the participant's pseudonym, length of Ph.D. program, first U.S. degree, Ph.D. major, age at interview, and gender.

Table 2

Participant Demographics

Pseudonym	Year in Ph.D.	First Degree Pursued in U.S.	Ph.D. Major	Current Age	Gender
Mike	Completed in 2021	Master's	Marketing	34	Male
James	2nd	Ph.D.	Natural resources	28	Male
K	2nd	Ph.D.	Natural resources	28	Male
Shawn	4th	Ph.D.	Electrical engineering	31	Male
Serene	2nd	Master's	Business analytics & statistics	29	Female
Joseph	5th	Ph.D.	Electrical engineering	27	Male
Xiaoming	Completed in 2019	Master's	Environmental engineering	32	Male
Amy	Completed in 2023	Ph.D.	Adult education	36	Female

Presented here are the individual stories and contexts of each participant, along with the overarching primary themes and categories that emerged across all participants. Each participant's story and background are presented, carefully capturing the essence from their narratives and showing readers who they are. The stories contain information such as the participant's brief introduction, their past educational journey, their decision to come to US to study, their first awareness of critical thinking, their understanding of critical thinking, their critical thinking development, their perspectives on knowledge and teachers, etc. These stories are based on the essential elements distilled through their narratives, supplemented by my field notes and researcher's journal, where I recorded my thoughts and experiences as a researcher. These stories contain some of the participants' original words which I marked by quotation marks. They follow a plot structure encompassing a beginning, middle, and end, as described by Polkinghorne (1995). Additionally, the stories encompass personal and social dimensions, spatial and situational considerations, and temporal aspects, all of which are integral to the analysis process as outlined by Clandinin and Connelly (2000) in their three-dimensional space framework. The stories preserved the uniqueness and depth of each individual's storytelling style and maintained authenticity. The themes and categories that emerged for each participant will be presented alongside the stories.

Then, the overarching primary themes and categories will be presented after the individual stories. Quotations directly from the participants will be included to support these themes and categories, ensuring trustworthiness. Additionally, I will discuss any outliers that deviate from the primary themes identified across all participants. The presentation order follows the sequence of the interviews, beginning with Mike and concluding with Amy.

Story and Contexts of Each Participant

Mike

Mike is a 34-year-old male. He has an urban upbringing in China but resided in

different big cities throughout growing up. He is talkative and kind-hearted. He enjoys helping people and doing good deeds. He has a variety of hobbies, ranging from dining out in different restaurants, making friends, to visiting museums. He is interested in the knowledge of multiple disciplines. He reads books from different fields. Mike and I have been long-term good friends. It helped him trust me and open up to me. We had a wonderful time during the interview. It felt like a hangout time as friends.

After completing his Bachelor's degree in finance in China, Mike embarked on a journey to the United States to pursue a Master's degree in the same field. The decision to pursue finance as his major was made by his grandfather. Given his background in the social sciences during high school, his options for majors were limited. Initially torn between accounting and finance, his grandfather ultimately concluded that accounting might not be the most suitable choice for a male student, leading him to choose finance as his college major.

His mother took the initiative for him to study abroad initially because he achieved outstanding scores on the college entrance exam in China, but unfortunately, he didn't get into his dream college. Consequently, his mother saw studying abroad as a way to compensate for this disappointment. With his excellent scores, he could have attended a much better college in China, and his mother believed that sending him overseas to study would help make up for the educational opportunity he missed.

After completing his Master's degree, Mike initially pursued a Ph.D. in economics but decided to abandon it after one year. After careful consideration of various factors and assessing his strengths and circumstances, he made the choice to apply for a Ph.D. program in marketing at a different university. Despite the challenges and difficulties he faced during his economics doctoral studies, he excelled in microeconomics and econometrics. He began to realize that these two subjects formed the foundation of marketing. Additionally, the

mathematical requirements in marketing were significantly less demanding compared to economics, making it a more manageable option for him. This decision marked a significant turning point for him, as it was the first time he made a major life choice on his own after thorough analysis. Ultimately, he successfully obtained a Ph.D. degree in marketing. Overall, he have resided in the U.S. for a total of 10 years.

In his opinion, critical thinking is not about blindly accepting or mindlessly conforming. His awareness of the significance of critical thinking occurred during his final year of pursuing a PhD when he started applying for jobs. While applying for faculty positions at liberal arts colleges, he noticed that the job requirements placed a strong emphasis on fostering students' critical thinking skills. Intrigued, he decided to research the topic on Wikipedia. It was at this point that he began to recognize the value of critical thinking, although he still didn't grasp its complete essence.

His definition of critical thinking encompasses four key aspects: firstly, it relies on a foundation of conscience; secondly, it involves empathy, requiring us to consider and empathize with the perspectives of others; thirdly, it entails a process of balancing different viewpoints and factors; and finally, it necessitates an open-minded approach.

Mike developed his critical thinking by experiencing significant life mistakes, including choosing and subsequently switching his doctoral advisor, as well as changing the church he attended. Initially, he made errors, but he extracted valuable lessons from them. Applying these lessons to fresh circumstances, he ventured forth once more, embracing new feedback. This iterative process allowed him to continually ascend and refine his critical thinking abilities. It is a spiraling up process.

In the past, Mike used to strive to please his advisor and regarded her words as decree. He never doubted or questioned her authority, and he lacked accountability for his own research. However, by the end of his second year, he realized that he hadn't made

significant progress and had lost his motivation. Consequently, he decided to switch advisors. Unfortunately, his new advisor lacked the necessary expertise to guide him in techniques and research content, although he could assist with the writing aspect. This experience made him aware of the limitations advisors may have and the need for him to take risks and make independent decisions. He began expressing his own opinions and thoughts to his advisor, gradually initiating a transformative process. As his advisor recognized his ability to handle his own research, his advisor gradually decreased his interference. Looking back, he now understand the importance of taking responsibility for his own growth from the beginning and thinking independently, rather than revolving solely around his advisor and blindly accepting their instructions.

In the past, Mike held teachers in high regard, seeing them as all-knowing figures who possessed godlike abilities. However, as time went on, his perception of teachers shifted, and he began to see them as collaborators and people who could offer advice and suggestions. He now takes the lead in his research and work.

Before embarking on his doctoral studies, Mike believed that acquiring new findings was the primary focus of knowledge. However, he soon realized that it wasn't solely about making new discoveries or finding novel information. Instead, engaging in discussions about new findings and cultivating a thoughtful mindset proved to be more crucial. He recognized the limitations of his own contributions and adopted a more conservative approach towards his findings. His perspective on knowledge has become more modest.

Honestly, Mike believed attending classes offered little tangible assistance. The majority of his classmates seemed to be more focused on showing off their knowledge when answering or posing questions. Furthermore, his advisor failed to exemplify the practice of critical thinking.

In Mike's opinion, in order to enhance critical thinking, it is crucial to foster students'

inclination and capacity for independent exploration. Even if their initial direction of exploration proves to be incorrect, this very mistake can ultimately contribute to the right path in the future. While it may appear that they are heading in the wrong direction during their exploration, when viewed from a broader and longer perspective, they are, in fact, moving towards the right direction.

Four themes were generated from Mike's story: awareness of critical thinking in Western contexts; sufficient understanding of critical thinking; transformation; and developing critical thinking relied on self as well as others. The Table representing Mike's themes and categories for this story are found in Appendix E.

James

James is a 28-year-old man who had a rural upbringing. I considered him a friend. During his time in school, he simultaneously engaged in farm work, which fostered his independence and resilience. Throughout his life, he has developed a diverse range of interests that have evolved over time. During middle school, he developed a keen interest in environmental protection, and in high school, he actively participated in physics competitions. Fundamental physics, particularly the foundations of mechanics, has always fascinated him, along with a strong passion for science and engineering principles. Apart from his academic pursuits, James also enjoys swimming. During our interview, he displayed a delightful sense of humor, and we shared many hearty laughs.

Ever since he was young, James had a strong desire to pursue his studies abroad. He drew inspiration from the early cohorts of Chinese international students who ventured to the West during the Ming Dynasty and in the period following China's open-up policy. He firmly believed that there were significant differences between education in China and the West, and he saw immense value in exploring the educational systems of the West. As a result, his longing to study in the Western countries had persisted for a considerable duration. After the

completion of his undergraduate studies in mechanical engineering and his master's degree in chemical engineering in China, he came to the United States to pursue a Ph.D. degree in natural resources. He has resided for a total of two years here.

When it comes to his awareness of critical thinking, he cannot pinpoint a specific moment when he first gained awareness of the concept. Instead, it has become ingrained in his mindset as a way of life. It has exerted a subtle and cumulative influence on him, ultimately shaping him significantly.

James understands critical thinking to be important as it involves forming a detailed and logical analysis of the pros and cons when making decisions, leading to more rational conclusions and choices. It is about analyzing and summarizing factors and information. It is a way of thinking. After conducting these analyses, people arrive at their own conclusions. James said; “The opposite of critical thinking is a rote learning process. It disregards cause-and-effect relationships and focuses solely on memorizing outcomes and applying them. It emphasizes knowing the what without understanding the why. As a doctoral student, it is essential to emphasize the cause and effect. Teachers also speak from experience. If you follow a teacher's conclusion without understanding why they made that statement, you become like a servant, devoid of your own intellect and merely acting as someone else's limbs and arms.”

James defines critical thinking as the process of analyzing and deducing when facing problems, conducting cause-and-effect analysis, and making decisions or drawing conclusions.

Regarding how James developed and cultivated critical thinking, first of all, his supervisor provides very little guidance. He thinks it's understandable that supervisors provide minimal guidance because critical thinking emphasizes independent learning and judgment, as well as the construction of one's own knowledge system and values. Therefore,

it is beneficial for cultivating critical thinking that supervisors provide less guidance. Critical thinking emphasizes autonomy, which means engaging in communication and collisions with others, obtaining feedback, self-reflection, updating, and further learning.

James thinks that in the field of science and engineering, the weightage of research tasks is greater. Attending classes primarily serves to earn credits and acquire fundamental skills, but attending classes alone does not provide as much assistance in cultivating critical thinking as engaging in research does. Classes focus more on developing communication skills, as well as the ability to conduct academic research and express ideas effectively. However, the knowledge covered in classes tends to be relatively basic. Throughout the process of accumulating knowledge in the discipline, self-study plays a significant role.

The process of conducting scientific research involves breaking down a topic based on the broad direction given by the advisor, and accomplishing the goals of each small step. Sometimes, the direction provided by the advisor may not be feasible. At times, the overall goal is very large and unrealistic, requiring it to be broken down and analyzed independently. In general, James summarized the process of scientific research as follows: conducting literature reviews and experiments, testing a hypothesis, receiving feedback, modifying the initial ideas, conducting further experiments, receiving feedback again, and repeating this iterative cycle of redesigning concepts. There will be many failures along the way. The overall process of conducting scientific research does not have someone guiding you; it is a process of self-exploration. This has strengthened his critical thinking skills. He already had some level of critical thinking before, but through the process of conducting scientific research, he continuously applied critical thinking, which further enhanced his abilities in critical thinking.

In James' opinion, it is necessary to listen and observe more, think about the connections between things, and engage in deep reflection to construct a framework of

knowledge to improve critical thinking. One must learn to break down complex and difficult concepts into simpler ones that align with the existing knowledge framework. It is important to accumulate the basic principles governing the world and things, transforming the unknown into a comprehensible realm of knowledge. In reality, there aren't that many fundamental principles in the world. Attending classes helps in constructing these basic rules, but it is crucial to deeply understand and value logical connections and the process of reasoning.

In James' opinion, learning critical thinking can initially be a challenging and mentally demanding task, resulting in low efficiency. However, these thought processes are meaningful. You will avoid being stuck in an endless process of memorization. Instead, you integrate new knowledge into your framework of knowledge through this deep thinking, understanding, and processing. Once it becomes a habit, when encountering new complex problems, you will naturally break them down and analyze them. The ability to solve problems will be strengthened. This is a gradual process that starts off slow but eventually speeds up.

To reflect on his learning experience here, coming from China to the United States to pursue a Ph.D., James has discovered two aspects that are different and requires his adaptation. The first aspect is regarding the courses. The number of Ph.D. courses in the United States is greater than in China, and the level of student participation is higher. He respects this environment, and he observes how other classmates engage in the classroom and what the professors expect. Then, he follows the professors' requirements. He thinks this kind of adjustment may be due to fear, but he is not that afraid. He has learned to bravely participate in class.

The second aspect of adaptation is related to research. Compared to China, communication with his advisor has decreased in the United States. One reason is that his ideas has been constantly rejected by the advisor. The reasons for rejection include the

relatively lower convenience of conducting experiments in American universities, insufficient equipment, and slow delivery of ordered materials. His advisor prefers to have foolproof experimental designs before conducting them, while his personal approach is to make improvements during the experimental process and then conduct the experiments. This was his habitual way of conducting experiments before, and it differs greatly from the expectations of his advisor in the United States. Therefore, he has faced certain difficulties in adapting to the research aspect. He has not completely overcome the challenges in research adaptation until now, but on one hand, he strives to meet his advisor's requirements, and on the other hand, he still retains his own ideas.

Regarding his views on knowledge and teachers, after he went to the United States to pursue my Ph.D., he continued the mindset he had during his previous studies in China. The only difference is that in China, when he had different ideas from his advisor, both his approach and his advisor's approach would involve conducting experiments to determine the validity based on the experimental results. In the United States, he continues to hold this mindset, but the inconvenience lies in the lower convenience of conducting experiments, the difficulty in obtaining results, and the longer time required to obtain results.

Four themes were generated from James' story: no specific moment of awareness of critical thinking (Outlier); sufficient understanding of critical thinking; amplification; and developing critical thinking relied on self as well as others. The Table representing James' themes and categories for this story are found in Appendix F.

K

K is a 28-year-old male. I considered him a friend. Based on a personality test he took, he identifies as an ISFJ, known as the defender personality type. The defender (ISFJ) embodies traits such as introversion, observance, feeling, and judging. Additionally, K describes himself as mature, generally passive in his approach to tasks, considerate of others'

emotions and feelings, and someone who prefers a certain level of distance from others, finding comfort in solitude. He pursued a bachelor's degree in food science during his undergraduate studies and focused on grain and oil for his master's degree in China. Currently, he is in his second year of a PhD program in natural resources in the United States, having resided there for a total of two years.

K studied food science for his undergraduate degree in China. Actually, during his undergraduate years, he had the idea of studying abroad and even prepared for the IELTS exam. At that time, he wanted to change to a different environment. However, some family issues arose, and he gave up on that idea. He performed well in his undergraduate studies and was therefore recommended for admission to be a postgraduate without having to take entrance exams. He pursued a master's degree in grain and oil, which is a related field to food science. After completing his graduate studies, due to the pandemic, he took a gap year and worked as a research assistant in the same laboratory where he pursued his master's degree. Later on, he came to the United States to pursue a Ph.D.

K made the decision to study abroad during his second year of the master's program. He believed that the research experience in the United States would be slightly better than in China. At that time, he had an opportunity for a combined master's and Ph.D. program, and his advisor asked for his response within a short period of time. It took him about one or two weeks to make the decision. He wanted to step out of my comfort zone and believed that he had the ability to pursue a Ph.D. in the United States, considering his language skills and research capabilities. He also felt that academia in China was highly competitive. Then, he was determined to come to the United States for his Ph.D. studies.

Currently, K is pursuing a Ph.D. in natural resources in the United States. It is a different field from his previous studies in university. The doctoral research topic is not related to food science. Specifically, his research focuses on cellulose, biomass, and

functional materials. During his master's program, he worked on a project related to food packaging, which has some relevance to his current research. He has been exposed to materials before because fields like biology, chemistry, environmental science, and material science are interconnected. Therefore, he also has a background in chemistry and a foundation in related disciplines. The research training he received during his master's program greatly helped him in his current Ph.D. studies. He has published several papers during his master's program, so he understands the entire research process and how to navigate it. Pursuing a Ph.D. naturally requires higher standards and better research. Although he didn't have a specific background in natural resources before, the training he received during his master's program and the interconnectedness of disciplines of biology, chemistry, environmental science, and material science helped him adapt quickly to this new academic field, which took about six months. Now, for him, doing research is like returning home.

The first time K gained the awareness of critical thinking was during his graduate studies, specifically when he was working on his second research paper, which was also a significant milestone in his life. At that time, he had to address questions raised by the reviewer. It was the first paper he had completed independently. From designing the experiments to addressing the reviewer's queries, it was a significant challenge for him. The reviewer consistently challenged the novelty of his paper. They asked him numerous questions and claimed that his paper lacked innovation. He engaged in arguments with the reviewer regarding the novelty of his work. He also read numerous articles and compared them with his own. Gradually, he identified the innovative aspects of his paper. After discussing the issue of novelty with the reviewer, he developed the ability to generate more innovative ideas in his research work.

K's understanding of critical thinking is "the ability to summarize, compare, and reflect. This is reflected in the methods of scientific research. Critical thinking is extremely important because without this ability, one cannot excel in scientific research. Critical thinking is about having the ability to discern whether something is reliable or not."

K's definition of critical thinking is that "it involves having the ability to think independently and to judge or compare the reasonableness of things based on the rationality of the situation at hand. Furthermore, it requires having the determination to engage in thoughtful contemplation. You cannot simply dismiss things and say you are too lazy to think about them; instead, you must maintain a spirit of skepticism towards things."

When it comes to developing and cultivating critical thinking, it has to be mainly embedded in K's research process. The most important thing is to read a lot of papers. His supervisor did not give him a specific topic, so he relied on reading a large number of literature to identify research gaps. Then he looked at the current hot topics and saw what else can be done in those areas. However, just reading papers was not enough; he also needed to conduct experiments and test the methods mentioned by others. Doing research and publishing papers is a very exploratory process, and many things are learned from reading papers. After reading many papers, he generated ideas and then assessed their feasibility. He validated them through experiments. Engaging in research projects has enhanced his critical thinking. His ability to assess whether something can be accomplished has improved, and he has become more proficient. By casually reading a few papers now, he can determine if something is reliable or not. Accumulating knowledge and going through the training process has made him more proficient and efficient, and his speed of summarizing and filtering information has increased. His ability to judge value and reasonableness has also improved.

Furthermore, regarding the coursework, he mentioned that doctoral courses help expand the knowledge framework. Before pursuing a Ph.D., he already established a

foundational knowledge framework in his discipline. Therefore, the courses during the Ph.D. program serve to expand his knowledge system rather than build a foundational knowledge base.

There is one course that K believe has helped develop his critical thinking. The way the teacher assigns homework is excellent. He provided high-scoring papers and asked students to derive the formulas and determine if they were correct or not. Even papers published in top journals may not be completely error-free. This homework and the course have greatly contributed to the development of his research abilities.

To summarize how K developed and cultivated critical thinking, firstly, he engaged in scientific research. Secondly, he read research papers. Thirdly, he conducted hands-on experiments. Fourthly, there was a specific course that contributed to it. Apart from these methods, he believes that having someone to guide and induce critical thinking is crucial. K said: “It is essential to have someone who can lead and assist you in the initial stages, helping you to reflect and consider why a certain article is good or bad. This process is part of scientific training. Without someone to guide you initially, progress can be slow and challenging. Without a clear method and someone to point you in the right direction for logical thinking, you may struggle. Therefore, having someone to guide and induce critical thinking is something I consider very important.”

Looking back on K’s doctoral study experience, the initial transition was actually not difficult, even relatively smooth. Because he completed his master's degree in China before coming here, and he did not directly come to the United States for his undergraduate studies. When he first came to the United States for his Ph.D., there were some inconveniences in daily life at the beginning, such as not having a car and facing language difficulties. Even now, he may still not be as proficient in the language as native speakers. However, there were not many critical thinking changes from China to the United States for studying. The

laboratory work here is similar to what he did in China before. K shared: “the only difference is that conducting research here is not as convenient as in China. Many aspects require more independence, such as contacting instruments and ordering reagents on my own. Relatively speaking, efficiency may be lower, but it allows for the development of critical thinking during this process, which helps me have a more comprehensive understanding of the entire research process.”

During K’s Ph.D. studies, his perception of education and knowledge did not undergo significant changes. He has always believed that the understanding of knowledge is an ongoing process, even before he went abroad. The more he understands a field, the more clearly he comprehend it. When he does not have much knowledge in a certain area, he tends to consider textbooks as authoritative sources. However, because he does scientific research, he is exposed to relatively cutting-edge knowledge, which may sometimes be unreasonable. Combining it with his own knowledge background, he can discern what is unreasonable within his field.

K stated: “teachers play a guiding role. They do not simply teach you what is right or what knowledge is; they open the channels for obtaining knowledge or show you shortcuts to quickly acquire knowledge. Understanding, digesting, and reflecting on knowledge rely on oneself.”

Four themes were generated from K’s story: awareness of critical thinking in Chinese contexts; sufficient understanding of critical thinking; amplification; and developing critical thinking relied on self as well as others. The Table representing K’s themes and categories for this story are found in Appendix G.

Shawn

Shawn is a 31-year-old man. I considered him a friend. He obtained his bachelor's and master's degrees in electrical engineering from China. He continued to pursue his Ph.D. in

electrical engineering, marking his first degree pursuit in the United States. Currently, he is in the fourth year of his Ph.D. program.

Shawn grew up in a rural area. His family had their own yard. Besides studying, he also had to grow plants. In his free time, he would play table tennis or basketball. Since he started doing household chores and farm work when he was young, he developed a resilient personality and a strong sense of independence. By the end of middle school, he had surpassed his parents' knowledge limits. He had to rely on self-study. From a young age, he would search for materials and tackle challenging problems from higher grade levels or competition questions. During his undergraduate studies, he participated in various competitions and was recommended for graduate school. During his graduate studies, coursework was not as important as it was during his undergraduate years. The main focus was on research projects, mainly in theoretical and control-oriented fields. He has a strong interest in any field related to engineering and technology.

The first time Shawn gained the awareness of critical thinking was during an interview when he helped the researcher, which is me, with an assignment. I asked him questions about critical thinking at that time. It was only later, after he went back, that he realized the process of the research project he did in the Oak Ridge laboratory during his first year in the United States was actually a part of critical thinking. It was a completely new experience for him to do that research project in Oak Ridge in his first year in the US, without any prior experience. At that time, he read a lot of literature and conducted a literature review. But at the time, he didn't realize that it was an example of critical thinking. It was only after he was asked questions about critical thinking that he reflected on the process and realized, "How did I go about this process?" This process was critical thinking. He stated: "here is my summary of the process of critical thinking: Firstly, you need to study a problem that you don't understand. Then, you need to review a large amount of literature,

reports, or books to identify commonly used methods to solve that problem. Next, you should contemplate why there are so many different methods instead of a single unified method. In reality, practical problems can be complex and involve different application scenarios. After going through these materials, you analyze and summarize, selecting the best and most suitable method for your specific case.”

Shawn’s understanding of critical thinking is that he believes good critical thinking is what is encompassed in the three definitions. He shared: “firstly, you need to be rational. Critical thinking is not about random thoughts or fantasies, but about reasonableness or rationality. Based on rationality, you need to make judgments about what you see, which is the second definition, judgment. This judgment should be built upon your own rational foundation, a rational judgment. The first two definitions are more high-level in nature. The third definition is more specific and practical. It breaks down critical thinking very clearly. For example, if I have read a lot of literature, how should I approach it? The most important point is to generalize and induct, to elevate what you have seen to a higher level. There are certainly some commonalities among these things. Then, apply the information you have gathered to your own questions. Critical thinking should be applied to scientific research or any other endeavor.”

Shawn’s definition of critical thinking is the ability to summarize and analyze a problem based on rational analysis, and then apply your conclusions to a new problem.

Doing scientific research has been extremely helpful for the development of Shawn’s critical thinking. In his first research project, he encountered many detours. Unconsciously, he was actually applying critical thinking, but he didn't know it at the time. He managed to complete his first year of doctoral studies despite some stumbling blocks and relied on his own exploration. After completing that research project, subsequent research projects progressed faster because he followed the same pattern. He shared: “doing research has

greatly benefited my critical thinking. Just like doing other tasks, such as writing research reports, they tend to be superficial, but research requires a meticulous approach because it cannot be repetitive and must be innovative, so you need to think deeply. Doing research is more advanced in terms of developing critical thinking.”

For Shawn, attending classes has a moderate impact on the development of critical thinking because the projects in class are not as challenging. Classwork has limited impact on critical thinking, only providing some assistance. However, there is one course that has had a comparatively big impact on his critical thinking. It is the machine learning course, where the teacher provided a comprehensive understanding from start to finish. The teacher also assigned projects and offered methods for students to apply. This course helped him categorize and apply technical knowledge.

Shawn shared: “I observe other classmates and reflect on my own learning process. I believe that in order to improve critical thinking, it is necessary to spend more time pondering questions. Many people are quite passive in their approach. They complete tasks according to the instructions of their advisors but lack their own thinking. Making generalizations, induction, and classification is quite challenging because it requires breadth and depth. Some classmates lack depth and haven't formed a systematic approach, so their inductions are not well done. The ability to generalize and induct is extremely important. To improve, the most crucial thing is to actively engage in thinking. Look at high-level literature reviews and see how others summarize the issues. Ask yourself why a particular chapter is written the way it is and what the logical relationships are between chapters. If you want to come up with something new, a quick way is to look at what others have written for future research. When writing your own article, you can include feasible research ideas in the future research section that you may not have time to pursue yourself. So, the possibilities in the future research section can be explored.”

Looking back at his study experience in the United States, Shawn felt that there had been some differences and changes since he came here. Firstly, in terms of teaching, he found that the curriculum here covers more topics compared to China, and the teachers provide more detailed explanations. In China, courses in the field of research might be taught at a faster pace, and they generally don't go into much depth. However, here he has noticed that the lectures are particularly thorough, and there is also a heavier workload of assignments. Basically, they ensure that you have sufficient practice after completing the course.

However, in terms of content, Shawn feels that pursuing a Ph.D. from China to the United States was a seamless transition because the field of study is the same. In reality, the content taught in China is quite similar to that in the United States, both in terms of theory and technical aspects. Therefore, he did not think there were significant difficulties, except for the language barrier. However, the professors here are generally accommodating towards international students, so they speak at a slower pace, and he can understand them for the most part. Overall, the transition and adaptation process has been relatively normal, and he does not feel that there are many differences.

After Shawn began his Ph.D. studies, there are definitely changes in his views on teachers and knowledge. He shared: “of course, I believe this is something that a Ph.D. student should do. We are supposed to engage in cutting-edge research. This means that the research we conduct may be something that others have not done before. Therefore, we need to work on something new. Because new things may have both advantages and disadvantages when they are first proposed. As Ph.D. students, we need to analyze them dialectically. For example, when we conduct literature reviews, we need to consider both the strengths and weaknesses of the methods we study. This leads us to approach problems from a more comprehensive perspective. Nowadays, knowledge is not simply black or white. Apart from what has already been written in books, which may be considered correct for a considerable

period of time, there may be flaws in research published in journal papers or limitations in their application scenarios. Therefore, we need to critically think about it. At this point, you need to think deeply and comprehensively. You shouldn't just accept it directly or reject it outright, but truly analyze it.”

Then, finally, he shared his perception of teachers. He stated: “because in China, when studying at the undergraduate or graduate level, your advisor or teacher may be both an elder and an authoritative figure. So basically, we need to try our best to listen to what they say, to learn from their teachings. However, when it comes to being a doctoral student, personally, I feel that the relationship with the advisor is more like that of collaborators. It's like the two of you are exploring something new together, or taking a step forward based on existing knowledge. Of course, the teacher is still a guide and an elder, but it's not necessary to blindly follow their ideas. While there is wisdom in following the established path and focusing on expertise, there are certain cutting-edge and specific problems where the teacher's existing experience may not provide a solution. Therefore, it becomes more like the teacher and I working together to solve a problem. So, I think, how should I put it, they are both a teacher and a collaborator.”

Four themes were generated from Shawn's story: awareness of critical thinking in Western contexts; sufficient understanding of critical thinking; transformation; and developing critical thinking relied on self as well as others. The Table representing Shawn's themes and categories for this story are found in Appendix H.

Serene

I met Serene for the first time during this interview conducted for my dissertation research, as I had no prior personal acquaintance with her. Serene, a 29-year-old woman, is currently pursuing her Ph.D. in business analytics & statistics. She has been living in the country for six years. Serene possesses a generally calm and quiet demeanor, although she

can be occasionally stubborn. She is known for her determination in achieving her goals. Serene enjoys various activities such as cooking, reading, playing with kittens, and engaging in short-term travel experiences lasting no more than three to five days.

During the interview, I found that Serene typically provided concise answers to my interview questions, prompting me to ask follow-up inquiries to uncover more details and stories from her. Interestingly, she exhibited a strong curiosity about my own educational experiences, posing numerous questions regarding my educational journey. In turn, I shared some of my past academic endeavors with her. This friendly, interactive, and two-way-street conversation turned out to bring out rich and detailed stories of Serene despite her generally concise answers to most of my original interview questions.

Serene completed her undergraduate studies in China, majoring in Port, Waterway, and Coastal Engineering. During her undergraduate years, she didn't do much besides attending classes, doing assignments, and taking exams. Later, in preparation for studying abroad, she focused on preparing for the TOEFL, GRE, and writing her personal statement.

Going abroad was actually her own idea. Initially, she wanted to go to the UK because everyone knows about Harry Potter. Her mom was more supportive of her education and more democratic, so she allowed her to go to the US for a month to experience it herself. In 2014, when she was in her second year of college, she went to the US for a study tour, and spent a month there. She visited the East and West Coasts of the US and visited many schools. She thought the American schools were quite good. So, at that time, she switched from preparing for the IELTS to preparing for the TOEFL.

Serene first pursued a Master's degree in Civil Engineering when she arrived in the United States. It was challenging at the beginning, as she had to adapt to various aspects of life. However, she found some friendly local Christians and also made friends with a few American girls who often took her out to have fun, so everything was going pretty well.

Initially, she had some difficulty understanding the classes, but in STEM fields, as long as you can solve problems, it's usually sufficient. There were some classes that required her to attend sessions in the Statistics Department. Eventually, she found statistics quite interesting, as it involved deriving results from data using various methods and making decisions based on them. However, she accidentally chose the most difficult statistics course and ended up with a C grade. The professor told her that she couldn't have a recommendation letter, which meant she missed the application deadline for that year. She had to wait for another semester and applied for admission in the fall of 2019, missing one semester in between. In the fall of 2019, she enrolled in the Master's program in Statistics. She wanted to change her major from Civil Engineering to Statistics, but she couldn't directly pursue a Ph.D. in Statistics, so she needed a Master's degree in Statistics as a stepping stone.

Serene felt a certain interest in academia, so she decided to apply for a Ph.D. In her current field of research, mathematics and coding skills are essential. Programming and writing code are vital for her doctoral studies in business. In the end, a business doctoral program requires a combination of mathematics, programming, and writing skills. Transitioning to a doctoral program in business analytics was relatively smooth for her because she already had a foundation in statistical software and mathematics from her master's degree. While she may need to supplement her knowledge in business-related topics, she is comfortable with specific methods and software. Reading relevant literature has also been sufficient to help her fill in her knowledge base in business. Therefore, the overall transition from master's to doctoral level was not very challenging. Moreover, during her years in the United States, she has greatly improved her language skills. She can understand academic lectures almost 95% of the time.

But it is worth mentioning that the biggest difficulty Serene encountered when she first entered the doctoral program was with her advisor. She had previously changed her

advisor because she didn't get along well with her previous Chinese advisor, who constantly belittled and discouraged her, saying that she couldn't handle the program and urging her to quit. At that time, she didn't even want to get out of bed, she was already depressed. She even went to a fortune teller to talk about her situation. The fortune teller said that you and your advisor are incompatible. Are you studying abroad? Then why don't you find a foreign advisor? If you find a foreign advisor, your adversity can be overcome. Later, She did discover that she got along much better with the white male professors in the department. So she contacted the director and changed the advisor, and now her advisor is a white male professor who is quite nice.

The first time Serene became aware of critical thinking was during her university years when she was preparing for the TOEFL exam. At that time, one of the TOEFL writing prompts was related to critical thinking, so she took some time to understand what it meant. She searched for "what is critical thinking" on Baidu and briefly read about it. While preparing for the TOEFL, she also gained some knowledge about campus life in the United States. In January 2014, she had the opportunity to study abroad in the United States. During her time there, she attended several classes where professors discussed critical thinking. They gave her advice on how to approach TOEFL writing and emphasized the importance of having your own thoughts when planning to apply for schools. The professors in the US also mentioned that the personal statement is the most crucial part of applying to American schools because standardized test scores are similar among applicants. To stand out, your personal statement and resume should reflect who you are as an individual. She believes this process is closely related to critical thinking.

As to Serene's understanding of critical thinking, she feels that the definitions of critical thinking provided by the academic community is actually quite similar to the academic training in science and engineering. She shared: "analysis definitely involves

starting with data analysis. You need to analyze the data statistically or using mathematical models. Then you interpret the results. From this interpretation, if you are in the field of business, you need to provide some insights and evaluate the results in relation to the phenomenon. Then you need to explain it again, so critical thinking is very important. Also, you need to learn how to question and how to challenge. As a PhD student, critical thinking means you can't just accept everything your advisor says. If they are wrong, you need to correct them and have your own ideas. Your advisor is not always right, so when they are wrong, you need to point it out, but be mindful of your approach. However, you have to let them know because otherwise it's not good for your research and for your communication and relationship with your advisor. Additionally, with news and the prevalence of fake news nowadays, you can't just believe everything people say; you have to use your own judgment and think critically. Same with literature and such, you shouldn't blindly trust it because people make mistakes. Even top-tier journals and good literature can have errors sometimes.”

Serene’s definition of critical thinking is that after you have an understanding and awareness of something, you make your own judgments.

In the past few years of her Ph.D., Serene’s critical thinking has improved to some extent. Currently, there are mainly two aspects: reading papers and the process of changing advisors. When she read papers from top journals now, she finds herself thinking about how to improve the paper. Initially, she was just taking in information and not actively thinking about it.

In terms of classes, many of the courses in Ph.D. are focused on reading papers and using programming to reproduce the results presented in those papers. There are some courses where Serene feels the teachers are not very well-prepared. She stated: “however, some courses are decent; it's like a fifty-fifty situation. Attending classes does help in building a foundation of knowledge, so it's not entirely without benefits. At least I know that

certain things exist, but as for how to use them or apply them, that's something you have to figure out yourself and rely on self-study. Once you know the method you need to use, you have to read books and learn on your own, which is crucial. Each person's research direction is different, and courses cannot be tailored to individual needs. To be honest, many of the courses in the Ph.D. stage are not very meaningful. Attending classes itself does not contribute much to the development of critical thinking; most of it is improved through self-study. You can learn by reading books and other resources. For example, if you don't understand a certain topic, you can start by looking it up on Wikipedia or searching on Google. As for coding, you can watch tutorials on YouTube to see how others do it, and then try it yourself. In addition to those, reading some classic articles and books should be sufficient. To be honest, teachers' assistance is limited in this regard.”

In terms of research, Serene has not written any papers yet. However, she has been preparing for her thesis and has already made some progress. Her thesis consists of three essays that she has worked on throughout the doctoral studies. The broad topic is "customary return," which involves studying the factors that influence customer return, for instance. The first step is to use statistical and programming software to clean the data. Based on the research question, she decides which statistical model to use and then examines whether the results are reasonable. If her advisor approves, she needs to find relevant theories. By comparing existing theories such as customer behavior theory with her results, she can analyze and proceed to write the paper. This is the whole process of research. Initially, she learned by reading papers. The papers usually have multiple sections, and by reading several of them, she learned about the research process. The advisor's expertise provides a general direction, and then she thinks about specific sub-directions to further refine the research questions.

Looking back on Serene's journey of pursuing a Ph.D., which includes her initial process of studying in the United States after coming from China, there has definitely been a transformation. When she first arrived in the U.S., she experienced some difficulties in terms of language and adapting to the lifestyle. However, through making efforts or simply natural progressing, she overcame those difficulties and adapted. In terms of academics, a master's degree is an upgraded version of undergraduate studies, with a focus on exams. But as she progressed in her Ph.D., she realized that self-learning, reading literature, and conducting research were more important. Textbooks served as a foundation, but the majority of learning happened through independent study.

Before pursuing a doctorate, Serene went to the United States to pursue a master's degree. She didn't feel much difference compared to studying in China. It was all about sitting in the classroom, teaching, and learning. She believe that good teachers should learn how to motivate students. Instead of telling students what they should do, they should inspire them by explaining why they should do something and how to enhance and improve themselves. During her doctorate, her relationship with her professors was one of collaboration. Prior to pursuing a doctorate, it was similar to the teacher-student dynamic in China.

Four themes were generated from Serene's story: awareness of critical thinking in Western contexts; sufficient understanding of critical thinking; transformation; and developing critical thinking relied on self as well as others. The Table representing Serene's themes and categories for this story are found in Appendix I.

Joseph

I encountered Joseph for the very first time during an interview I conducted for my dissertation research. Prior to this encounter, I had no personal acquaintance with him. Joseph is a 27-year-old man who is pursuing a major in electrical engineering. Interestingly, he chose

to pursue his doctoral degree directly after completing his bachelor's degree in the same field. Joseph arrived in the United States in 2018 for the Ph.D. program and has resided here for five years. He was born in a small county town in China. Both of his parents are engineers. There are quite a few books in his house. The computer in their house was bought early, and his parents provided him with a lot of guidance. He said he is more introverted by nature. He is not willing to talk to others too much. When he was young, he often played computer games alone at home or made models by himself, such as paper models or plastic models. Around the age of 12, he created a website to learn computer knowledge on his own. He also enjoys watching TV dramas when he has free time.

Joseph is a warm-hearted and gentlemanly guy. At the time, we were in the conference room for the interview, and the tables needed to be moved and rearranged. He was willingly to move and arrange the tables, assuring me that I didn't need to lend a hand as he could manage it on his own. I think he is helpful and very gentlemanly, and he takes care of girls. He is a very warm-hearted guy. Later, our interview went very smoothly and enjoyably.

Joseph studied electrical engineering in university. During his time in college, he participated in some competitions and joined a student technical team. He took part in an electronic design contest, which was a provincial competition focused on designing electronic devices. He dedicated a lot of effort to this competition for two years. His parents thought he was doing well academically, so they suggested that he studies abroad, saying that it might lead to better opportunities in the future. Therefore, studying abroad was their suggestion.

Joseph first became aware of critical thinking during his university years when his English teacher mentioned it in an English class. The teacher said that Western countries place a strong emphasis on critical thinking. Additionally, during his undergraduate studies, there was an elective course offered at my school called "Critical Thinking." He enrolled in

that course, but the content taught by the instructor at the time was more paradigmatic and felt somewhat like exam-oriented education.

Joseph's understanding of critical thinking is that "it involves approaching problems comprehensively, being open-minded, and crucially, not holding a predetermined stance. In terms of academic papers, critical thinking is about novelty and originality in thinking.

I define critical thinking as an objective and comprehensive, as well as relatively open, form of analysis. It is a method of analytical thinking."

During his PhD, Joseph developed critical thinking, primarily through conducting research and serving as a reviewer. In the beginning, he encountered many challenges during his research projects. The first project didn't receive funding, so it wasn't approved at that time. Therefore, the first half year of his PhD was spent doing assistant jobs. Later, after six months, he started another research project, but he wasn't very familiar with it, nor was he interested in it. He is more interested in hardware, but that project was about abstract and theoretical concepts. He had to rush and do it anyway. Since he didn't have much understanding of research at the time, he was exploring in the dark on his own, receiving criticism while struggling through the process. It was a painful and frustrating experience. He always felt trapped in difficulties and couldn't escape. So, during this period, his development of critical thinking was actually very limited. He had two instances where I wanted to quit, but due to the outbreak of the pandemic, he couldn't follow through with it. He rushed to meet deadlines, putting on a brave face, and followed the schedule given by his advisor to come up with something, just to show some progress, but without a solid and valid conclusion. Although he superficially fulfilled the tasks according to his advisor's requirements, the quality was not very high. At that time, he didn't understand why his advisor, who wasn't previously involved in this field, wanted him to do this.

When this part was finished, Joseph started working on the hardware. While working on the virtual part earlier, he didn't have any subjective drive. But when it comes to hardware, it's something he enjoys, so he has a certain level of autonomy. Gradually, he figured out what he should do, the methods to use, and the order in which things should be done. With his knowledge and experience in this field, the overall process of working on hardware was smoother compared to the initial stages. However, he also encountered some problems that were outside his expertise, which required a lot of time for research. These issues were not the ones he had anticipated initially; they were unexpected problems that arose. The entire project took four years because his advisor preferred to work on large-scale projects and some unexpected problems arose. Some of the problems related to fundamental materials and electromagnetic fields were not directly relevant to his major. Fortunately, his undergraduate courses covered a wide range of topics, and he acquired a solid foundation of knowledge, including practical experiments in physics. The entire process was quite confusing because there was no one to assist him, he didn't know anyone working specifically on materials, and there weren't specific references to rely on. So, he had to buy books from China, as that way he didn't need to consult a dictionary and could explore on his own. He tackled these new problems, especially those from other fields, through his own exploration and resolution.

Looking back at the process of doing research, when Joseph first came to the United States, he had no understanding of conducting research according to American standards. He shared: "in fact, this is a common challenge for every student coming from China. The topic given by my advisor was difficult and too broad. In the beginning, my advisor didn't provide much guidance, probably thinking that I could handle it, and since I managed to complete it prior to deadlines, my advisor didn't say much. Later on, when facing challenges, my advisor didn't provide specific technical guidance, but he would offer high-level guidance. For example, my advisor would ask questions like, "You've been working on this for several

months and still can't achieve results. Have you considered trying a different approach?" or he would remind me, "Is it necessary for you to work on this? Others have already done it. What makes your approach different? What is unique about the problem itself, not just technically?" This also applied to a recent conference presentation where my advisor would suggest how to write the topic to cater to different audiences. Now, when I give presentations, I focus more on helping the audience understand my research questions. I believe that the high-level guidance from my advisor has been extremely helpful. I carefully consider why my advisor says certain things, and his feedback is constructive. The advice he provides helps develop my critical thinking. I gradually learn a lot about how to approach problems and think critically from my advisor. In the past, I only knew the general principles and what should be done but lacked specific and intuitive understanding. Later on, I was able to concretize these things, breaking them down into how to approach difficulties or any situations that arise, including the challenges I mentioned earlier and even the chapters in my thesis, which I treated as ongoing research. My advisor would ask questions like, "What makes your approach unique? Why do it this way?" Many soul-searching questions like these. Later on, I started thinking about these things on my own before even discussing with my advisor. I would consider the feasibility of an idea by myself and then engage in discussions with my advisor."

Another aspect is that his experience as a reviewer for peer reviews has greatly contributed to the development of his critical thinking and has been a significant learning experience for him. He stated: "I started reviewing papers in 2018, both for conferences and journals. It is a service I provide. Initially, I wasn't sure how to approach the reviews and focused mainly on the validity, whether the mathematical and physical aspects were logically sound. However, my advisor often posed thought-provoking questions, such as why I wanted to do this. For example, during my thesis defense, my advisor would not only ask technical

questions but inquire about the significance and motivation behind the research. He played a crucial role in overseeing my work. This had a significant impact on my approach as a reviewer. Gradually, I learned to look beyond the technical aspects and consider the overall scope of the research, including logical consistency in presentation and the significance of the motivation. My advisor had a great influence on my reviewing style. Additionally, I also pay attention to how other reviewers approach their evaluations. Whether they recommend acceptance or rejection, and how they guide authors towards revisions. Slowly, I have been applying what I learned from my advisor in these aspects as well.”

The classes were too easy for Joseph. He shared: “for Chinese teachers, because many of my professors are Chinese, they only cover basic topics in class, which is no different from undergraduate classes in China. Many things can also be learned in China, but the advantage here in the United States is that it offers a slightly wider range of options. Course selection is not as flexible in China, whereas in the United States, you can freely choose and take courses from other disciplines. If you have a broader range of interests in China, the difference between taking classes in the United States and in China is not significant. Except for a few courses taught by a few exceptional professors, who really provide high-quality education, the rest didn't offer much help in terms of knowledge. In terms of thinking, even the high-quality courses didn't focus much on critical thinking. They mainly emphasized technical and knowledge-based aspects. Building a solid foundation and accumulating knowledge mainly rely on self-study, which is a significant part of the learning process. However, as I mentioned earlier, some courses were more traditional in nature and covered an adequate amount of knowledge. Self-study primarily involves reading books and articles, which are the most important aspects. It's not possible to cover everything in class; you can only be taught things from five or ten years ago. For more recent developments in the past five or ten years, you have to rely on reading books or articles from other sources.”

Joseph thinks one way to improve critical thinking is through communication. He often interacts with his group members, sometimes having meals together and exchanging ideas. He also attends conferences to meet different people and engage in diverse conversations. During holidays, he visits other schools to meet people he knew from before or those he has met at conferences. Another thing is that recently, there is a new teacher in his department who organized a Ph.D. Tea Time event. This activity involves communication from various aspects of research and life. In his building, there are people studying electrical engineering and computer science, and a fixed time is set for everyone to exchange ideas together. People from different fields and backgrounds can communicate with each other.

Looking back on his experience of pursuing a Ph.D. in the United States, Joseph found that research standards differ between China and the U.S. He shared: “it took me a long time to grasp these differences. In China, emphasis is placed primarily on novelty, whereas in the U.S., a more comprehensive approach is taken, focusing on practicality and other factors, not just novelty. The transition from studying in China to pursuing a Ph.D. in the U.S. brought about changes, but many of these changes were already expected and anticipated by me.”

He further added: “in China, when pursuing a Ph.D., a student typically focuses on a single topic for five or six years, delving deeper and deeper into it. This emphasis is also reflected in the thesis. The main line of research must be distinct, and there should not be significant leaps during the defense. Exploring the problem, adopting different methods, and thoroughly investigating the research process are necessary. On the other hand, in the U.S., the expectations of advisors are quite the opposite. Your research is not limited to a single problem. The motivation behind your work is crucial—it needs to have significance, prospects, and the ability to solve practical problems. Advisors will encourage you to pursue such research. They won't dictate how you should conduct your research because they believe

it is your own responsibility. In the U.S., there are no strict requirements regarding a single main line during the defense. Instead, you are expected to incorporate different aspects of your research into your work, even including unrelated elements in your thesis. It is not limited to a single main thread. This realization is something I have come to understand and summarize as a person who have gone through this experience after five years of doctoral studies here.”

His views on knowledge and teachers have changed. Initially, he didn't question teachers as much. Now he realized that in some fields, students have a better understanding and more experience than the advisor. Also, when reading other people's articles, they may seem impressive, but after discussing with others, he realizes that what he initially perceived may not be correct. What others have done may appear beautiful, but they only show you the beautiful parts. In reality, there may be other issues that are not displayed. Absorbing things without discernment is not reasonable in practice.

Four themes were generated from Joseph’s story: awareness of critical thinking in Chinese contexts; sufficient understanding of critical thinking; transformation; and developing critical thinking relied on self as well as others. The Table representing Joseph’s themes and categories for this story are found in Appendix J.

Xiaoming

I encountered Xiaoming for the very first time during this interview I conducted for my dissertation research. Prior to this encounter, I had no personal acquaintance with him. Xiaoming is a 32-year-old male, specializing in environmental engineering for his Ph.D. He successfully completed his doctoral degree in 2019. His academic journey in the United States began with pursuing a Master's degree in civil engineering, and he has been in the country for 10 years.

Xiao Ming is quite an innate independent thinker. He doesn't easily accept things just because someone tells him to. He enjoys outdoor activities such as fishing, cycling, running, and hiking. He likes all kinds of aerobic exercises.

Xiaoming completed his undergraduate studies in China, majoring in Coastal Engineering, with a focus on marine structures. When he decided to pursue further education in the United States, his initial intention was to see what is there and explore opportunities abroad. Initially, he also considered studying in the United Kingdom, but he ultimately felt that the United States offered better prospects. His family supported his decision and provided financial assistance, so after graduating with his bachelor's degree, he came to the United States to pursue a master's degree in Civil Engineering.

During his master's studies, he didn't initially consider continuing to a PhD. However, after completing two years of graduate studies and undertaking internships, he had already signed contracts with several companies. However, after gaining practical work experience during his final year of the master's program, he decided that while he was young, he didn't want to follow the conventional path and instead wanted to do something different. In a way, this decision involved critical thinking. Although he hadn't fully developed his critical thinking skills at the time, he felt that he had started to form his own ideas about certain issues. He didn't entirely agree with some of the existing practices. In environmental engineering, there are numerous regulations and rules, but they are often based on rules of thumb without strong theoretical foundations. This is what motivated him to pursue a PhD. He chose to specialize in environmental engineering for his doctoral studies.

Initially, his motivation was to understand why many regulations in the field were formulated in a certain way. He saw this as the beginning of critical thinking. It requires an initiation and the motivation to question the norms. It's like the saying goes, "You can never wake someone who pretends to be sleeping."

Xiaoming first became aware of critical thinking when his advisor mentioned the term to him for the first time. To be honest, at that time, he had never really understood what critical thinking meant. He didn't bother looking up its definition, but he had a general idea of what it meant. Speaking of his personality, he tends to prefer thinking things through on his own and he is not someone who easily believes whatever a third party tells him.

Xiaoming's understanding of critical thinking is that a crucial aspect of it is formulating your own conclusion through observation and data gathering. Instead of simply accepting an opinion given by a third party, critical thinking involves using your own logical reasoning to reach a conclusion. Opinions from others can be either correct or incorrect. However, when it comes to first principles, especially in fields like physics where logical reasoning is highly valued, we rely heavily on logical deduction.

Xiaoming's definition of critical thinking is that it is the process of carefully examining your observations and data, and arriving at a conclusion you intend to reach through rational and logical reasoning.

Developing and cultivating critical thinking primarily involves several aspects. The first is studying subjects like physics and mathematics, which heavily emphasize reasoning, logic, and critical thinking. Engaging in these disciplines for an extended period of time instills the habit of questioning why. When working with fluid dynamics, for instance, which is a challenging area within mechanics, one must possess meticulous thinking in order to understand the purpose behind each step. This becomes ingrained as a natural inclination because to study such problems, one needs to comprehend why previous researchers approached them the way they did and what their reasoning was. The accumulation of knowledge in the early stages is motivated by this curiosity. In the process of acquiring this knowledge, you follow the logical progression of those who came before you, learning from and emulating their reasoning. In essence, pursuing a Ph.D. involves learning a specific logic.

Only after mastering the logical methods of mathematics and physics can you embark on your own research. Therefore, critical thinking, especially in the realm of physics and fluid dynamics, is essential. Without critical thinking, it becomes difficult to understand what you are doing and to generate meaningful research.

Xiaoming has never specifically contemplated what critical thinking is, but based on his personal experience, he believes that certain individuals are inclined towards studying physics and similar subjects because they enjoy exploring theoretical concepts, engaging in deduction, and asking why. This curiosity is the key motivation behind critical thinking. Critical thinking is a process of training where you learn from the logic of those who came before you. However, he personally believes that developing critical thinking is quite challenging. It requires transforming a person's character into someone who naturally possesses those traits, which is a highly unnatural process. From his limited experience, if someone lacks curiosity and motivation, although it is not impossible to cultivate critical thinking in them, it would be extremely challenging and unnatural.

Another aspect is engaging in discussions with colleagues. He vividly remembers during my frequent meetings with his advisor, he would always play the 'devil advocate' whenever he presented something to him. He would challenge various aspects of his work, and this became a crucial part of his training. Through this feedback, he started to internalize the process of carefully considering his reasoning before showing him anything. He would assess whether there was solid reasoning to support his work. Another thing that comes to mind is something his teacher told him when he was in graduate school. He advised him not to use the word "assume" when writing papers or conducting research. He emphasized that every decision he made needed to be supported by theoretical foundations. He had to provide support for each decision. Searching for references is essentially a form of reasoning. At the time, he didn't fully understand why he said that. It was only during his Ph.D. studies that he

grasped the general idea. All these aspects are interconnected.

Xiaoming shared: “the educational experience of pursuing a Ph.D. contributes to the development of critical thinking. During the years of pursuing a Ph.D., critical thinking undoubtedly improves. The Ph.D. journey is essentially a process of cultivating critical thinking. Throughout this period, every aspect contributes to developing critical thinking, whether implicitly or explicitly. Every day, you engage in critical thinking, conducting research, contemplating academic and scientific questions. You think for yourself, exchange ideas with others, and read research papers. Every day, you are engaged in these activities, constantly practicing critical thinking, which undoubtedly enhances your skills and makes you better over time. However, I don't believe that pursuing a Ph.D. involves a transformational process; rather, it amplifies your existing abilities based on your motivation. Attending classes and conducting research go hand in hand. Attending classes helps you understand the thought process of previous researchers. The teachers impart reasoning and explain why certain theories are constructed in a particular way. They consider which questions were addressed, which ones were not, which ones require improvement, and which ones do not. This process itself involves critical thinking, and understanding the thought processes of previous researchers is crucial. Learning these logics on your own would be extremely challenging. However, the effectiveness of attending classes depends on the type of courses. If you take liberal arts courses, I'm unsure how helpful they would be. Courses on politics, for example, may provide less informative content and be of little use. Taking courses that involve strong logic and reasoning would certainly be beneficial for developing critical thinking.”

He added: “one crucial factor to consider is subjectivity. I am uncertain whether these cultivation efforts are subjective, depending on whether individuals desire to be developed in this manner or have other motivations. Attending classes merely amplifies existing traits

based on the students' inherent character. For those who do not possess these characteristics, attending classes would not be beneficial. Personally, I believe there would not be significant improvement. Some individuals simply do not possess the necessary traits, and forcing them to acquire those traits would be highly unnatural. Education has its merits, but I am uncertain about its effectiveness in transforming someone who lacks critical thinking into a critical thinker. I believe education acts as an amplifier rather than a complete transformation. These conclusions are based on my personal reflections and observations of colleagues. There are numerous reasons behind this. First, the courses themselves may present significant challenges for certain individuals. Second, their motivation plays a role, and third, some courses may not effectively cultivate critical thinking. I still believe that critical thinking is highly subjective.”

Additionally, Xiaoming holds the viewpoint that culture plays a significant role. Chinese people tend to dislike confrontation. However, in Western countries, confrontation is considered normal. This cultural difference makes it difficult to develop critical thinking among Chinese individuals. Chinese people tend to avoid surface conflicts, but the manner in which they express themselves may differ. For example, they may express their criticisms through written means. If you look at the discussions on platforms like Weibo, you'll find many critical opinions. In different cultural environments, especially in the United States, the environment undoubtedly promotes critical thinking among students because it is considered normal here. When you attend school and engage in daily practices, you can only get better and better. He believes the environment in the United States promotes critical thinking.

Looking back on his doctoral learning experience, his personal experience, Xiaoming does not think pursuing a Ph.D. involved a transformative process. Even when he first came from China to the United States for his master's degree, he didn't feel it was a transformative experience. He started calling out professors during his master's, and it felt normal to him.

The initial adjustment phase didn't involve a transformation or adaptation in terms of critical thinking; it was more about adapting to the language and lifestyle. So, pursuing a Ph.D. in the United States was a continuation of the same process, without a major transformation. He didn't feel like the U.S. shaped him or taught him critical thinking. He considers it more of an amplification process.

He also believes that critical thinking is related to age. When you're in your teens, you're not really thinking about critical thinking; you simply enjoy your life. It's only after turning twenty that you might start thinking about these things and what you want to do with your time. The more you think about it, the more naturally it develops.

Another crucial point Xiaoming noticed during his Ph.D. journey is that in the United States, teachers and students are peers. Secondly, although American professors are experts, they encourage students to challenge authority. This is very different from Chinese teachers. In China, you cannot challenge authority. However, he has always had a spirit of questioning. Even in China, when the teacher was wrong, he would point it out. The environment in the United States is excellent, and it provides a relatively equal status. When students discuss issues with teachers, students can oppose the teacher's viewpoints, but not in a rude or confrontational manner. Students need to provide reasoning and present arguments. The communication of ideas is not based on the notion that "I am faculty, so you must listen to me." He personally haven't encountered such a thing in the United States. Instead, it's because the person understands more and thinks more deeply than you that you would listen to them.

As for methods to improve critical thinking, for Chinese students, he believes it's important to realize that you are working with the faculty, not working for them. Secondly, Chinese students need to learn how to argue with their teachers. If there is no reasoning, it means the student hasn't deeply thought about these issues. American students are generally better in these aspects because it's already normal for them; they have been accustomed to it

since childhood.

Four themes were generated from Xiaoming's story: awareness of critical thinking in Western contexts; sufficient understanding of critical thinking; amplification; and developing critical thinking relied on self as well as others. The Table representing Xiaoming's themes and categories for this story are found in Appendix K.

Amy

Amy, a 36-year-old woman, is someone I know as an acquaintance. She pursued her first degree in the United States, focusing on adult education, and obtained a PhD. Her journey in the PhD program lasted for five and a half years, which means she has been residing in the United States for the same duration. Prior to that, Amy earned her bachelor's degree in English from China. She furthered her education by acquiring a Master's degree in International Relations in China, during which she had the opportunity to study abroad in Denmark for a year. After completing her master's degree, she spent four years working in the management of international students and online education at a prestigious university in China.

Amy describes herself as relatively introverted and passive, displaying a peaceful demeanor in her interactions with both people and things. Her hobbies include watching movies and swimming. During our interview, she surprised me by being talkative and enthusiastic about sharing her past learning experiences and work history. As a result, our conversation was incredibly enjoyable, covering not only research topics but also personal life experiences.

During her final high school year, Amy became somewhat rebellious and was not very willing to study. She didn't do a good job at applying to schools for her undergraduate studies, so she ended up attending a provincially owned institution. Since she studied science in high school, but she was always interested in English, whenever she found science subjects

boring and tiring, she would solve English exercises as a way to balance things out and have fun. Additionally, her homeroom teacher in middle school was an excellent English teacher who had a significant influence on her. That's why she decided to study English during her undergraduate years. She excelled throughout my undergraduate studies, achieved good grades, received the honor of an outstanding graduate, and even had the opportunity for direct admission to graduate school. However, she chose not to pursue the direct admission route and decided to take the entrance exam for graduate studies. Since her undergraduate major was English, she frequently listened to international broadcasts like CNN, which sparked her interest in international affairs. Consequently, she pursued a master's degree in International Relations. Her university had a joint training program with Denmark, so during her second year of graduate school, she went to study in Denmark. Ten students, including herself, went from China to Denmark, and they formed a small group. It was her first time going abroad and the first time experiencing western education. During my time in Europe, I also traveled to other European countries on a budget.

Finding a job after graduation wasn't easy for Amy, as her undergraduate institution had its limitations, and many employers emphasize the rankings of the undergraduate institution highly. However, through persistence and hard work, she eventually found a job at a top university in China, working in international student program management, including support and administration of online education. She worked at that university for four years. As she always wanted to further improve herself and experience a more advanced international environment than Denmark, and also influenced and encouraged by her husband, who planned to continue his studies in the United States after completing his Ph.D., she decided to resign from her job and pursue a Ph.D. in the United States. Her experience in higher education management provided her with exposure to many government officials from developing countries and non-traditional students. This laid the foundation for her application

to American doctoral programs in adult education and became the topic of her doctoral dissertation eventually. She gained valuable knowledge and experiences during her Ph.D. studies in the United States. It provided her with a solid academic foundation and unforgettable beautiful experiences.

Regarding when Amy first became aware of critical thinking, she believes she may have been cultivating it during her master's program, but at that time, she didn't really gain conscious awareness of the concept of critical thinking. From what she recalled, the first time she became aware of critical thinking was in the latter half of the first semester of her doctoral studies. Since her field of study was adult education, she learned about some of Freire's theories, which are related to critical thinking. Moreover, in the past, she was more passive in her approach and accepting of information. However, when she started attending classes with her classmates, she noticed that students from other cultures were willing to challenge and ask questions. In essence, to challenge is to criticize, and perhaps she lacked the courage and ability in that aspect. She realized her shortcomings in this area. That was probably when she first became aware of my critical thinking. Additionally, she came from a different discipline, so when she first started her studies, it was a phase of absorbing knowledge in the field. She believes that critical thinking is based on a thorough understanding and absorption of knowledge, upon which you can form your own opinions and critique certain concepts. During that time, as a new student, considering her knowledge background and personal disposition, she tended to be more passive and reserved, so it was a phase of observation and absorption for her.

Amy's understanding of critical thinking is this: "Critical thinking is when, after fully understanding and possessing a foundational knowledge of a particular subject, you put forward your own ideas. It could also involve questioning a commonly accepted piece of knowledge or viewpoint and suggesting that it may not be particularly applicable in a certain

context, and then considering what should be done in that environment. One aspect of critical thinking is about transformation—it's about seeking change rather than accepting things as they are. This understanding is also influenced by the philosophical foundation of education and teaching that I learned during my doctoral studies. In the context of critical thinking, there is a focus on social change. The research interests revolve around marginalized groups such as minorities, gender issues, or labor. Critical thinkers or scholars challenge existing rules or things that serve the interests of the majority and instead strive to assist those marginalized or overlooked groups. Their research aims to give voice to these individuals. From a knowledge standpoint, it involves questioning widely accepted ideas and proposing that they may not apply in certain environments, although they may be applicable to the majority. The next step is then to work towards changing these rules and advocating for those who are not served by them in different environments, ensuring that their voices are heard. The aspect of theory involves conducting research in this area whereas the aspect of practice involves taking action. So, these are my two understandings: one is theoretical, and the other is practical.”

Amy’s definition of Critical thinking is that “critical thinking is an ever-changing process. It is not something you possess or don't possess, have or don't have; it's always there. I can use the word "reflection" to describe critical thinking. Critical thinking involves reflection. If it's self-criticism, then it's self-reflection. If you criticize external knowledge, I would use reflection to describe that process. I believe that everyone has the ability of critical thinking, but it's a matter of awareness, whether you realize if you're doing it in your daily life. However, once you become aware, you may have a better understanding with a theoretical background. But critical thinking is always present. It exists throughout the entire process of life. A crucial foundation of critical thinking is reflection, both on oneself and on

society. To simply put it, critical thinking is an ever-changing process, accompanying each individual throughout their life, a continuous process of reflection on society and oneself. For me, attending classes and reading literature are the primary ways to develop critical thinking. During my Ph.D., classes were the main focus. In the process of attending classes, my development of critical thinking followed a sequence of observation, absorption, and imitation. It was a gradual process. First, I observed how other students asked questions in class. If I found a student's question to be good, I would then imitate their approach and reflect on why I didn't think of or ask that particular question. When reading the next article or exploring the next theory, I would try to discover interesting points that could initiate discussions. This became a habitual thinking process for me in the course of my research. Later on, I also participated in academic conferences. However, attending conferences was more beneficial to my research rather than significantly impacting my critical thinking. In class, I interacted with classmates who I spent time with on a daily basis, and our interactions carried over into our academic pursuits. Within a learning environment, everyone exhibited different characteristics depending on their state of mind. This variety had a greater impact on me. As for conferences, I approached them with a learning mindset, absorbing everything without much reflection. Participating in conferences opened up my thinking. I would think, "Oh, I can conduct research on this topic," or "That could be an interesting area to explore." Conferences stimulated my curiosity, but I'm uncertain about how much curiosity takes up in critical thinking. The conferences were not as helpful in terms of self-reflection and challenging existing knowledge."

Amy also enhanced her critical thinking through peer support group in her Ph.D. program. She shared: "forming study groups with classmates for peer support can be beneficial. Regular discussions among group members about our research allow us to raise questions and challenge each other. Sometimes, a classmate may point out something that

you didn't consider. It's like mutually critiquing each other's work, providing an opportunity for mutual growth. Peer support is particularly helpful for students with a Chinese cultural background, as it reduces concerns about conflicting interests or fear of offending teachers and not being able to graduate. Students can challenge each other professionally. Moreover, we have a saying in China that "when three people walk together, there must be one who can be my teacher," meaning that classmates can teach you something."

To reflect on her doctoral learning journey, the process of pursuing a Ph.D. brought about a relatively gentle transformation for Amy. She said: "perhaps it was due to my calm temperament. Accepting things gradually without feeling a sudden shift in my entire being is how I experienced it. Transitioning from China to the United States for my Ph.D. was a gradual process, and personally, I didn't undergo a radical transformation, such as changing from introverted to extroverted overnight. I might have undergone some changes, but I only realized them later on; at the time, I didn't feel any different. In terms of outward behavior, I am still the same person. I didn't suddenly start standing up in class and questioning the teacher's statements. In class, I tend to express myself in a more reserved manner. I simply became aware of my deficiency in that area or my passive acceptance of certain aspects. Primarily, I focus on thinking critically but may still be reserved in class, not speaking up much. However, when conducting my own research, I remind myself to think more critically now. I engage in more thoughtful contemplation. In my thoughts, I remind myself not to blindly accept but to think more deeply. Previously, I used to believe that everything the teacher said was correct, especially as a Chinese student who often respects and trusts authority figures. But now, whether it's an elder or someone else assigning me a task or explaining something to me, I tend to think it through first. I have realized that I am slightly different in this regard compared to before, but it may not be evident in my outward behavior.

Reading articles and writing papers differ in this aspect. Outwardly, I still appear gentle because of our Chinese culture.”

Regarding the perception of knowledge and teachers, Amy’s views has changed during her years of pursuing a doctoral degree. Initially, she accepted the knowledge without questioning because she was not from the field. So, she focused on absorbing information like a sponge. Later on, she didn't challenge the teachers directly, but while conducting her own research, she started to think and reflect more. However, she still believe that she has not reached a level where she can challenge the authority of teachers. She simply engage in self-reflection when conducting her research, practicing self-reflection. She acknowledges that she is still not particularly familiar with this field.

Her attitude towards teachers hasn't changed much. However, she believes that in her research field, teachers also respect her ideas. Nevertheless, she is aware that teachers are not infallible. She does not think Chinese teachers fit the stereotypical image of being excessively authoritarian. She pursued my education in China until graduate school and had many excellent teachers. There are both good and bad teachers everywhere. University professors teach subjects in which they excel, so they won't teach what they aren't good at, and consequently, you won't challenge them in those areas. Thus, she approaches her studies with a learning mindset, using critical thinking primarily in her own research. My perception of teachers remains unchanged during her doctoral studies, as they are still experts, and she approaches them with a learning attitude.

Four themes were generated from Amy’s story: awareness of critical thinking in Western contexts; sufficient understanding of critical thinking; transformation; and developing critical thinking relied on self as well as others. The Table representing Amy’s themes and categories for this story are found in Appendix L.

Primary Themes from the Study

The narrative analysis of the interview transcripts generated four key themes: a) awareness of critical thinking in Western contexts VS Chinese context, b) sufficient understanding of critical thinking, c) Transformation VS Amplification, and d) developing critical thinking relying on self as well as others. Awareness of critical thinking in Western contexts VS Chinese context includes the categories of awareness of critical thinking in Western contexts, and awareness of critical thinking in Chinese context. Sufficient understanding of critical thinking includes the categories of importance of critical thinking; rational thinking and logical reasoning; decision making, analysis, and judgment; traits and abilities; and societal and cultural factors. Transformation VS Amplification includes the categories of transformation, and amplification. Lastly, the theme of developing critical thinking relied on self as well as others, including the categories of self, and others. Table 11 illustrates the primary themes and categories from the study.

Theme One: Awareness of Critical Thinking in Western Contexts VS Chinese Context

The first theme that emerged was *awareness of critical thinking in Western context VS Chinese context*. This theme includes the categories of awareness of critical thinking in Western contexts, and awareness of critical thinking in Chinese context, which pertains to the point at which participants first became conscious of critical thinking or when it came to the forefront of their minds. Five participants had their first awareness of critical thinking in Western contexts, typically during their time spent studying abroad in the West such as in the US or Denmark, or while preparing for such studies. Two participants gained awareness of critical thinking within Chinese context, specifically during their undergraduate and graduate years in China. Additionally, there was one exception where participants did not have a specific time or moment of awareness regarding critical thinking. Table 12 illustrates the participants and theme one.

Table 11
Primary Themes and Categories from the Study

Themes	T1 Awareness of critical thinking in Western contexts VS Chinese contexts	T2 Sufficient understanding of critical thinking	T3 Transformation VS Amplification	T4 Developing critical thinking relied on self as well as others
Categories	1.1 Awareness of critical thinking in Western contexts	2.1 Importance of critical thinking	3.1 Transformation	4.1 Self
Categories	1.2 Awareness of critical thinking in Chinese context	2.2 Rational thinking and logical reasoning	3.2 Amplification	4.2 Others
Categories		2.3 Decision making, analysis, and judgment		
Categories		2.4 Traits and abilities		
Categories		2.5 Societal and cultural factors		

Table 12

Participants and Theme One: Awareness of critical thinking in Western contexts VS Chinese context

Theme 1: Awareness of Critical Thinking in Western Contexts VS Chinese Context	
Category 1.1 Awareness of Critical Thinking in Western Contexts	Participants: Mike, Shawn, Serene, Xiaoming, Amy
Category 1.2 Awareness of Critical Thinking in Chinese Context	Participants: Joseph, K

Awareness of Critical Thinking in Western Contexts. Among the eight participants, five of them first became aware of critical thinking in a Western context. For example, Mike realized the concept of critical thinking during his fifth year of pursuing a Ph.D. when he was looking for a job. Mike shared:

At that time, I was about to graduate with a Ph.D. and was also searching for employment. I came across many job postings, especially from liberal arts colleges, where all the departments emphasized the importance of critical thinking. When they were hiring faculty members, they stressed the need for them to cultivate students' critical thinking skills. I even looked it up on Wikipedia for the first time, and although I started to value the term "critical thinking," I still didn't fully comprehend it at that time. During job interviews, I wanted to demonstrate that I possessed strong critical thinking skills by providing examples based on what I had learned and using my own reasoning to correct common cognitive biases. Back then, I was still influenced by the Chinese translation of critical thinking, believing that it primarily focused on criticism and correction.

Similar to Mike, Xiaoming also first realized the concept of critical thinking during his doctoral studies. He said, "the first time I heard this term was from my doctoral advisor, although I didn't look it up at the time, I had a rough idea of what it meant."

As Amy shared her story, she also mentioned that her first awareness of critical thinking occurred in her doctoral studies. She shared her experience:

During my master's program, I may have been developing critical thinking skills without being aware of the term itself. In the latter half of the first semester of my doctoral studies, which focused on adult education, I started learning about some of Freire's theories. Previously, I was more passive in my approach to learning. However, when I started attending classes with students from different cultures, I

noticed that they were willing to challenge and ask questions. In essence, challenging is synonymous with criticizing. I may not have had the courage or ability to do so myself, but I recognized my own shortcomings in that regard at the time. That was when I became aware of critical thinking.

Interestingly, Shawn's first awareness of critical thinking was triggered by his interview with me when he was in his second year doctoral studies. At that time, I conducted an interview with him for one of my class assignments about the topic of critical thinking. Shawn stated that "after the interview we had, I reflected on my research process, and it suddenly occurred to me that all I have done for my research and my research process is actually critical thinking. And that was the first time when I gained the awareness of critical thinking."

Unlike previous participants, Serene's first awareness of critical thinking did not occur after going abroad, but rather before leaving the country. Although it wasn't during her study abroad period, it was during the time when she was preparing for exams to study overseas in a Western education system. It was during this period of preparing for the exams that Serene first became aware of critical thinking. Therefore, it is still Western influence that led her to the awareness of critical thinking in the first place. Serene shared her experience:

The first time I became aware of critical thinking was during my university years when I was preparing for the TOEFL exam. At that time, the TOEFL writing section included a question on critical thinking, so I took some time to understand what it meant. I looked up "what is critical thinking" on Baidu, and briefly read about it. While preparing for the TOEFL, I also gained some knowledge about campus life in the United States. In China, undergraduate teachers are definitely not familiar with critical thinking, but in January 2014, I had a study tour in the United States. I attended a few classes there, and the professors also discussed critical thinking. They talked to me about how to approach TOEFL writing and emphasized the importance

of having your own thoughts when planning for college applications. During my time in the United States, those professors also mentioned that the personal statement is the most crucial part of applying to American schools because standardized test scores are similar among applicants. What sets you apart from others is how your personal statement and resume reflect the kind of person you are. I believe this process is closely related to critical thinking.

Awareness of Critical Thinking in Chinese Context. Two participants first became aware of critical thinking in a Chinese context. For instance, Joseph gained his awareness of critical thinking the first time when he was in undergraduate. He stated:

The first time I became aware of critical thinking was during my college years when my English teacher mentioned it in an English class. He said that Western countries place a lot of importance on critical thinking. During my undergraduate studies, there was an elective course in my school called "critical thinking." I took that course at the time, but the teacher's lectures were still quite conventional and paradigmatic, and it felt somewhat like rote learning or exam-oriented education.

Same as in a Chinese context, K first became aware of critical thinking when he was pursuing his Master's degree in China. K shared:

The first time the concept of critical thinking came to my consciousness was when I was working on my second paper during my graduate studies, which was also the second paper of my life. At that time, I had to address the questions raised by the reviewer. It was the first paper I had independently completed in my life. From experimental design to addressing the reviewer's questions, it was a great challenge for me. The reviewer constantly challenged the novelty of my paper. They asked me many questions and stated that my paper lacked innovation. I kept arguing with the reviewer about the novelty of my work. I also read many articles and compared them

with my own. Gradually, I discovered the innovative aspects of my own paper. After discussing the issue of novelty in my paper with the reviewer, I developed the ability to generate more innovative ideas in my research work.

Outlier. There is one participant who does not have a moment when he became aware of critical thinking the first time. However, he believes that critical thinking has been embedded in his life all the time. James explained:

When it comes to my awareness of critical thinking, I cannot pinpoint a specific moment when I first gained awareness of the concept. Instead, it has become ingrained in my mindset as a way of life. It has exerted a subtle and cumulative influence on me, ultimately shaping me significantly. For example, I have always had the habit of thinking of the cause-and-effect and the correlations between things. I don't just memorize things. Instead, I think of the "why". Now, critical thinking is embedded in my process of doing doctoral research.

Theme Two: Sufficient Understanding of Critical Thinking

The second theme that emerged from the participant narratives was *sufficient understanding of critical thinking*. This theme includes the categories of importance of critical thinking; rational thinking and logical reasoning; decision making, analysis, and judgment; traits and abilities; and societal and cultural factors. The participants demonstrated a sufficient grasp of critical thinking during the interviews, indicating their understanding of this concept. When questioned about critical thinking, all participants effectively conveyed their conceptualizations, experiences, and perspectives on the subject. It is noteworthy that none of the participants exhibited surprise or unfamiliarity with this concept, emphasizing their literacy in the area of critical thinking. Table 13 illustrates the participants and theme two.

Importance of Critical Thinking. Every single participant acknowledged the importance of

Table 13

Participants and Theme Three: Sufficient Understanding of Critical Thinking

Theme 3: Sufficient Understanding of Critical Thinking	
Category 3.1 Importance of critical thinking	Participants: K, Serene, Xiaoming, Amy
Category 3.2 Rational thinking and logical reasoning	Participants: K, Shawn, Xiaoming
Category 3.3 Decision making, analysis, and judgment	Participants: James, Shawn, Serene, Joseph
Category 3.4 Traits and abilities	Participants: Mike, James, K, Shawn, Serene, Joseph, Xiaoming, Amy
Category 3.5 Societal and cultural factors	Participants: Xiaoming, Amy

critical thinking, particularly in relation to their research. For instance, K stated that “critical thinking is actually extremely important. Without it, it is impossible to do good research”.

Similarly, Serene echoed:

I feel that the definitions of critical thinking provided by the academic community is actually quite similar to the academic training in science and engineering. Analysis definitely involves starting with data analysis. You need to analyze the data statistically or using mathematical models. Then you interpret the results. From this interpretation, if you are in the field of business, you need to provide some insights and evaluate the results in relation to the phenomenon. Then you need to explain it again, so critical thinking is very important. Also, you need to learn how to question and how to challenge. As a PhD student, critical thinking means you can't just accept everything your advisor says. If they are wrong, you need to correct them and have your own ideas.

Xiaoming also believes that critical thinking is essential for research. He stated that “critical thinking, especially in the realm of physics and fluid dynamics, is default. Without critical thinking, it becomes difficult to understand what you are doing and to generate meaningful research.”

Not only in the aspect of research, as Amy recounted her story, she stressed the importance of critical thinking in all aspects of life. She stated that “critical thinking is always present. It exists throughout the entire process of life. Critical thinking is an ever-changing process, accompanying each individual throughout their life, a continuous process of reflection on society and oneself.”

Rational Thinking and Logical Reasoning. Narratives of participants revealed the elements of rational thinking and logical reasoning in their understanding of critical thinking.

Participants believe that critical thinking involves rational thinking and logical reasoning.

For example, Xiaoming described critical thinking as “the process of carefully examining your observations and data, and arriving at a conclusion you intend to reach through rational and logical reasoning.” James agreed, stating that critical thinking leads to “more rational conclusions and choices.” Similarly, Shawn defined critical thinking as “the ability to summarize and analyze a problem based on rational analysis, and then apply your conclusions to a new problem.” He further expanded, “you need to be rational. Critical thinking is not about random thoughts or fantasies, but about reasonableness or rationality.” K echoed, stating that his definition of critical thinking is that “it involves having the ability to think independently and to judge or compare the reasonableness of things based on the rationality of the situation at hand.”

Decision Making, Analysis, and Judgment. Participants believe that critical thinking involves decision making, analysis, and judgment. For instance, James stated that “I understand critical thinking as forming a detailed and logical analysis of the pros and cons when making decisions.” He further expanded: “it is about analyzing and summarizing factors and information” and “as a doctoral student, it is essential to emphasize the cause and effect”. Therefore, he defines critical thinking as “the process of analyzing and deducing when facing problems, conducting cause-and-effect analysis, and making decisions or drawing conclusions.”

Similarly, Joseph shared: “I define critical thinking as an objective and comprehensive, as well as relatively open, form of analysis. It is a method of analytical thinking.” Shawn echoed: “my definition of critical thinking is the ability to summarize and analyze a problem based on rational analysis, and then apply your conclusions to a new problem.”

As Serene shared her story, she stated that “my definition of critical thinking is that after you have an understanding and awareness of something, you make your own judgments.

That's what critical thinking is.” Shawn also stressed the element of judgment when he shared his understanding of critical thinking. He stated, “based on rationality, you need to make judgments about what you see. This judgment should be built upon your own rational foundation, a rational judgment.”

Traits and Abilities. Participants understand critical thinking as a series of traits and abilities. Traits include skepticism, open-mindedness, novelty, and curiosity and motivation. Abilities include ability to think independently and judge; ability to generate ideas based on mastery of subject knowledge; ability to induct and deduct; ability to apply; and ability to interpret and evaluate.

Skepticism. Participants believe that critical thinking involves skepticism. For example, Mike stated: “I think that critical thinking is to never blindly believe or blindly follow.” Shawn also advocated for a spirit of skepticism when he shared his perspectives on critical thinking: “critical thinking is not about nitpicking or finding faults in something, as it is often portrayed in China. It is not about being critical just for the sake of it. Rather, critical thinking is the spirit of skepticism,” K also stated that “you must maintain a spirit of skepticism towards things.” Similarly, Serene stressed the importance of skepticism as she shared:

You need to learn how to question and how to challenge. As a PhD student, critical thinking means you can't just accept everything your advisor says. If they are wrong, you need to correct them and have your own ideas. Your advisor is not always right, so when they are wrong, you need to point it out, but be mindful of your approach. However, you have to let them know because otherwise it's not good for your research and for your communication and relationship with your advisor. Additionally, with news and the prevalence of fake news nowadays, you can't just believe everything people say; you have to use your own judgment and think

critically. Same with literature and such, you shouldn't blindly trust it because people make mistakes. Even top-tier journals and good literature can have errors sometimes.

Open-mindedness. Participants believe that critical thinking involves open-mindedness. For instance, Joseph stated that “my understanding of critical thinking is that it involves approaching problems comprehensively, being open-minded, and crucially, not holding a predetermined stance.” In a similar vein, Mike shared his definition of critical thinking as “it necessitates an open-minded approach”.

Novelty. Participants believe that critical thinking is about novelty when it comes to research. For example, Joseph shared his understanding of critical thinking: “in terms of academic papers, critical thinking is about novelty and originality in thinking.” Similarly, K echoed: “critical thinking is novelty in academic paper”.

Curiosity and motivation. Participants believe that critical thinking involves curiosity and motivation. For instance, K shared his perspectives on critical thinking: “it requires having the determination to engage in thoughtful contemplation. You cannot simply dismiss things and say you are too lazy to think about them.”

In a similar vein, Xiaoming stressed the importance of curiosity and motivation when it comes to critical thinking. He shared:

In environmental engineering, there are numerous regulations and rules, but they are often based on rules of thumb without strong theoretical foundations. This is what motivated me to pursue a PhD. My motivation was to understand why many regulations in the field were formulated in a certain way. I saw this as the beginning of critical thinking. It requires an initiation and the motivation to question the norms. It's like the saying goes, "You can never wake someone who pretends to be sleeping." I have never specifically contemplated what critical thinking is, but based on my personal experience, I believe that certain individuals are inclined towards studying

physics and similar subjects because they enjoy exploring theoretical concepts, engaging in deduction, and asking why. This curiosity is the key motivation behind critical thinking. Critical thinking is a process of training where you learn from the logic of those who came before you. However, I personally believe that developing critical thinking is quite challenging. It requires transforming a person's character into someone who naturally possesses those traits, which is a highly unnatural process. From my limited experience, if someone lacks curiosity and motivation, although it is not impossible to cultivate critical thinking in them, it would be extremely challenging and unnatural.

Ability to think independently and judge. Participants believe that critical thinking involves the ability to think independently and judge. For instance, K stated that “critical thinking is about having the ability to discern whether something is reliable or not.” He added that “my definition of critical thinking is that it involves having the ability to think independently and to judge or compare the reasonableness of things based on the rationality of the situation at hand.”

Ability to generate ideas based on mastery of subject knowledge. Participants believe that critical thinking involves the ability to generate ideas based on mastery of subject knowledge. For instance, Amy shared that “critical thinking is when, after fully understanding and possessing a foundational knowledge of a particular subject, you put forward your own ideas.” K echoed: “critical thinking is about generating your own research ideas. To be honest, my advisor didn’t provide me with any concrete and feasible research topics. I self-studied the subject knowledge and formulated my research ideas myself.”

Ability to induct and deduct. Participants believe that critical thinking involves the ability to induct and deduct. For example, Shawn reflected on his research process and realized that the research process he experienced was actually critical thinking. He stated that

“critical thinking includes rational thinking, rational classifying, induction, and deduction.”

He explained: “if I have read a lot of literature, how should I approach it? The most important point is to generalize and induct, to elevate what you have seen to a higher level. There are certainly some commonalities among these things.” He further added: “Making generalizations, induction, and classification is quite challenging because it requires breadth and depth. Some classmates lack depth and haven't formed a systematic approach, so their inductions are not well done. The ability to generalize and induct is extremely important.”

Ability to apply. Participants believe that critical thinking involves the ability to apply. For example, Amy shared her understanding of critical thinking as two aspects: the theoretical and the practical. The practical aspect is to apply and take action. She explained: “the aspect of theory involves conducting research in this area whereas the aspect of practice involves applying the theoretical findings and taking action.” Shawn also believes critical thinking involves the ability to apply as he shared that when doing research, researchers need to “apply the information you have gathered to your own questions.” He elaborated that “critical thinking should be applied to scientific research or any other endeavor.” He further pointed out that his definition of critical thinking contains the element of “applying your conclusions to a new problem.”

Ability to interpret and evaluate. Participants believe that critical thinking involves the ability to interpret and evaluate. For instance, as Serene shared her story, she stated:

You need to analyze the data statistically or using mathematical models. Then you interpret the results. From this interpretation, if you are in the field of business, you need to provide some insights and evaluate the results in relation to the phenomenon. Then you need to explain it again, so critical thinking is very important.

Societal and Cultural Factors. Participants also noticed the elements of societal and cultural factors when it comes to critical thinking. For example, Xiaoming said that “age is a factor to consider when it comes to critical thinking. When you are very young, why do you think about critical thinking. You just have fun.” He also stated that “in China, it is not possible to challenge authorities because of the culture. Chinese people really don’t like surface conflicts.” Amy also shared that even after her transformative learning experience, on the surface, she has not changed much because of her Chinese culture. She stated: “outwardly, I still appear gentle because of our Chinese culture.”

Outliers. One outlier emerged from the participants’ narratives regarding the understanding of critical thinking. Only Mike’s narrative mentioned the religious and ethical concerns in terms of understanding and definitions of critical thinking. Mike valued the elements of conscience and empathy as important elements of critical thinking. He was the only participant who embedded his perspectives and experiences of critical thinking in his religious life. He shared his definitions of critical thinking: “firstly, it relies on a foundation of conscience; secondly, it involves empathy, requiring us to consider and empathize with the perspectives of others.” He explained that how he developed critical thinking involved changing the church he attended. Mike’s unique perspectives and experiences with religion in terms of critical thinking highlight the point that each individual’s identities and stories are unique and complex and that no study can capture everything about a phenomenon. It takes many studies to completely portray the phenomena of the study.

Theme Three: Transformation VS. Amplification

The third theme that emerged from the participant narratives was *transformation vs. amplification*. This theme includes the categories of transformation, and amplification. Five participants characterized their critical thinking experiences as transformation, while the

remaining three participants identified them as amplification. Table 14 illustrates the participants and theme three.

Transformation. It is a process of transformation when it comes to critical thinking development for some participants' doctoral studies journey. For example, Mike shared his transformative experience revolving his advisor:

In the past, I used to strive to please my advisor and regarded her words as decree. I

never doubted or questioned her authority, and I lacked accountability for my own research. However, by the end of my second year, I realized that I hadn't made significant progress and had lost my motivation. Consequently, I decided to switch advisors. Unfortunately, my new advisor lacked the necessary expertise to guide me in techniques and research content, although he could assist with the writing aspect. This experience made me aware of the limitations advisors may have and the need for me to take risks and make independent decisions. I began expressing my own opinions and thoughts to my advisor, gradually initiating a transformative process. As my advisor recognized my ability to handle my own research, he gradually decreased his interference. Looking back, I now understand the importance of taking responsibility for my own growth from the beginning and thinking independently, rather than revolving solely around my advisor and blindly accepting their instructions.

Mike further added that his perceptions on teachers and knowledge have changed as he shared:

In the past, I held teachers in high regard, seeing them as all-knowing figures who possessed godlike abilities. However, as time went on, my perception of teachers

Table 14

Participants and Theme Three: Transformation VS Amplification

Theme 3: Transformation VS Amplification	
Category 3.1 Transformation	Participants: Mike, Shawn, Serene, Joseph, Amy
Category 3.2 Amplification	Participants: James, K, Xiaoming

shifted, and I began to see them as collaborators and people who could offer advice and suggestions. I now take the lead in my research and work. Before embarking on my doctoral studies, I believed that acquiring new findings was the primary focus of knowledge. However, I soon realized that it wasn't solely about making new discoveries or finding novel information. Instead, engaging in discussions about new findings and cultivating a thoughtful mindset proved to be more crucial. I recognized the limitations of my own contributions and adopted a more conservative approach towards my findings. My perspective on knowledge has become more modest.

Shawn also believed that he experienced a transformative process as he shared his experience of first doctoral research project:

In my first research project, I encountered many detours. Knowing something and being able to do it are two different things. Theoretically, I might know what a research pattern looks like, but the first year of working on the research project was my first experience in exploring and completing the process. I felt like exploring it in dark. I managed to complete my first year of doctoral studies despite some stumbling blocks and relied on my own exploration. After completing that research project, subsequent research projects progressed faster because I followed the same pattern.

Shawn further explained that his views on professors and knowledge have transformed. He shared:

Because in China, when studying at the undergraduate or graduate level, your advisor or professor may be both an elder and an authoritative figure. So basically, we need to try our best to listen to what they say, to learn from their teachings. However, when it comes to being a doctoral student, personally, I feel that the relationship with the advisor is more like that of collaborators. It's like the two of you are exploring

something new together, or taking a step forward based on existing knowledge. Of course, the teacher is still a guide and an elder, but it's not necessary to blindly follow their ideas. While there is wisdom in following the established path and focusing on expertise, there are certain cutting-edge and specific problems where the teacher's existing experience may not provide a solution. Therefore, it becomes more like the professor and I working together to solve a problem. So, I think, how should I put it, they are both a teacher and a collaborator.

He continued sharing his views on knowledge:

As Ph.D. students, we are supposed to engage in cutting-edge research. This means that the research we conduct may be something that others have not done before. Therefore, we need to work on something new. Because new things may have both advantages and disadvantages when they are first proposed. As Ph.D. students, we need to analyze them dialectically. Knowledge is no longer black or white, correct or incorrect. At this point, you need to think deeply and comprehensively. You shouldn't just accept it directly or reject it outright, but truly analyze it.

Similarly, Serene understood her critical thinking experience as a transformative process in two aspects. She shared:

I mainly transformed in two aspects: reading papers and listening to advisors. When I read papers from top journals now, I find myself thinking about how to improve the paper. Initially, I was just taking in information and not actively thinking about it. One more thing is that my previous advisor told me that I shouldn't pursue a PhD. At that time, I also wondered whether what she said was true or false. But now, I am like, why do I have to believe her nonsense. Why should I consider dropping out just

because she suggested so? She's not sponsoring me. Later, I contacted the director to request a change of advisor.

Joseph also suffered from some initial struggles and obstacles when he started his doctoral studies. He understood his critical thinking experience as a transformative process as he shared:

In the beginning, I encountered many challenges during my research projects. Since I didn't have much understanding of research at the time, I was exploring in the dark on my own, receiving criticism while struggling through the process. It was a painful and frustrating experience. I always felt trapped in difficulties and couldn't escape. I had two instances where I wanted to quit, but due to the outbreak of the pandemic, I couldn't follow through with it. I rushed to meet deadlines, putting on a brave face, and followed the schedule given by my advisor to come up with something, just to show some progress, but without a solid and valid conclusion. Looking back at the process of doing research, when I first came to the United States, I had no understanding of conducting research according to American standards. In fact, this is a common challenge for every student coming from China. After years of struggling, exploring, and learning, I realized that there are such different standards of doing research in China and America. Then, I transformed and began to follow American standards.

Slightly different from the above participants, Amy understood her critical thinking experience as a transformative process; however, as she described, “a gentle transformation.” She shared:

To reflect on my doctoral learning journey, the process of pursuing a Ph.D. brought about a relatively gentle transformation for me. Perhaps it was due to my calm

temperament. Accepting things gradually without feeling a sudden shift in my entire being is how I experienced it. Transitioning from China to the United States for my Ph.D. was a gradual process, and personally, I didn't undergo a radical transformation, such as changing from introverted to extroverted overnight. I might have undergone some changes, but I only realized them later on; at the time, I didn't feel any different. In terms of outward behavior, I am still the same person. I didn't suddenly start standing up in class and questioning the teacher's statements. In class, I tend to express myself in a more reserved manner. I simply became aware of my deficiency in that area or my passive acceptance of certain aspects. Primarily, I focus on thinking critically but may still be reserved in class, not speaking up much. However, when conducting my own research, I remind myself to think more critically now. I engage in more thoughtful contemplation. In my thoughts, I remind myself not to blindly accept but to think more deeply. Previously, I used to believe that everything the teacher said was correct, especially as a Chinese student who often respects and trusts authority figures. But now, whether it's an elder or someone else assigning me a task or explaining something to me, I tend to think it through first. I have realized that I am slightly different in this regard compared to before, but it may not be evident in my outward behavior. Reading articles and writing papers differ in this aspect. Outwardly, I still appear gentle because of our Chinese culture.

She further elaborated on her transformation of views on knowledge as she shared:

Regarding the perception of knowledge, my views have transformed during my years of pursuing a doctoral degree. Initially, I accepted the knowledge without questioning because I was not from the field. So, I focused on absorbing information like a sponge. Later, I didn't challenge the teachers directly, but while conducting my own research, I started to think and reflect more. However, I still believe that I haven't

reached a level where I can challenge the authority of teachers. I simply engage in self-reflection when conducting my research, practicing self-reflection. I acknowledge that I'm still not particularly familiar with this field.

Amplification. Three participants understood their critical thinking experience as an amplification process. For instance, Xiaoming described his critical thinking experience as amplification rather than transformation. He stated that “every aspect of doing a Ph.D. is to train critical thinking. It is amplification. There is no transformation in terms of critical thinking.” In a similar vein, James believed that critical thinking development is strengthened through doctoral studies and there is no sharp transformation in the process of developing critical thinking. He stated that “critical thinking has become ingrained in my mindset as a way of life. It has exerted a subtle and cumulative influence on me, ultimately shaping me significantly. It is embedded in my process of doing doctoral research.” Similarly, K also believed that his critical thinking experience was amplification instead of transformation as he shared that “there was not much critical thinking changes in my doctoral studies. It is amplification.”

Theme Four: Developing Critical Thinking Relied on Self as well as Others

The last theme that emerged from the participant narratives was *developing critical thinking relied on self as well as others*. This theme includes the categories of self, and others. Through the amalgamation and synthesis of all participant narratives, it became evident that critical thinking development occurred through both individual efforts and external influences. From their accounts, a range of strategies emerged, which can be categorized into two groups: self-oriented strategies and those involving external sources. As a result, I categorized their strategies into the following two distinct categories. Table 15 illustrates the participants and theme four. Figure 1 illustrated the specific self-oriented strategies and strategies involving external sources that participants used.

Table 15

Participants and Theme Four: Developing Critical Thinking Relied on Self as well as Others

Theme 4: Developing Critical Thinking Relied on Self as well as Others

Category 4.1 Self

Participants: Mike, James, K, Shawn,
Serene, Joseph, Xiaoming, Amy

Category 4.2 Others

Participants: Mike, James, K, Shawn,
Serene, Joseph, Xiaoming, Amy

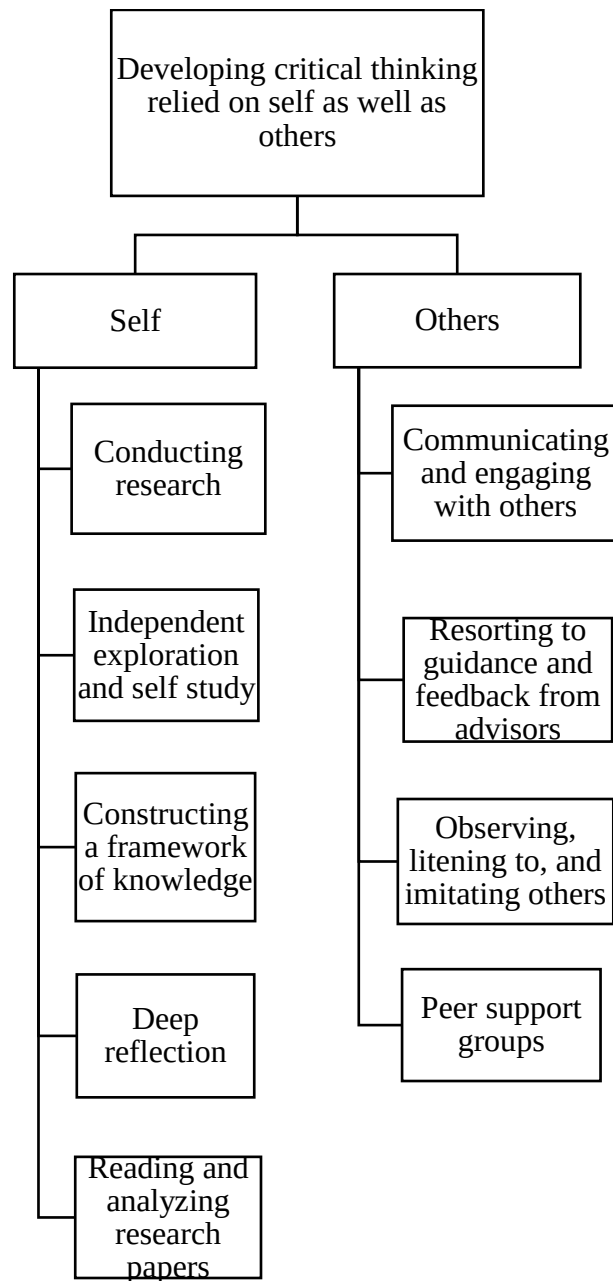


Figure 1 *Developing Critical Thinking Relied on Self as well as Others*

Self. Every participant believed that they primarily developed their critical thinking on their own. Strategies they adopted include conducting research, independent exploration and self-study, constructing a framework of knowledge, deep reflection, reading and analyzing research papers, and actively engaging in thinking and being curious.

Conducting Research. Almost all participants agreed that conducting research was the most important way to develop critical thinking for them during their doctoral studies. For instance, James stressed the importance of conducting research for his critical thinking development as he stated that “for us in the field of science and engineering, the weightage of research tasks is greater than attending classes”. He further elaborated on his process of doing research and stated that:

The overall process of conducting scientific research does not have someone guiding you; it is a process of self-exploration. This has strengthened my critical thinking skills. I already had some level of critical thinking before, but through the process of conducting scientific research, I continuously applied critical thinking, which further enhanced my abilities in critical thinking.

K also advocated for the importance of conducting research as he shared that “when it comes to developing and cultivating critical thinking, it has to be mainly embedded in my research process”. Shawn echoed: “doing scientific research is extremely helpful for developing critical thinking”. Serene also stated that “the process of conducting research definitely involves critical thinking”. Similarly, Joseph believed that one of the most primary ways he developed critical thinking was via conducting research as he shared that “during my Ph.D., I developed critical thinking, primarily through conducting research and serving as a reviewer.” In a similar vein, Xiaoming believed that his critical thinking development was embedded in his everyday doctoral studies and conducting research contributed to development of critical thinking. He shared:

The Ph.D. journey is essentially a process of cultivating critical thinking. Throughout this period, every aspect contributes to developing critical thinking, whether implicitly or explicitly. Every day, you engage in critical thinking, conducting research, contemplating academic and scientific questions. You think for yourself, exchange ideas with others, and read research papers. Every day, you are engaged in these activities, constantly practicing critical thinking, which undoubtedly enhances your skills and makes you better over time.

Independent Exploration and Self-study. Independent exploration and self-study is another important strategy to develop critical thinking for the participants. For example, Mike developed his critical thinking through significant life mistakes he made while exploring on his own. He described the process of learning from his mistakes as follows:

Initially, I made errors, but I extracted valuable lessons from them. Applying these lessons to fresh circumstances, I ventured forth once more, embracing new feedback. This iterative process allowed me to continually ascend and refine my critical thinking abilities. It is a spiraling up process.

He further emphasized the importance of independent exploration to the development of critical thinking as he shared:

In order to enhance critical thinking, it is crucial to foster students' inclination and capacity for independent exploration. Even if their initial direction of exploration proves to be incorrect, this very mistake can ultimately contribute to the right path in the future. While it may appear that they are heading in the wrong direction during their exploration, when viewed from a broader and longer perspective, they are, in fact, moving towards the right direction.

Similarly, James valued independent exploration in his process of doing research, He shared:

In general, I summarize the process of scientific research as follows: conducting literature reviews and experiments, testing a hypothesis, receiving feedback, modifying the initial ideas, conducting further experiments, receiving feedback again, and repeating this iterative cycle of redesigning concepts. There will be many failures along the way. The overall process of conducting scientific research does not have someone guiding you; it is a process of self-exploration. This has strengthened my critical thinking skills.

K echoed that his advisor did not provide much guidance and he explored feasible research topics on his own. He stated that “to be honest, my advisor didn’t give me any feasible research topics. It was myself who came up with a feasible research topic after self-studying and exploring”. Serene also disclosed that most of her critical thinking was improved through self-study as she shared that “most of critical thinking is improved through self-study. You can learn by reading books and other resources”. Joseph also agreed the importance of self-study for his doctoral studies journey. He stated: “building a solid foundation and accumulating knowledge mainly rely on self-study, which is a significant part of the learning process.”

Constructing a Framework of Knowledge. Participants value the importance of establishing a solid foundational knowledge for the development of critical thinking. For instance, James believed that constructing a framework of knowledge is essential to developing critical thinking. He shared:

To improve critical thinking, it is important to engage in deep reflection to construct a framework of knowledge. One must learn to break down complex and difficult concepts into simpler ones that align with the existing knowledge framework. It is important to accumulate the basic principles governing the world and things, transforming the unknown into a comprehensible realm of knowledge. In reality, there

aren't that many fundamental principles in the world. Attending classes helps in constructing these basic rules, but it is crucial to deeply understand and value logical connections and the process of reasoning.

K also valued building a solid and comprehensive knowledge framework. He believed that doctoral courses helped expand his knowledge framework. He stated:

I want to mention that doctoral courses help expand the knowledge framework.

Before pursuing a Ph.D., you already establish a foundational knowledge framework in your discipline. Therefore, the courses during the Ph.D. program serve to expand your knowledge system rather than build a foundational knowledge base.

Deep Reflection. Deep reflection is another individual strategy participants resort to when it comes to developing critical thinking. For example, James employed deep reflection to develop critical thinking. He stated: “it is necessary to think about connections between things and engage in deep reflection”. He further stressed the importance of reflecting on the cause-and-effect and simplifying the complicated. He stated that “you integrate new knowledge into your framework of knowledge through this deep thinking, understanding, and processing. Once it becomes a habit, when encountering new complex problems, you will naturally break them down and analyze them”. Amy also advocated for the importance of deep reflection as she stated that “critical thinking is deep reflection on the society and oneself”.

Reading and Analyzing Research Papers. Next self-oriented strategy participants used to develop critical thinking is reading and analyzing research papers. For example, K emphasized the importance of reading papers. He shared:

When it comes to developing and cultivating critical thinking, it has to be mainly embedded in my research process. The most important thing is to read a lot of papers.

My supervisor did not give me a specific topic, so I rely on reading a large number of

literature to identify research gaps. Then I look at the current hot topics and see what else can be done in those areas.

In a similar vein, Shawn stressed the necessity of reading and analyzing research papers. He shared how to read and analyze research papers in details as follows:

Look at high-level literature reviews and see how others summarize the issues. Ask yourself why a particular chapter is written the way it is and what the logical relationships are between chapters. If you want to come up with something new, a quick way is to look at what others have written for future research. When writing your own article, you can include feasible research ideas in the future research section that you may not have time to pursue yourself. So, the possibilities in the future research section can be explored.

Similarly, Serene learned how to do research through reading research papers as she shared that “I learned by reading papers. The papers usually have multiple sections, and by reading several of them, I learned about the research process”. She further added:

The methods to improve critical thinking, in my opinion, should involve reading more articles. You should see what others have done and then consider what more you can contribute. You need to identify the research gap. If others haven't done much, you should explore if you can make a small contribution. You should read and think more, ponder how others came up with their ideas, and why you couldn't think of them.

Similarly, Xiaoming shared that his everyday life as a doctoral student included reading research papers. He stated: “every day, you engage in critical thinking, conducting research, contemplating academic and scientific questions. You think for yourself, exchange ideas with others, and read research papers”. Amy also believed that reading research papers is one of the primary ways she utilized to develop critical thinking. She stated: “for me, attending classes and reading literature are the primary ways to develop critical thinking”. She further

explained that “when reading the next article or exploring the next theory, I would try to discover interesting points that could initiate discussions. This became a habitual thinking process for me in the course of my research”. She discovered that she later began to adopt a more critical approach when reading papers after her critical thinking improved. She stated: “the process of pursuing a Ph.D. brought about a gentle transformation for me. I transformed when it comes to reading articles and writing papers, embracing a more critical approach now”.

Actively Engaging in Thinking and Being Curious. The last self-oriented strategy participants adopted to develop critical thinking is actively engaging in thinking and being curious. For instance, Shawn reflected on how he developed critical thinking and noticed the importance of actively engaging in thinking. He shared:

I observe other classmates and reflect on my own learning process. I believe that to improve critical thinking, it is necessary to spend more time pondering questions. Many people are quite passive in their approach. They complete tasks according to the instructions of their advisors but lack their own thinking. Making generalizations, induction, and classification is quite challenging because it requires breadth and depth. Some classmates lack depth and haven't formed a systematic approach, so their inductions are not well done. The ability to generalize and induct is extremely important. To improve, the most crucial thing is to actively engage in thinking. Look at high-level literature reviews and see how others summarize the issues. Ask yourself why a particular chapter is written the way it is and what the logical relationships are between chapters. If you want to come up with something new, a quick way is to look at what others have written for future research. When writing your own article, you can include feasible research ideas in the future research section that you may not

have time to pursue yourself. So, the possibilities in the future research section can be explored.

Serene also believed that engaging in thinking contributes to the development of critical thinking. She stated that “you should read and think more, ponder how others came up with their ideas, and why you couldn't think of them”.

Similarly, Xiaoming advocated for the default role natural curiosity and motivation played when it comes to developing critical thinking. He shared:

I believe that certain individuals are inclined towards studying physics and similar subjects because they enjoy exploring theoretical concepts, engaging in deduction, and asking why. This curiosity is the key motivation behind critical thinking. Critical thinking is a process of training where you learn from the logic of those who came before you. However, I personally believe that developing critical thinking is quite challenging. It requires transforming a person's character into someone who naturally possesses those traits, which is a highly unnatural process. From my limited experience, if someone lacks curiosity and motivation, although it is not impossible to cultivate critical thinking in them, it would be extremely challenging and unnatural.

Others. Participants also employed strategies that involved external influences to develop critical thinking. Strategies they utilized include communicating and engaging with others; resorting to guidance and feedback from advisors; observing, listening to, and imitating others; and peer support groups.

Communicating and Engaging with Others. Participants found that communicating and engaging with others contributed to their development of critical thinking. For example, James believed that communicating with others is an essential part of critical thinking as he stated that “critical thinking emphasizes autonomy, which means engaging in communication and collisions with others, obtaining feedback, self-reflection, updating, and further

learning”. Serene also advocated for communicating and engaging with others as she stated that “it’s beneficial to get to know more people, communicate with others, and engage with your advisor”. In a similar vein, Joseph highlighted the importance of communicating with others. He shared:

I think one way to improve critical thinking is through communication. On paper, you can only see others' articles, but through communication, you can understand how others think, why they do certain things, and why they write such articles. This aspect is more helpful than just reading the articles themselves. Understanding how others have solved problems and the issues they have encountered in achieving their results is beneficial for developing critical thinking skills. As a doctoral student, you are researching something that hasn't been done before. Each person's work is different, and their methods, approaches, and perspectives are also different. If you can communicate with others, with different people such as your teachers, senior and junior colleagues, and students in different fields within your department, as well as people from different schools, including teachers and students, it will be very helpful. This helps expand your thinking and allows you to understand how others approach and perceive these issues. I often interact with my group members, sometimes having meals together and exchanging ideas. I also attend conferences to meet different people and engage in diverse conversations. During holidays, I visit other schools to meet people I know from before or those I have met at conferences. While having fun, I also take the opportunity to communicate with them and learn about their situations.

He continued describing a specific example in his department:

Another thing is that recently, there is a new teacher in our department who organized a Ph.D. Tea Time event, and I think it's a great opportunity for communication. This teacher organized the Ph.D. Tea Time because he felt that our field was lacking in this

aspect of communication. This activity involves communication from various aspects of research and life. In our building, there are people studying electrical engineering and computer science, and a fixed time is set for everyone to exchange ideas together. People from different fields and backgrounds can communicate with each other. I often tell others that many times the limitations of your research don't come from your own field of expertise because the principles in your field are limited and you use them every day. If there's something you don't understand, you can learn and study it carefully to figure it out. It's often the things outside your field that truly restrict you.

Resorting to Guidance and Feedback from Advisors. Some participants believed that advisors provided important guidance and help for them; thus, contributing to their development of critical thinking. For instance, Serene discussed the important role her current advisor played in her doctoral studies. She stated: “my current advisor has a solid foundation in business, and he has some outside resources. He has a lot of partners. So he could provide first-hand data from his partners for me to do my research.” She further added that “my current advisor knows the value of research papers and if a particular paper can be published or not”. She also believed that discussing with advisors is beneficial to her as she shared that “the advisor's guidance is crucial”, and that “it's beneficial to engage with your advisor. Discussing with classmates may not go into much detail because there are significant differences among the branches in my field”.

In a similar vein, Joseph disclosed that his advisor had significant influence on his thinking and research, especially in his latter part of doctoral studies. He shared:

Later on, when facing challenges, my advisor didn't provide specific technical guidance, but he would offer high-level guidance. For example, my advisor would ask questions like, "You've been working on this for several months and still can't achieve results. Have you considered trying a different approach?" or he would remind me, "Is

it necessary for you to work on this? Others have already done it. What makes your approach different? What is unique about the problem itself, not just technically?"

This also applied to a recent conference presentation where my advisor would suggest how to write the topic to cater to different audiences. Now, when I give presentations, I focus more on helping the audience understand my research questions. I believe that the high-level guidance from my advisor has been extremely helpful. I carefully consider why my advisor says certain things, and his feedback is constructive. The advice he provides helps develop my critical thinking. I gradually learn a lot about how to approach problems and think critically from my advisor. In the past, I only knew the general principles and what should be done but lacked specific and intuitive understanding. Later on, I was able to concretize these things, breaking them down into how to approach difficulties or any situations that arise, including the challenges I mentioned earlier and even the chapters in my thesis, which I treated as ongoing research. My advisor would ask questions like, "What makes your approach unique? Why do it this way?" Many soul-searching questions like these. Later on, I started thinking about these things on my own before even discussing with my advisor. I would consider the feasibility of an idea by myself and then engage in discussions with my advisor.

He further described how he benefited from his advisor's guidance as a peer reviewer. He shared:

Initially, I wasn't sure how to approach the reviews and focused mainly on the validity, whether the mathematical and physical aspects were logically sound.

However, my advisor often posed thought-provoking questions, such as why I wanted to do this. For example, during my thesis defense, my advisor would not only ask technical questions but inquire about the significance and motivation behind the

research. He played a crucial role in overseeing my work. This had a significant impact on my approach as a reviewer. Gradually, I learned to look beyond the technical aspects and consider the overall scope of the research, including logical consistency in presentation and the significance of the motivation. My advisor had a great influence on my reviewing style.

Xiaoming also shared how he benefited from his advisor's guidance and feedback. He narrated:

I vividly remember during my frequent meetings with my advisor, he would always play the 'devil advocate' whenever I presented something to him. He would challenge various aspects of my work, and this became a crucial part of my training. Through this feedback, I started to internalize the process of carefully considering my reasoning before showing him anything. I would assess whether there was solid reasoning to support my work.

K also stressed the importance of having an advisor to guide and induce critical thinking. He shared:

I believe that having an advisor to guide and induce critical thinking is crucial. It is essential to have someone who can lead and assist you in the initial stages, helping you to reflect and consider why a certain article is good or bad. This process is part of scientific training. Without someone to guide you initially, progress can be slow and challenging. Without a clear method and someone to point you in the right direction for logical thinking, you may struggle. Therefore, having an advisor to guide and induce critical thinking is something I consider very important.

Observing, Listening to, and Imitating others. Some participants utilized observing, listening to, and imitating others as a strategy to develop critical thinking. For

example, James stated that “to improve critical thinking, it is necessary to listen and observe more”. Amy also employed this strategy to improve critical thinking. She shared:

In the process of attending classes, my development of critical thinking followed a sequence of observation, absorption, and imitation. It was a gradual process. First, I observed how other students asked questions in class. If I found a student's question to be good, I would then imitate their approach and reflect on why I didn't think of or ask that particular question. When reading the next article or exploring the next theory, I would try to discover interesting points that could initiate discussions. This became a habitual thinking process for me in the course of my research.

She further mentioned how she learned from attending conferences. She shared:

As for conferences, I approached them with a learning mindset, absorbing everything without much reflection. Participating in conferences opened up my thinking. I would think, "Oh, I can conduct research on this topic," or "That could be an interesting area to explore." Conferences stimulated my curiosity, but I'm uncertain about how much curiosity takes up in critical thinking. The conferences were not as helpful in terms of self-reflection and challenging existing knowledge.

Peer Support Groups. Peer support groups is the last external help participants received to develop critical thinking. Amy described how peer support groups benefited her critical thinking, especially as a Chinese student. She shared:

I also enhanced my critical thinking through peer support group in my Ph.D. program, which is a method I recommend to cultivate critical thinking. Forming study groups with classmates for peer support can be beneficial. Regular discussions among group members about our research allow us to raise questions and challenge each other. Sometimes, a classmate may point out something that you didn't consider. It's like mutually critiquing each other's work, providing an opportunity for mutual growth.

Peer support is particularly helpful for students with a Chinese cultural background, as it reduces concerns about conflicting interests or fear of offending teachers and not being able to graduate. Students can challenge each other professionally. Moreover, we have a saying in China that "when three people walk together, there must be one who can be my teacher," meaning that classmates can teach you something.

Chapter Summary

Chapter Four presented the findings of this dissertation study. Individual stories of each participant were provided as well as themes. Common themes among participants were provided as well. Four primary themes from the study were presented accompanied by quotations of participants to support. The four themes were: awareness of critical thinking in Western contexts VS Chinese context; sufficient understanding of critical thinking; transformation VS amplification; and developing critical thinking relied on self as well as others. In the next chapter, the findings will be discussed in relation to existing literature. And conclusion of this dissertation will be presented in the next chapter.

CHAPTER FIVE DISCUSSION AND CONCLUSION

In this chapter, the findings from the narrative inquiry on Chinese international doctoral students' perspectives on developing critical thinking in the U.S. is discussed in relation to the existing literature. The two research questions guiding this study are addressed. Then implications for practice are presented, and the significance of the dissertation is deliberated. Further potential areas for further research are identified, and finally, a conclusion is drawn.

Addressing Research Questions

Research Question 1: How do Chinese international doctoral students understand and conceptualize critical thinking?

The first research question aimed to uncover how Chinese international doctoral students understand and conceptualize critical thinking. The analysis of participants' narratives revealed that Chinese international doctoral students understand critical thinking as a process of independent inquiry, rational analysis, and the ability to challenge assumptions. Their experiences in the U.S. led to an increased awareness of critical thinking's importance, with a focus on comprehensive comprehension, questioning, and reflecting on knowledge.

The findings from Theme One, "Awareness of Critical Thinking in Western contexts VS Chinese Contexts," offer a nuanced perspective on this matter. The majority of participants revealed that their initial awareness of critical thinking was sparked within Western educational contexts, often during their time studying abroad or in preparation for overseas studies. This insight highlights the transformative influence of exposure to Western educational paradigms, where critical thinking is often more explicitly emphasized.

Conversely, a minority of participants shared that their awareness of critical thinking had been cultivated within Chinese educational environments. This implies that some

Chinese institutions are actively fostering a culture of critical thinking, even though the emphasis might not be as pronounced as in Western contexts.

The divergence between these experiences underscores the contextual nuances that contribute to the participants' diverse conceptualizations of critical thinking. This suggests that cultural influences and educational backgrounds play pivotal roles in shaping how Chinese international doctoral students perceive and engage with critical thinking concepts.

The participants' responses in relation to the first research question shed light on how Chinese international doctoral students understand and conceptualize critical thinking (Chen, 2017). Their narratives align with several key aspects of critical thinking as defined in the literature. Let's discuss how their answers relate to the existing literature on critical thinking.

Firstly, the participants' descriptions of critical thinking as a process of independent inquiry, rational analysis, and the ability to challenge assumptions resonate with the literature's emphasis on critical thinking involving reasoning and rationality (Ennis, 1991). Robert Ennis (1991) highlighted the role of reflective thinking focused on deciding what to believe or do, which aligns with the participants' views of critical thinking involving rational analysis. This suggests that the participants perceive critical thinking as a cognitive process that involves careful consideration and evaluation of ideas, mirroring Ennis' notion of "reasonable reflective thinking." This alignment underscores the participants' ability to articulate their understanding of critical thinking in a manner consistent with established theoretical dimensions.

Moreover, the participants' recognition of critical thinking's importance, particularly in terms of comprehensive comprehension, questioning, and reflecting on knowledge, corresponds to the literature's emphasis on critical thinking involving judgment (Facione, 1990; Lipman, 1988). Facione (1990) and Lipman (1988) both stressed that critical thinking leads to purposeful, self-regulatory judgment involving interpretation, analysis, evaluation,

and inference. The participants' focus on comprehensive comprehension and questioning align with these elements of judgment, as they indicate a process of assessing information, analyzing it, and drawing meaningful conclusions. It is essential to emphasize that their understanding of critical thinking aligns with the theoretical dimensions proposed in the literature.

The participants' experiences of heightened awareness of critical thinking within Western educational contexts and exposure to Western paradigms of education echo the literature's acknowledgment of cultural influences on critical thinking (Durkin, 2008). It aligns with Durkin's (2008) stages of adaptation for Chinese students transitioning into Western educational contexts. The divergence between participants who experienced their first encounters with critical thinking in Western settings and those who encountered it within Chinese educational environments reflects the contextual nuances discussed by various scholars (Durkin, 2008). The participants' experiences reinforce the literature's recognition that cultural factors and educational backgrounds significantly shape how individuals perceive and engage with critical thinking concepts.

Additionally, the participants' narratives support the literature's perspective on critical thinking as involving a set of cognitive skills and dispositions (Facione, 1990; Paul, 1990). The participants' descriptions of independent inquiry, rational analysis, challenging assumptions, and the ability to question align with the cognitive skills emphasized in the literature, such as analysis, interpretation, and evaluation. Furthermore, their recognition of the importance of comprehensive comprehension and reflecting on knowledge corresponds to the disposition of inquisitiveness mentioned in the literature (Paul, 1990).

In addition, several participants' understanding of critical thinking suggests transformative learning experiences. Mike's perspectives highlights a pivotal shift from blindly following advisor instructions to taking ownership of his research, indicating a

transformation of “habit of mind” from passive obedience to active engagement. Similarly, James' story demonstrates a shift in his perception of teachers from all-knowing figures to collaborators, reflecting a change of “prior frame of reference” in how he relates to authority figures. These critical experiences align with Mezirow's idea of perspective transformation, where learners reframe their assumptions and viewpoints.

The narratives of K and Shawn resonate with the concepts of rational discourse and reflective discourse in transformative learning. K's story underscores the importance of critical analysis and dialectical thinking, which are essential aspects of reflective discourse. Shawn's story emphasizes the dialectical process of analyzing strengths and weaknesses, similar to Mezirow's notion of rational discourse. Both narratives indicate a movement towards deeper critical thinking and engagement with complex ideas, consistent with the transformative learning framework (Mezirow, 1991). Studies focusing on Chinese learners have also emphasized the significance of reflective discourse, as Dirkx values the inner work or the nature of self in terms of transformative learning (Dirkx & Mezirow, 2006).

Furthermore, Serene's story reveals the transformative shift from a focus on information acquisition to cultivating a thoughtful mindset. Her story aligns with transformative learning's emphasis on critical self-reflection and the deepening of critical thinking (Mezirow, 1991) as well as a study conducted in reaction to multiculturalism and internationalization that adopted critical reflection, when encountering inevitable cross-cultural situations (Coryell, 2013).

Xiaoming and Amy's stories provide insights into the gradual and subtle nature of transformative learning. While they may not have undergone radical shifts in their identities, their narratives highlight subtle changes in their approaches to critical thinking. Xiaoming's acknowledgment of the importance of questioning authority and Amy's evolution from passive acceptance to critical contemplation showcase the ongoing process of transformation.

Overall, the participants' answers provide empirical evidence that reinforces the theoretical underpinnings of critical thinking as described in the literature (Facione, 1990; Paul, 1990; Ennis, 1991). Their understanding of critical thinking as a cognitive process involving reasoning, judgment, and a combination of skills and dispositions aligns closely with the definitions and dimensions put forth by scholars such as Ennis, Paul, Facione, and Lipman. Furthermore, the participants' recognition of cultural influences on their conceptualizations of critical thinking highlights the dynamic interplay between education, culture, and individual experiences in shaping how critical thinking is perceived and practiced. Also, their understanding of critical thinking indicates transformative learning experience.

However, the critical contribution of this study lies in providing empirical evidence to illustrate how these theoretical dimensions manifest within the lived experiences of Chinese international doctoral students. It offers a bridge between existing theoretical frameworks and practical application, providing a deeper understanding of how these students navigate critical thinking in their academic journeys.

Importantly, the study extends the literature by revealing the dynamic interplay between cultural and educational contexts and individual experiences in shaping perceptions and practices of critical thinking among Chinese international doctoral students. This empirical evidence serves as a vital link between theoretical conceptions of critical thinking and the lived experiences of students, showcasing how these dimensions are understood and applied within a specific cultural and educational context. This contribution provides a richer, more holistic perspective on critical thinking among this particular student group.

In essence, the research demonstrates that the participants' understanding of critical thinking is not only theoretically consistent but also practically grounded in their academic journeys. This empirical evidence enriches our understanding of how critical thinking is

understood and practiced by Chinese international doctoral students, filling a gap in the literature and offering a nuanced perspective that can inform educators and policymakers working with this student population. It emphasizes the need to consider both theoretical dimensions and real-world experiences when addressing critical thinking in diverse educational settings.

Research Question 2: How have Chinese international doctoral students developed critical thinking during their doctoral studies in the U.S.?

The second research question aimed to explore how Chinese international doctoral students have developed critical thinking during their doctoral studies in the U.S. Participants' narratives suggest that critical thinking development among Chinese international doctoral students is influenced by both cultural contexts and the U.S. educational environment.

Themes Two to Four collectively illuminate the multifaceted nature of this development process. Students engage in an ongoing process of adapting to new expectations, questioning assumptions, and critically evaluating information.

In Theme Two, "Sufficient Understanding of Critical Thinking," the participants' proficient articulation of critical thinking concepts highlights their competence in this realm. This proficiency suggests that Chinese international doctoral students possess a foundational grasp of critical thinking that is actively integrated into their academic endeavors.

Themes Three and Four, "Transformation VS. Amplification" and "Developing Critical Thinking Relied on Self as well as Others," respectively, provide deeper insights into the mechanisms and influences that contribute to critical thinking development. The participants' narratives revealed a spectrum of experiences – some described transformative encounters that reshaped their cognitive frameworks (transformation), while others emphasized the amplification of pre-existing skills and traits (amplification).

The interplay between self-directed efforts and external influences, as unveiled in Theme Four, adds depth to our understanding of critical thinking development. Participants drew upon a range of strategies, from self-initiated reflection and engagement with scholarly literature to mentorship and peer collaboration.

The participants' responses to research question two shed light on the development of critical thinking among Chinese international doctoral students during their studies in the U.S. By comparing their answers to the existing literature, particularly the studies on Chinese students' critical thinking development in Western universities (Durkin, 2008; Fakunle et al., 2016), we can identify several points of convergence and divergence.

The study's findings echo the existing literature's emphasis on the foundational importance of grasping critical thinking concepts, as evidenced by the participants' "Sufficient Understanding of Critical Thinking" (Theme Two). This parallels Durkin's (2008) first stage of adaptation, where Chinese students need to understand Western academic conventions and requirements. Both the participants and Durkin's stages highlight the initial challenge of adapting to the academic norms and expectations of Western institutions.

Furthermore, the participants' narratives of transformative encounters ("Transformation VS. Amplification" - Theme Three) align with Durkin's (2008) characterization of stages two and three. In these stages, Chinese students move away from misconceptions and gradually begin to embrace critical thinking as more than just confrontational argumentation. This transformation resonates with the participants' experiences of reshaping cognitive frameworks and questioning assumptions, suggesting a parallel evolution of understanding critical thinking's multifaceted nature.

In Theme Four, "Developing Critical Thinking Relied on Self as well as Others," the participants' descriptions of using a range of strategies for critical thinking development mirror Durkin's (2008) stages two to four. The participants' engagement with scholarly

literature, self-initiated reflection, mentorship, and collaboration with peers corresponds to the gradual progression of critical thinking expertise observed in Durkin's study. Durkin's third stage, where Chinese students become capable but not adventurous, is mirrored in the participants' narratives of gradually honing their skills through engagement with literature and analytical practices.

The interplay between self-directed efforts and external influences highlighted in Theme Four is consistent with the findings of Fakunle et al. (2016), where Chinese students sought ways to develop critical thinking for academic success. The participants' reliance on self-initiative and seeking help from mentors parallels the strategies employed by Chinese students in the UK context, illustrating a cross-cultural similarity in the developmental pathways of critical thinking.

How the participants developed critical thinking indicates transformative learning experience. While not all participants explicitly described profound transformative experiences, the data suggests the presence of identifiable phases. For example, Mike described his initial frustration phase when he treated his advisor as God but experienced all types of failures. James expressed an initial adjustment phase when he observed and followed professors' requirements in the classroom. Similarly, K highlighted the adaptation process and the development of critical thinking through independent study during his doctoral journey. Shawn's narrative indicated a seamless transition with a focus on deeper engagement with content and research independence. Joseph discussed differences in research expectations between China and the U.S., indicating a phase of reevaluating and adapting research approaches. Xiaoming's story emphasized a continuity of development with an amplification of critical thinking skills. Amy's account suggested a gradual shift in her mindset towards critical thinking, particularly in research contexts.

The phases identified in the participants' narratives demonstrate alignment with Mezirow's transformative learning theory (Mezirow, 1991). The initial phase of disorienting dilemmas or challenges is evident in participants' accounts of encountering differences between Chinese and U.S. educational systems. The subsequent phase of self-examination and reflection is reflected in participants' descriptions of adapting to new expectations, critically analyzing knowledge, and reconsidering their role in the learning process.

However, it is essential to note that not all participants experienced dramatic shifts or a complete transformation. Some narratives, like Shawn's and Xiaoming's, suggest a more gradual amplification of existing critical thinking skills rather than a transformative process. This variance indicates that while transformative learning theory provides a valuable framework for understanding critical thinking development, individual experiences may differ in the extent and nature of transformation.

In examining the departures from transformative learning theory within the findings, it becomes evident that the theory may need further refinement to account for the subtler, less dramatic shifts that some participants experienced. While transformative learning theory typically emphasizes profound shifts in perspective and fundamental changes in one's worldview, this study reveals that critical thinking development can also occur in more incremental and subtle ways. This observation prompts us to question whether Mezirow's theory adequately accommodates the spectrum of transformation, from the radical to the gradual.

One way to conceptualize these departures is to consider that transformative learning theory may encompass a broader spectrum of change than previously acknowledged. Mezirow's theory (1991) primarily addresses the more profound, paradigm-shifting transformations, but the findings suggest that there are intermediate stages or phases of transformation that warrant further exploration. These intermediate phases could be seen as

incremental steps towards more profound shifts, illustrating a nuanced developmental process in critical thinking.

It is also important to acknowledge the influence of cultural context in shaping the nature and extent of transformation. Chinese cultural values, educational background, and social expectations may influence how Chinese international doctoral students experience and express transformative learning. This indicates that the interplay between cultural context and transformative learning deserves additional attention within the transformative learning framework. Future research may delve into how cultural context impacts the transformative experiences of Chinese international students in Western academic settings.

Research has demonstrated that the cultural context significantly influences the transformative learning experiences of individuals (Cranton, 2014). In the case of Chinese students, their experiences are deeply shaped by Confucian values that prioritize obedience to authority and respect for tradition (Dirkx & Fisher, 2012). These values may both facilitate and hinder transformative learning, depending on how students navigate the tension between their cultural upbringing and the demands of Western higher education (Wu & Watkins, 2017). Therefore, understanding how cultural factors intersect with transformative learning is crucial for designing effective educational interventions that respect cultural diversity and encourage personal growth (Feng, 2016).

This study highlights the value of transformative learning theory as a lens for understanding the development of critical thinking among Chinese international doctoral students in the U.S. While it offers a compelling framework, the findings underscore the need for a more nuanced perspective that encompasses a wider spectrum of transformation, accounting for both dramatic shifts and gradual amplifications in critical thinking. Additionally, the influence of cultural context on the transformative process suggests an avenue for further research in this domain.

The participants' narratives also demonstrated cognitive development. Their development align, resonate, or diverge from Perry's well-established scheme. These insights contribute to the understanding of the nuances in intellectual and ethical development among Chinese international doctoral students in the U.S.

James' narrative, for instance, illustrates movement along Perry's scheme, specifically from a dualistic perspective towards a more complex, multiplicity-oriented viewpoint (Perry, 1970). His initial perception of educators as all-knowing echoes Perry's dualistic thinking (Perry, 1970). Still, as he evolves to view educators as collaborators and grapples with the intricacies of research, he demonstrates a noticeable shift towards multiplicity, aligning with Perry's framework (Perry, 1970). James' intellectual and ethical development also aligns with the findings that doctoral training promoted epistemological development for Chinese international doctoral students (Zhu & Cox, 2015).

In a similar vein, Mike's narrative mirrors Perry's concept of commitment within relativism (Perry, 1970). His transition from passive acceptance to critically engaging with his advisor's guidance represents a clear evolution towards a more sophisticated understanding of knowledge, consistent with Perry's stages (Perry, 1970). Also, Mike's journey echoes the findings that doctoral training promoted epistemological development for Chinese international doctoral students (Zhu & Cox, 2015).

Joseph's story, on the other hand, provides valuable insights into the complexities of epistemological development (Perry, 1970). His recognition of disparities in research standards between China and the U.S. and his adaptation to a more comprehensive approach signal movement towards a more sophisticated epistemological stance, which resonates with Perry's framework (Perry, 1970). Also, Joseph's epistemological development is consistent with the findings that doctoral training promoted epistemological development for Chinese international doctoral students (Zhu & Cox, 2015).

In Serene's and Amy's narratives, I witness compelling shifts towards relativism and commitment, echoing Perry's developmental stages (Perry, 1970). Serene's transition from valuing novelty to emphasizing thoughtful engagement signifies a clear movement towards a more complex view of knowledge, aligning with Perry's framework (Perry, 1970). Amy's evolution from passive acceptance to critical contemplation also indicates a shift towards more sophisticated epistemological beliefs, consistent with Perry's stages (Perry, 1970). Again, both Serene and Amy's journey align with the findings that doctoral training promoted epistemological development for Chinese international doctoral students (Zhu & Cox, 2015).

However, it is important to note that not all participants' narratives follow a linear trajectory consistent with Perry's scheme (Perry, 1970). For example, Xiaoming's story emphasizes the continuity of his critical thinking development through a consistent approach of questioning authority, reflecting a commitment to critical engagement (Perry, 1970). While this commitment aligns with some aspects of Perry's scheme, it also highlights the individual variations and unique paths that participants can take.

Overall, the participants' narratives offer a nuanced understanding of their intellectual and ethical development, shedding light on the complexities and diversities within their epistemological growth (Perry, 1970). While some participants' journeys align closely with Perry's established framework, others exhibit subtler trajectories or unique patterns, emphasizing the dynamic nature of intellectual and ethical development among Chinese international doctoral students in the U.S. These findings not only resonate with the existing literature but also extend our understanding by highlighting the richness and variability of epistemological development in this specific context (Yan, 2018; Mak, 2013; Zhang, 1995, 1999; Zhu & Cox, 2015).

The development of critical thinking for the participants indicates an alignment between critical thinking development and epistemological growth, which is aligned with the

existing literature (Perry, 1970; Yan, 2018; Mak, 2013). The participants' descriptions of critically examining knowledge, questioning authority, and engaging in independent research resonate with the cognitive shifts articulated by Perry. These observations highlight the symbiotic relationship between critical thinking and epistemological evolution. It is increasingly evident that sophisticated epistemological beliefs facilitate the cultivation of critical thinking skills (Yan, 2018).

Moreover, this study augments the existing literature by unveiling fresh insights into the intricate interplay between critical thinking development and epistemological growth. Perry's scheme provides a structured framework, but the unique experiences of the participants reveal a more dynamic and context-dependent process than previously recognized (Mak, 2013; Zhang, 1995; Zhu & Cox, 2015).

One of the key findings of this research pertains to the nuanced nature of intellectual and ethical development in the realm of critical thinking (Yan, 2018). Perry's model implies a linear progression, yet my data uncover the presence of regression and loops in participants' journeys. These instances of regression and loops occur when participants encounter dilemmas that challenge their evolving epistemological beliefs or temporarily revert to dualistic thinking (Mak, 2013).

For instance, Joseph experienced a period of regression during the initial phase of his Ph.D. program. When he encountered challenges in his research projects, such as a lack of funding and unfamiliarity with certain topics, he described feeling "trapped in difficulties" and having a hard time progressing. This regression is marked by a setback in his research and a temporary loss of confidence, possibly reverting to a more simplistic mindset focused on overcoming immediate obstacles rather than critically engaging with the broader research process. In addition, Joseph's journey showcases loops in his critical thinking development, especially regarding his approach to research. Initially, he faced challenges in understanding

research conducted according to American standards. However, his advisor's high-level guidance and thought-provoking questions encouraged him to think critically about the significance and motivation behind his research. This process of returning to fundamental questions and reconsidering the purpose of his research signifies a loop, wherein he revisited and refined his critical thinking skills. Joseph's journey demonstrates instances of both regression and loops, illustrating the non-linear nature of his intellectual and ethical development. These experiences highlight the dynamic and evolving character of his critical thinking skills as he navigated the challenges of his Ph.D. program.

In these moments of regression and loops, the participants deviate from the linear trajectory implied by Perry's model and navigate through periods of intellectual reevaluation, where previously held beliefs are revisited and reconsidered. These findings challenge the conventional notion of a unidirectional path and emphasize the intricate, non-linear nature of intellectual and ethical development (Mak, 2013).

Furthermore, the participants' narratives illuminate the substantial role played by cultural context in shaping their intellectual and ethical development. Chinese international doctoral students, as a distinct subgroup, face unique challenges and influences that profoundly impact their epistemological growth (Zhang, 1995; Zhu & Cox, 2015). Comparing their experiences to those of domestic U.S. doctoral students underscores the significance of cultural context in understanding the interplay between critical thinking development and epistemological beliefs (Mak, 2013).

While Perry's scheme of intellectual and ethical development remains a valuable framework, this study introduces findings that challenge the linearity of this framework. These findings emphasize the indispensable role of cultural context and contextual dynamics. As such, they underscore the need for a more holistic and context-aware perspective when investigating the relationship between critical thinking and epistemological growth. In doing

so, this study enriches our understanding of how intellectual and ethical development unfolds in a complex, dynamic, and culturally influenced manner (Zhang, 1995; Yan, 2018).

The following discussions focus on how the findings can be established correlations with the seven key themes identified in the existing literature:

1. Critical Thinking Cultivation in China: The research findings presented here reaffirm and deepen the understanding of critical thinking cultivation in the Chinese educational context. As noted in the existing literature, there is a pronounced shift in Chinese students' approach to critical thinking when transitioning from Chinese to Western educational settings (Tang, 2016; Zhang & Kim, 2018). The participants' narratives provide first-hand accounts that align with the literature, emphasizing how Chinese students experience this transition and the challenges and triumphs that accompany it.

The narratives of the participants illuminate the complexities of adapting from an educational system that traditionally values conformity, rote learning, and memorization to one that places a premium on critical thinking and independent thought (Tang, 2016). This shift in perspective becomes evident as participants reflect on their awareness of critical thinking. For the majority, the first conscious awareness of critical thinking occurred during their time spent studying abroad or while preparing for such studies in the U.S. This highlights a significant turning point in their intellectual journey, and it aligns with the literature's assertion that the transition to Western educational settings plays a pivotal role in this awareness (Zhang, 2017).

Furthermore, as the participants shared their stories, they underlined the challenges they faced when attempting to navigate the new terrain of critical thinking in a Western context (Chen, 2019; Li et al., 2019). This corresponds with the literature's observation that Chinese students might initially struggle with Western-style education due to the profound differences in teaching methods. It is notable that while some of the participants gained

awareness of critical thinking within Chinese educational contexts, this was the minority, and for the majority, the awareness of critical thinking blossomed during their international doctoral studies in the U.S.

In this light, the findings substantiate the literature's assertions about the influence of Western-style education and the importance of cultivating critical thinking from an early stage. The process of critical thinking development indeed appears to be deeply intertwined with the transition from Chinese to Western educational contexts.

Notably, the challenges highlighted by the participants mirror the need for educational reforms in China to encourage critical thinking earlier in students' academic journeys. The adaptations made in Chinese college English classes, such as incorporating brainstorming methods, reflective writing, and the promotion of open discussion and exploration of ideas, reflect the efforts to introduce students to critical thinking at an earlier stage (Tang, 2016; Zhang & Kim, 2018). These approaches also emphasize the value of interactive learning and freedom for students to explore answers to their own questions, aligning with the essence of critical thinking.

Moreover, the participants' experiences relate to the integration of critical thinking into problem-based learning (PBL) and evidence-based learning, especially in medical fields (Du et al., 2013; Wang et al. 2017; Zhang & Lambert, 2008). The shift toward PBL in China's medical education has enhanced students' critical thinking dispositions, as seen in the improvement of their confidence and inquisitiveness (Li et al., 2019). This finding affirms that Chinese students' critical thinking skills are malleable and can be developed through pedagogical innovations.

However, the participants' experiences also resonate with the literature's observations about the challenges posed by deep-rooted cultural and pedagogical norms in China. The enduring low dispositions of truth-seeking and open-mindedness reflect the impact of

traditional didactic teaching and the cultural inclination to maintain surface harmony and conformity to authority (Zhang & Lambert, 2008). These findings reinforce the necessity of continued interventions to address these deeply ingrained issues and promote critical thinking as an essential skill in the Chinese educational system.

In sum, the narratives of the participants echo the existing literature on critical thinking cultivation in China, emphasizing the importance of the transition to Western educational settings as a catalyst for increased awareness and emphasis on critical thinking. Their experiences highlight the challenges of this transition, suggesting that early interventions and educational reforms in China are critical to fostering a culture of critical thinking from an early stage, which, in turn, would benefit Chinese international doctoral students during their studies abroad.

2. Chinese International Students' Experiences (Critical Thinking Included) in Western Higher Education: This research directly aligns with the theme of Chinese international students' experiences in Western higher education, shedding light on the journey of Chinese international doctoral students as they navigate the Western higher education landscape. Their narratives serve as poignant examples of the broader experiences identified in the literature, highlighting the significant shift they undergo when transitioning from an educational environment characterized by obedience to professors, standardized curricula, and rote learning to one that highly encourages critical thinking, creativity, and independent thought (Ma, 2020).

The contrast between the Chinese education system and Western higher education, as underscored in the literature (Ma, 2020), is palpable in the narratives of the participants. The narratives reveal the struggles and successes they encounter as they adapt to the American higher education system (Badger, 2019). These adjustments are particularly evident in their encounters with critical thinking. The Chinese education system has historically emphasized

obedience to authority, conformity, and a standardized curriculum rooted in Confucianism, which contrasts sharply with the American emphasis on multiplistic thinking, truth seeking, challenging authority, and a focus on the process over the outcome (Ma, 2020). The participants' experiences echo these differences and underline the profound shift they must undergo when pursuing their doctoral studies in the U.S.

The participants' experiences, particularly their encounters with critical thinking, can be situated within the context of American academic norms that value inquiry, individualism, and independent thought (Wu & Hu, 2020). These norms differ markedly from traditional Chinese educational practices, where students are generally expected to obey and conform to the guidance of their professors (Xu & Grant, 2017; Wu & Hu, 2020). This discrepancy in expectations leads to a transformative experience for Chinese international doctoral students, who must evolve from being obedient students to having the courage to critique their supervisors, as opposed to viewing them as absolute authorities (Xu & Grant, 2017; Wu & Hu, 2020).

For the participants, the transition to Western higher education represents a profound shift in their approach to critical thinking. While in China, they were often directed to think in specific directions provided by their teachers (Badger, 2019). This obedience and lack of opportunities to think independently or critically are aspects of the traditional Chinese education system that the participants needed to unlearn as they progressed in their doctoral journeys (Xu & Grant, 2017; Wu & Hu, 2020). The narratives of the participants exemplify their learning process in becoming independent critical thinkers.

The experiences of Chinese international students in the U.S. mirror those of their counterparts in Australia, as demonstrated by Jones (2005). The study found that Chinese international students in the Australian academic context exhibited similar conceptualizations of critical thinking as their local peers, irrespective of cultural and linguistic differences. It

illustrates the adaptability of Chinese international students to Western academic contexts and standards. These findings are congruent with this study's participants' experiences, suggesting the universality of the development of critical thinking skills among Chinese international doctoral students.

Furthermore, the narratives of the participants emphasize the role of the learning environment and teaching styles in the development of critical thinking. The absence of explicit discussions on critical thinking within some Chinese international students' accounts underlines the need for more transparent and culturally responsive teaching, learning, and assessment standards (Turner, 2006). The ambiguity and lack of transparency in the cultural translation of these standards raise questions about how Chinese international students can better understand and appreciate the centrality of critical thinking in Western higher education.

In sum, the participants' narratives align with the existing literature, particularly within the theme of Chinese international students' experiences in Western higher education. They underline the transformation Chinese international students undergo when transitioning to Western educational contexts, with a particular focus on the development of critical thinking skills. These experiences emphasize the need for a supportive academic environment that recognizes and addresses the challenges and adaptations faced by Chinese international students, fostering the development of critical thinking skills essential for success in Western higher education.

3. Chinese International Students' Understanding of Critical Thinking: The participants' perspectives on critical thinking resonates with the overarching theme of understanding critical thinking among Chinese international students (Chen, 2017; Lucas, 2019; Pu & Evans, 2019). By examining the participants' insights, this research contributes to our understanding of how these students perceive critical thinking.

Chen's (2017) study involving Chinese undergraduate students in American higher education institutions unveiled various facets of critical thinking understanding. While the participants are at the doctoral level, Chen's findings align with the importance that Chinese students attribute to critical thinking in academic contexts. Likewise, the participants conveyed the significance of critical thinking for academic success. However, Chen's study also highlighted an interesting perspective where critical thinking had limited importance in the context of future careers and life, indicating a nuanced view of the role of critical thinking among Chinese students. This study's participants' perspectives on the value of critical thinking for their personal and academic development resonate with Chen's findings (Chen, 2017).

Lucas (2019) contributed a narrative case study exploring critical thinking from the vantage point of Chinese graduate students in the U.S. While Lucas's study highlights that Chinese students' understanding of critical thinking tends to concentrate on dispositions, such as innovative thinking, independent thinking, and a questioning attitude, this study's participants' perspectives place a strong emphasis on both dispositions and the development of specific skills and abilities associated with critical thinking. Therefore, this study's findings reveal a distinction in focus between Lucas's study and this research, emphasizing that this study's participants prioritize the cultivation of both the dispositions and skills related to critical thinking, potentially reflecting the advanced academic stage of doctoral studies (Lucas, 2019).

The research by Pu and Evans (2019) adds another layer to the discussion by investigating how Chinese students perceive and apply critical thinking in the context of postgraduate thesis writing. This offers an additional dimension to our understanding of the challenges Chinese students face regarding critical thinking. This study's participants' narratives and the perspectives shared in Pu and Evans' study indicate that the application of

critical thinking can be perceived differently depending on one's role as a novice researcher, learner, or practitioner. This finding emphasizes the importance of explicitly developing the skills and abilities associated with critical thinking throughout the academic journey, particularly in the context of thesis writing and research (Pu & Evans, 2019).

In sum, the participants effectively conveyed their grasp of critical thinking concepts and highlighted the importance of developing dispositions and specific skills and abilities associated with critical thinking. This emphasis on both dispositions and skills differentiates the findings from Lucas's study, which focuses on dispositions. It also aligns with previous studies emphasizing the significance of critical thinking in academic contexts while acknowledging the need for explicit education in the development of these skills and abilities. Additionally, these findings underscore the varying perspectives Chinese students hold regarding the applicability of critical thinking to their future careers and lives, thereby enhancing our understanding of the complexities surrounding critical thinking among this student population.

4. Stereotype that Chinese International Students Lack Critical Thinking Skills:

This research provides a compelling challenge to the prevailing stereotype that Chinese international students inherently lack critical thinking skills. The narratives woven by the participants paint a vivid picture of their possession, development, and active application of critical thinking skills throughout their academic pursuits in the United States. Their stories serve as a testament to their substantial critical thinking abilities, dispelling the preconceived notion that Chinese international students inherently lack these skills.

The prevailing stereotype, as outlined in the literature, has perpetuated the idea that Chinese international students exhibit deficiencies in critical thinking due to factors such as cultural differences and language barriers. Previous studies have suggested that these students tend to maintain a passive presence in Western classrooms, potentially as a result of their

English language proficiency, and may encounter challenges in creative and innovative writing (Tian & Low, 2011).

However, this research paints a different, more comprehensive picture. It underscores that the development and application of critical thinking skills among Chinese international students should not be solely attributed to cultural disparities or language barriers. The participants' narratives reveal the presence of strong adaptability, a profound desire for knowledge acquisition, and the capacity to cultivate critical thinking abilities. It becomes clear that a multifaceted approach, incorporating elements such as language proficiency, content familiarity, individual backgrounds, and the complexities of teaching and learning contexts, is essential in assessing an individual's critical thinking capabilities.

By highlighting the narratives and experiences of the participants, this study effectively challenges the deeply ingrained stereotype. It underscores that Chinese international students can, and do, engage in critical thinking and exhibit these skills during their academic journeys in the U.S. While acknowledging the influence of cultural norms and classroom dynamics, it becomes evident that these factors do not restrict their ability to manifest their critical thinking abilities.

In essence, this research offers a rich tapestry of experiences and narratives that profoundly contradict the notion of a critical thinking deficiency among Chinese international students. It replaces this stereotype with a more accurate depiction, recognizing the role of multifarious influences and highlighting the potential for these students to not only adapt but also actively contribute to the critical thinking landscape in their academic environments.

5. Contradicting Stereotypes: This research offers valuable insights into the adaptability and resilience of Chinese international students. The narratives of the participants serve as a testament to their ability to challenge and debunk stereotypes that suggest Chinese students lack critical thinking skills.

The participants' experiences demonstrate their capacity to embrace critical thinking and independent thought, effectively contradicting the prevailing stereotype. While recognizing the differences between the educational systems and cultural norms of China and the United States, these students have shown that they can overcome challenges and succeed in a new academic and cultural context.

Li's (2013) case study of high-achieving Chinese undergraduate students and Heng's (2018) research on Chinese undergraduate students in the U.S. reinforce the findings. Both studies provide evidence of Chinese students' proficiency in critical thinking and their adaptability to new learning environments. They reveal that despite the constraints of the Chinese education system, these students display considerable progress and changes in their critical thinking abilities during their studies in the United States.

In sum, the narratives and themes presented in this study underscore the adaptability and resilience of Chinese international doctoral students. They have not only developed critical thinking skills but have also effectively challenged preconceived stereotypes. This research encourages us to recognize the dynamic nature of this student population and to appreciate the valuable contributions they make to the international academic community. The debunking of stereotypes is an essential outcome, emphasizing the potential and adaptability of Chinese international students, which goes far beyond the stereotype that has persistently been associated with them.

6. Journey of Developing Critical Thinking in Western Universities: The narratives of the participants provide valuable insights into their transformative experiences during their academic journeys in the United States. They showcased their progression from initially being reserved to eventually becoming confident critical thinkers. As mentioned above, their journey mirrors the stages of adaptation and development highlighted in the

existing literature, particularly the work of Durkin (2008) and Fakunle et al. (2016), emphasizing the importance of support systems and strategies for fostering critical thinking.

This journey of developing critical thinking in Western universities, as illuminated by both the participants and existing literature, underscores the potential and adaptability of Chinese students. It emphasizes the importance of support systems, exposure to diverse pedagogical approaches, and the gradual development of confidence in critical thinking skills.

In sum, this research has delved into the narratives and experiences of Chinese international doctoral students as they developed critical thinking during their studies in the United States. The themes and narratives presented in this study highlight the dynamic and multifaceted nature of this process, from awareness and understanding to the development of critical thinking skills.

The journey of developing critical thinking, as explored through the participants' narratives, aligns with the stages of adaptation and development highlighted in existing literature. It emphasizes the pivotal role of support systems and strategies in nurturing critical thinking abilities among Chinese students.

Ultimately, this research contributes to our understanding of the adaptability and resilience of Chinese international students and challenges stereotypes surrounding their critical thinking capabilities. It underscores the importance of embracing diverse perspectives and the potential for growth and transformation in academic journeys. This study encourages further research and initiatives aimed at fostering critical thinking skills among international student populations and promoting cross-cultural understanding in academic settings.

7. Comparative Study of Critical Thinking Between Chinese and American College Students: The existing literature, as exemplified by the works of Zhang (2009), Yan (2018), and Dennett (2014), highlights the comparisons between the critical thinking

dispositions and approaches of Chinese and American students. These studies collectively refute the stereotype that Chinese students are deficient in critical thinking skills. Instead, they suggest that differences in cultural norms and communication styles may lead to a nuanced expression of critical thinking among Chinese students.

This study's findings, as illuminated by the narratives of the participants, align with this comparative study. The participants' accounts affirm the notion that Chinese students are not lacking in critical thinking skills but may differ in their approach to its expression due to cultural norms. Their narratives illustrate their capacity for critical thinking and the nuanced ways in which they navigate cultural differences while adapting to the U.S. academic environment.

However, there are also nuanced differences between the participants' responses and the existing literature. Unlike the limited duration of stay for some Chinese students in the UK, as highlighted by Durkin (2008), the participants in U.S. doctoral programs potentially have longer exposure to the U.S. academic environment. This extended duration might explain the participants' descriptions of transformative experiences (as seen in Theme Three), suggesting that their critical thinking development could progress further along Durkin's stages. This implies that their longer exposure and immersion in the U.S. academic environment may contribute to deeper critical thinking development.

In essence, the participants' answers provide valuable insights into how Chinese international doctoral students develop critical thinking in the U.S. Their experiences both affirm and expand upon the existing literature. The parallels in the stages of critical thinking development, the significance of foundational understanding, and the interplay between self-directed efforts and external influences highlight the consistency in the developmental trajectory across Western higher education contexts. Moreover, the participants' narratives

suggest a potential for more profound transformation due to the extended duration of their doctoral studies in the U.S.

This discussion demonstrates the interplay between research findings and established literature, enriching our understanding of how cultural contexts and educational environments shape the development of critical thinking among Chinese international doctoral students. It reaffirms the idea that while the foundation of critical thinking may be universal, its manifestation and expression can be influenced by cultural and contextual factors. It highlights the importance of considering cultural factors in evaluating and appreciating the diverse ways in which individuals develop and express their critical thinking skills.

In sum, this research contributes to the broader conversation about critical thinking and its development, particularly among Chinese international doctoral students in the U.S. The narratives of the participants not only challenge stereotypes but also provide a nuanced understanding of the role of culture and educational environments in shaping critical thinking. It encourages further research and discussions in this area and underscores the importance of fostering cross-cultural understanding and inclusivity in the global academic community.

Implications for Practice

The findings of this study may not provide immediate implications for practice; however, theoretically, it holds significant implications for practice, particularly in the context of addressing the impact of cultural traditions and educational systems on the development of critical thinking skills among Chinese international doctoral students. The integration of cultural values, enhanced exchange between international and domestic students and faculty, and policy-level considerations can further enrich the practices aimed at supporting the academic and personal growth of these students.

Educators and institutions should place cultural traditions and educational systems at the forefront of their support strategies. Recognizing that Chinese international doctoral students often come from educational systems with distinct characteristics, there is a need to bridge these differences effectively. Understanding the influence of Confucian values, such as respect for authority and a collectivist approach to learning, can guide educators in creating culturally sensitive learning environments. By acknowledging these traditions, educators can better address the students' needs during their transition to U.S. educational contexts. This involves promoting a balance between the traditional values of respect and obedience and the cultivation of critical thinking skills. Therefore, educators should facilitate an open and inclusive classroom atmosphere that encourages students to actively engage, ask critical questions, and participate in collaborative knowledge construction.

To enrich the educational experience of Chinese international doctoral students, there is a need to facilitate meaningful cultural exchange within the academic community. Encouraging dialogue and interactions between international and domestic students can help break down cultural barriers and promote cross-cultural understanding. Such exchanges should go beyond superficial cultural appreciation and aim to create a space for genuine conversation and learning. Faculty members can play a pivotal role in fostering these interactions by creating opportunities for international and domestic students to work together on projects, engage in discussions, and share their perspectives. This approach not only supports the development of critical thinking but also promotes a richer, more inclusive learning environment for all. Thus, it will contribute to the internationalization of higher education.

Institutional policies and support systems should be tailored to the specific needs of Chinese international doctoral students. This includes recognizing the potential challenges they may face in transitioning from authoritarian learning environments to more

participatory, critical-thinking-oriented ones. Educational institutions should consider offering orientation programs that provide comprehensive guidance on academic expectations, classroom norms, and the development of critical thinking skills. Additionally, faculty training on working effectively with international students can be valuable. Supporting mentorship programs, peer-assisted learning initiatives, and workshops on critical thinking can further enhance the learning experience. These policy-level considerations aim to create a more inclusive, welcoming, and supportive academic environment for Chinese international doctoral students.

Chinese international doctoral students as adult learners can proactively engage in strategies that promote transformative learning and epistemological development. Cultivating self-reflection, open dialogue, and critical analysis of their own assumptions are essential components of the process of perspective transformation. Students should actively seek diverse sources of knowledge, not only within their academic fields but also across disciplines, and engage in thoughtful discourse with peers and instructors. Seeking mentors and advisors who not only encourage independent thinking but also guide students through the stages of intellectual and ethical development can be a valuable step. Additionally, this group of international adult learners should be encouraged to reflect on their own cultural backgrounds and how these backgrounds influence their thinking and academic approaches. This level of self-awareness contributes to the development of more nuanced critical thinking skills.

This study's implications for practice extend beyond the academic realm to address the multifaceted dynamics of cultural traditions and educational systems. By recognizing these influences, fostering cultural exchange, and developing targeted policies, educators and institutions can provide more effective support to Chinese international doctoral students in their journey to develop critical thinking skills and become active contributors to the global

academic community. These recommendations not only benefit the students but also enrich the educational landscape for all participants, leading to a more inclusive and intellectually vibrant academic community.

Significance of the Dissertation

This dissertation holds profound significance for a range of stakeholders, both in theoretical and practical domains. It advances our understanding of the development of critical thinking among Chinese international doctoral students during their U.S. academic journeys, offering insights that are applicable to various audiences.

Theoretical Significance:

1. **Transformative Learning Theory Enrichment:** The study contributes to the theoretical landscape by deepening our comprehension of transformative learning theory. It illuminates how this theory can be applied to international doctoral students, specifically Chinese students, shedding light on the potential for profound cognitive and personal transformation during their academic pursuits in a foreign context. This expansion of transformative learning theory's applicability paves the way for further research and theoretical development within the field of adult education, cross-cultural psychology, and transformative learning scholarship.
2. **Perry's Scheme of Intellectual and Ethical Development:** By applying Perry's scheme, the dissertation adds value to the understanding of intellectual and ethical development in a cross-cultural context. The study exemplifies how the integration of Perry's framework enriches our comprehension of students' cognitive and ethical growth, particularly within the context of the diverse experiences of Chinese international doctoral students in the U.S. This exploration has the potential to stimulate further research and foster a more comprehensive understanding of intellectual and ethical development in a global educational setting.

Practical Significance:

1. **Educators and Academic Institutions:** This research equips educators and academic institutions with valuable insights into the specific challenges and opportunities Chinese international doctoral students encounter as they develop critical thinking skills. The practical applications of this understanding include tailoring curriculum design, teaching methodologies, and support services to create a more inclusive and culturally sensitive learning environment. By considering the unique needs of this student population, educators can enhance the overall educational experience and academic success of Chinese international doctoral students.
2. **International Doctoral Students:** Chinese international doctoral students can directly benefit from this research as it offers guidance for their academic journey in the U.S. The study provides a roadmap for their intellectual and ethical development, fostering self-awareness and transformative learning. By embracing the strategies and experiences highlighted in this dissertation, international students can proactively engage in their own growth, ultimately enhancing their academic and personal achievements.
3. **Policy Makers and Academic Administrators:** This research offers insights that can inform the development of policies and support systems at the institutional level. Policy makers and academic administrators can consider the challenges and cultural differences highlighted in this study when shaping orientation programs, mentorship initiatives, faculty training, and internationalization efforts. These considerations can lead to more effective policies and practices that foster a welcoming and supportive academic environment for Chinese international doctoral students.
4. **Cross-Cultural Researchers and Practitioners:** Beyond the immediate context of Chinese international doctoral students, this research carries relevance for cross-

cultural researchers and practitioners who aim to create inclusive academic environments. By exploring the interplay between cultural traditions, educational systems, and critical thinking development, this dissertation contributes to the broader field of cross-cultural psychology and education. Researchers and practitioners can draw from this work to inform their strategies for addressing the unique needs of diverse student populations and fostering cognitive growth.

In summary, this dissertation's significance extends to a wide range of audiences, providing a bridge between theoretical advancement and practical application. It enriches transformative learning theory and Perry's scheme of intellectual and ethical development, offering actionable insights for educators, international students, policy makers, and cross-cultural practitioners. By acknowledging the unique experiences of Chinese international doctoral students, this research contributes to a more inclusive and globally informed educational landscape.

Further Research

This study, focusing on Chinese international doctoral students' experiences and development of critical thinking, opens the door to a wealth of opportunities for further research, aimed at both broadening the scope of international student experiences and delving into complementary facets of their educational journey. Here are some specific directions for future research:

1. **Comparative Cross-Cultural Studies:** To gain a more comprehensive understanding of how critical thinking develops in international students, future research can involve diverse populations from various countries and academic disciplines. For example, a study might investigate the experiences of doctoral students from different countries, such as India, Brazil, or Germany, and explore how their cultural backgrounds and disciplinary contexts influence their critical thinking development. This could involve

conducting qualitative research with students from these countries, employing narrative interviews or focus group discussions to capture their unique perspectives.

2. **Longitudinal Studies:** While this study offers a snapshot of Chinese international doctoral students' critical thinking development, it is essential to explore the long-term impact of doctoral education. Longitudinal studies could follow international students throughout their doctoral programs, examining how their critical thinking skills evolve over time. These studies might involve multiple data collection points, such as interviews or surveys at various stages of the doctoral journey, to track changes in their cognitive and ethical development.
3. **Faculty and Staff Perspectives:** To provide a more comprehensive understanding of international students' experiences, future research could focus on the perspectives of faculty and academic staff who interact with these students. Qualitative research methods, including in-depth interviews or surveys, can be employed to capture the insights of faculty members. This research might explore how faculty perceive the critical thinking development of international students, the challenges they encounter, and the strategies they employ to facilitate their growth. Investigating the experiences and practices of faculty and staff can complement the student-centered perspective provided by this study.
4. **Support and Intervention Studies:** Further research can delve into the effectiveness of support systems and interventions designed to enhance critical thinking among international students. For example, researchers can design and implement targeted interventions within academic programs to measure their impact on students' critical thinking development. These interventions might include specific curriculum modifications, mentorship programs, or cross-cultural training initiatives. Employing

a qualitative research approach, such as action research or case studies, can provide rich insights into the effectiveness of these interventions.

5. **Mixed-Methods Research:** Combining qualitative and quantitative research methods can offer a more comprehensive perspective on international students' critical thinking development. Future research can integrate qualitative data, such as interviews and narratives, with quantitative assessments of critical thinking skills. This mixed-methods approach can provide a more robust understanding of the multifaceted nature of critical thinking development among international doctoral students.

By pursuing these research avenues, scholars can continue to expand our knowledge of how critical thinking develops in international students and further enrich the field of cross-cultural education. These research directions have the potential to inform educational practices, faculty training, and support services, ultimately fostering a more inclusive and globally informed academic environment.

Conclusion

In conclusion, this dissertation has explored Chinese international doctoral students' perspectives on developing critical thinking in the U.S. Transformative learning theory and Perry's scheme of intellectual and ethical development provided valuable frameworks for understanding the participants' experiences and cognitive growth. The analysis of narrative interviews revealed key themes and commonalities among participants. The findings provide rich insights into the processes of critical thinking development, shedding light on the transformative potential of doctoral education and the complex evolution of epistemological beliefs. The narrative inquiry has illustrated the intricate relationship between cultural contexts, educational environments, and individual agency in shaping the understanding and development of critical thinking among Chinese international doctoral students. The findings from the Four Themes collectively underscore the dynamic and multidimensional nature of

critical thinking development. Addressing Research Questions 1 and 2, my exploration has revealed the varied pathways through which Chinese international doctoral students come to comprehend critical thinking and how they actively engage with and advance this cognitive skillset during their doctoral studies in the U.S.

These insights offer valuable contributions to educational practice and policy, suggesting opportunities for curriculum enhancement, cultural sensitivity, and tailored support mechanisms. By acknowledging the contextual nuances and individual trajectories that underpin critical thinking development, educators and institutions can better facilitate the academic success and holistic growth of Chinese international doctoral students in their pursuit of higher education in the U.S.

The findings also contribute to the literature on critical thinking development, cross-cultural education, and transformative learning. This study underscores the importance of fostering a supportive educational environment that encourages independent inquiry, critical analysis, and the development of sophisticated epistemological beliefs. Through the narratives of these participants, a deeper understanding of the journey towards enhanced critical thinking among Chinese international doctoral students has been achieved. This study contributes to the fields of adult education and international student experiences and invites further exploration into the cultivation of critical thinking skills among diverse student populations.

REFERENCES

- Achirri, K. (2021). "Life is splendid here in the U.S.": Intercultural learning in contemporary Chinese students' academic adjustment. *Qualitative Report*, 26(4).
<https://doi.org/10.46743/2160-3715/2021.3501>
- Ahern, K. J. (1999). Ten tips for reflexive bracketing. *Qualitative Health Research*, 9, 407-411.
- Ahern, A., Dominguez, C., McNally, C., O'Sullivan, J. J., & Pedrosa, D. (2019). A literature review of critical thinking in engineering education. *Studies in Higher Education (Dorchester-on-Thames)*, 44(5), 816–828.
<https://doi.org/10.1080/03075079.2019.1586325>
- Anderson-Levitt, K. M. (2003). *Local meanings, global schooling: anthropology and world culture theory*. Palgrave Macmillan.
- Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (Eds.). (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives (Complete edition). New York, N.Y: Longman.
- Atkinson, D. (1997). A critical approach to critical thinking in TESOL. *TESOL Quarterly*, 31(1), 71-94.
- Badger, J. (2019). A Case Study of Chinese Students' and IEP Faculty Perceptions of a Creativity and Critical Thinking Course. *Higher Education Studies*, 9(3), 34–44.
- Bailin, S., Case, R., Coombs, J. R., & Daniels, L. B. (1990). Common misconceptions of critical thinking. *Journal of Curriculum Studies*, 31(3), 269-283.
- Battaglini, D. J., Schenkat, R. J., (1987). Fostering cognitive development in college students—The Perry and Toulmin models. ERIC Digest.
- Bellack, D. R., Wang, M., & Faustmann, L. (1992). A cross-cultural comparison of

- analogical reasoning between Chinese graduate students studying in either the People's Republic of China (PRC) or the United States (USA). Retrieved from <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=ED349900>
- Benson, R., Hewitt, L., Heagney, M., Devos, A., & Crosling, G. (2010). Diverse pathways into higher education: Using students' stories to identify transformative experiences. *Australian Journal of Adult Learning*, 50(1), 26–53.
- Bjorklund, B. R., & Bee, H. J. (2008). *The journey of adulthood (6th ed.)*. Upper Saddle River, NJ: Pearson/Prentice Hall.
- Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). A taxonomy of educational objectives: Handbook I Cognitive Domain. New York; David McKay.
- Bodycott, P., & Lai, A. (2012). The influence and implications of Chinese culture in the decision to undertake cross-border higher education. *Journal of Studies in International Education*, 16(3), 252–270.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Retrieved from: <http://eprints.uwe.ac.uk/11735>
- Brazill, S. (2021). Narrative inquiry into Chinese international doctoral students' journey: A strength-based perspective. *International Journal of Doctoral Studies*, 16, 395–428. <https://doi.org/10.28945/4785>
- Brazill, S. (2022). Chinese International Doctoral Students' Cross-cultural Socialization: Leveraging Strengths and Multiple Identities. *International Journal of Doctoral Studies*, 17, 87–114. <https://doi.org/10.28945/4925>
- Brookfield, S. (1987). *Developing critical thinkers: Challenging adults to explore alternative*

- ways of thinking and acting* (1st ed., Jossey-Bass higher education series). Jossey-Bass.
- Campbell, J., & Li, M. (2008). Asian students' voices: An empirical study of Asian students' learning experiences at a New Zealand university. *Journal of Studies in International Education*, 12(4), 375–396. <https://doi.org/10.1177/1028315307299422>
- Chan, E. Y. M. (2019). Blended learning dilemma: Teacher education in the Confucian heritage culture. *Australian Journal of Teacher Education*, 44(1), 36–51.
- Chan, N.-M., Ho, I. T., & Ku, K. Y. L. (2011). Epistemic beliefs and critical thinking of Chinese students. *Learning and Individual Differences*, 21(1), 67–77. Retrieved from <https://search-ebscohost-com.proxy.lib.utk.edu/login.aspx?direct=true&db=eric&AN=EJ909614&scope=site>
- Chase, S. E. (2013). Still a field in the making. In N. K. Denzin & Y. S. Lincoln (Eds.), *Collecting and interpreting qualitative materials* (4th ed., pp. 55-83). Sage Publications, Inc.
- Chen, G. M. (1993). *A Chinese perspective of communication competence*.
- Chen, L. (2017). *Problematizing the Critical Thinking Concept: Perspectives of Chinese Undergraduate Students and Their U.S. University Faculty*. ProQuest LLC. ProQuest LLC. Retrieved from <https://search-ebscohost-com.proxy.lib.utk.edu/login.aspx?direct=true&db=eric&AN=ED575370&scope=site>
- Cheng, X. (2000). Asian students' reticence revisited. *System*, 28(3), 435-446.
- Cheng, L., & Xu, N. (2011). The complexity of Chinese pedagogic discourse. *Journal of Curriculum Studies*, 43(5), 606–614.
- Christie, M., Carey, M., Robertson, A., & Grainger, P. (2015). Putting transformative learning theory into practice. *Australian Journal of Adult Learning*, 55(1), 9–30.
- Chuang, S.-F. (2012). Different instructional preferences between Western and far East Asian

- adult learners: A case study of graduate students in the USA. *Instructional Science: An International Journal of the Learning Sciences*, 40(3), 477–492.
- Clandinin, D. J. (Ed.). (2007). *Handbook of narrative inquiry: Mapping a methodology*. SAGE Publications, Inc.
- Clandinin, D.J., & Connelly, F.M. (2000) *Narrative Inquiry: Experience and story in qualitative Research*. Jossey-Bass.
- Clandinin, D. J., & Rosiek, J. (2007). Mapping a landscape of narrative inquiry: Borderland spaces and tensions. In D. J. Clandinin (Ed.), *Handbook of narrative inquiry: Mapping a methodology* (pp. 35-75). Sage.
- Clark C., & Caffarella, R. S. (Eds.). (2011). An update on adult development theory: New ways of thinking about the life course: *New Directions for adult and continuing education* Number 84. Wiley.
- Coryell, J. (2013). Collaborative comparative inquiry and transformative cross-cultural adult learning and teaching: A western educator metanarrative and inspiring a global vision. *Adult Education Quarterly*, 63(4), 299–320.
<https://doi.org/10.1177/0741713612471420>
- College Entrance Examination Board. (1983). *10 SATs: Scholastic aptitude tests of the College Board*.
- Corcoran, C. (2014). Chinese learning styles: Blending Confucian and Western theories. *Journal of Instructional Pedagogies*, 13.
- Craig, C. J. (2005). Historical research and narrative inquiry: Striking similarities, notable differences. *American Educational History Journal*, 32(2), 214–218.
- Cranton, P. (2014). Validating narratives of learning. *New Directions for Adult and Continuing Education*, 142, 21-30.
- Cranton, P., & Merriam, S. (2015). *A guide to research for educators and trainers of adults*.

- Krieger Publishing Company.
- Creswell, J., & Creswell, J., 2018. *Research design*. 5th ed. SAGE Publications, Inc.
- Crites, J. O. (1965). Test reviews: Watson-Glaser Critical Thinking Appraisal. *Journal of Counseling Psychology*, 12(3), 328–330. <https://doi.org/10.1037/h0020517>
- Cross, J. (2015). Book Review: The Palgrave Handbook of Critical Thinking in Higher Education, edited by Martin Davies and Ronald Barnett, USA: Palgrave Macmillan. *Journal of Organizational Knowledge Communication*, 2(1), 81-87.
- Daiute, C. (2014). *Narrative inquiry: a dynamic approach*. SAGE Publications, Inc.
- Dam, G.T., & Volman, M. (2004). Critical thinking as a citizenship competence: Teaching strategies. *Learning and Instruction*, 14(4), 359–379.
- Dana C. (2013). Subjectivity not statement and not APA!. *The Qualitative Report*, 18, 1-5.
- Davidson, C. (2009). Transcription: Imperatives for qualitative research. *International Journal of Qualitative Methods*, 8(2), 35-52.
- Davies, M., & Barnett, R. (2015). The Palgrave Handbook of Critical Thinking in Higher Education. New York USA: Palgrave Macmillan.
- De Groot, I. (2018). Narrative learning for democratic citizenship identity: A theoretical framework. *Educational Review*, 70(4), 447–464.
- Deepa, I. (2017). The Palgrave handbook of critical thinking in higher education, *Innovations in Education and Teaching International*, 54(4), 403-405, DOI: 10.1080/14703297.2017.1330176
- Dennett, S. K. (2014). A Study to Compare the Critical Thinking Dispositions between

- Chinese and American College Students. *ProQuest LLC*. Retrieved from <https://search-ebscohost-com.proxy.lib.utk.edu/login.aspx?direct=true&db=eric&AN=ED557684&scope=site>
- Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. Sage.
- Dewey, J. (1909). *Moral Principles in Education*. Boston: Houghton Mifflin Company.
- Dewey, J. (1910). *How we think*. D.C. Heath & co.
- Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. Boston: Health and Company.
- Ding, M. (2021). *Teaching early algebra through example-based problem solving: Insights from Chinese and U.S. elementary classrooms*. Routledge.
- Dirkx, J. M., & Fisher, D. L. (2012). Theoretical foundations of the scholarship of teaching and learning: A conceptual framework for dialogue. In P. H. Hutchings (Ed.), *The Scholarship of Teaching and Learning Reconsidered: Institutional Integration and Impact* (pp. 51-76). Jossey-Bass.
- Dirkx, J. M., & Mezirow, J. (2006). Musings and reflections on the meaning, context, and process of transformative learning: A dialogue between John M. Dirkx and Jack Mezirow. *Journal of Transformative Education*, 4(2), 123-139.
- Dominguez, C. C. (2018). *A European review on critical thinking educational practices in higher education institutions*. Vila Real: UTAD. ISBN: 978-989-704-258-4.
- Du, X., Emmersen, J., Toft, E., & Sun, B. (2013). PBL and Critical Thinking Disposition in Chinese Medical Students--A Randomized Cross-Sectional Study. *Journal of Problem Based Learning in Higher Education*, 1(1), 72–83.
- Durkin, K. (2008). The adaptation of east Asian Masters students to western norms of critical thinking and argumentation in the UK. *Intercultural Education*, 19(1), 15-27.
- Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework

- for the 21st century. *Thinking Skills and Creativity*, 12, 43–52.
<https://doi.org/10.1016/j.tsc.2013.12.004>
- El-Farargy, N. (2010). Evaluation of a chemistry curriculum intervention using the Perry model of intellectual development. *Chemistry Education Research and Practice*, 11(2), 98–106.
- El Soufi, N., & See, B. H. (2019). Does explicit teaching of critical thinking improve critical thinking skills of English language learners in higher education? A critical review of causal evidence. *Studies in Educational Evaluation*, 60, 140–162.
<https://doi.org/10.1016/j.stueduc.2018.12.006>
- Ennis, R. H. (1962). A Concept of Critical Thinking. *Harvard Educational Review*, 32(1), 81-111.
- Ennis, R. (1998). Is critical thinking culturally biased? *Teaching Philosophy*, 21(1), 15-33.
- Ennis, R. (1991). Critical thinking: A streamlined conception. *Teaching Philosophy*, 14, 15-24.
- Ennis, R. (2000) A super-streamlined conception of critical thinking, CriticalThinking.Net, University of Illinois, UC. Available online at: <http://www.criticalthinking.net/SSConcCTApr3.html>
- Facione, P. A. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi report). American Philosophical Association.
- Fakunle, L., Allison, P., & Fordyce, K. (2016). Chinese Postgraduate Students' Perspectives on Developing Critical Thinking on a UK Education Masters. *Journal of Curriculum and Teaching*, 5(1), 27–38.
- Fan, F., & de Jong, E. J. (2019). Exploring professional identities of nonnative-English-speaking teachers in the United States: A narrative case study. *TESOL Journal*, 10(4).

- Feng, J. (1991). The adaptation of students from the People's Republic of China to an American academic culture. *ERIC Document Reproduction Service (No. ED 329833)*.
<https://doi.org/10.1088/1748-605X/aa9486> Manuscript
- Feng, A. (2016). Educating for global competence: Confucianism and transformative learning. *Journal of Transformative Education*, 14(3), 245-267.
- Fengyan, W. (2004). Confucian thinking in traditional moral education: Key ideas and fundamental features. *Journal of Moral Education*, 33(4), 429–447.
- Flick, U. (2014). *Collaborative learning: An introduction to qualitative research*. Sage.
- Erkovich, A. (2015). Taking It with you: Teacher education and the baggage of cultural dialogue. *Frontiers of Education in China*, 10(2), 175–200.
- Genzola, A. E. (2015). Weblogs on language learning: A technology-enhanced instruction in a tertiary-level EFL classroom in China. *Arab World English Journal*, 6(4), 389–407.
- Given, L., 2016. *100 questions (and answers) about qualitative research*. Sage.
- Glaser, E. M. (1941). *An experiment in the development of critical thinking*. Teachers College, Columbia University.
- Grbich, C. (2013). *Qualitative Data Analysis: An Introduction* (2nd ed.). Sage.
- Greer, B. J. (2005). *Overcoming academic challenges: The experiences of mainland Chinese graduate students at an American university*. [Doctoral Dissertation, The University of Iowa, 3172396] ProQuest Dissertations Publishing.
- Gubrium, J. F., & Holstein, J. A. (2009). *Analyzing narrative reality*. Sage.
- Han, S., & Yi, Y. (2009). English majors' writing course and the development of critical thinking skills. *Foreign Languages and Literature Studies*, 1, 24-28.
- Hare, W. (1999). Critical thinking as an aim of education. In R. Marples (Ed.), *The aims of education* (pp. 85–99). London: Routledge.
- He, Y., & Hutson, B. (2018). Exploring and leveraging Chinese international students'

- strengths for success. *Journal of International Students*, 8(1), 87-108.
- Hearn, S., Saulnier, G., Strayer, J., Glenham, M., Koopman, R., & Marcia, J. (2012). Between integrity and despair: Toward construct validation of Erikson's eighth stage. *Journal of Adult Development*, 19(1), 1–20.
<https://doiorg.proxy.lib.utk.edu/10.1007/s10804-011-9126-y>
- Henderson, S. (1994). Theories of cognitive development and the teaching of argumentation in first-year composition.
- Heng, T. (2017). Voices of Chinese international students in USA colleges: 'I want to tell them that ... '. *Studies in Higher Education*, 42(5), 833-850.
- Heng, T. (2019). Understanding the heterogeneity of international students' experiences: A case study of Chinese international students in U.S. universities. *Journal of Studies in International Education*, 23(5), 607–623. <https://doi.org/10.1177/1028315319829880>
- Heng, T. T. (2018). Different Is Not Deficient: Contradicting Stereotypes of Chinese International Students in US Higher Education. *Studies in Higher Education*, 43(1), 22–36.
- Henze, J., & Zhu, J. N. (2012). Current research on Chinese students studying abroad. *Research in Comparative and International Education*, 7(1), 90–104.
- Higgins, P. (2019). *A Narrative Inquiry on the Experiences of Refugee Adult Learners in Community Colleges in the Southeastern Region of the United States*. [Doctoral Dissertation, University of Tennessee] TRACE: Tennessee Research and Creative Exchange.
- Hodes, C. L. (1988). Perry's scheme of development.
- Hoggan, C. (2016). Transformative learning as a metatheory: Definition, criteria, and typology. *Adult Education Quarterly*, 66(1), 57–75.
<https://doi.org/10.1177/0741713615611216>

- Holmes, P. (2005). Ethnic Chinese students' communication with cultural others in a New Zealand university. *Communication Education*, 54(4), 289–311.
<https://doi.org/10.1080/03634520500442160>
- Hou, M. (2021). Ambitious and anxious: How Chinese college students succeed and struggle in American higher education. *Journal of International Students*, 11(3), 757–760.
<https://doi.org/10.32674/jis.v11i3.3743>
- Huang, R. & Li, Y. (2014). Improving mathematics classroom instruction through exemplary lesson development: A Chinese approach. In *Transforming Mathematics Instruction* (pp. 231–252). Springer International Publishing. https://doi.org/10.1007/978-3-319-04993-9_14
- Hunter-Johnson, Y. (2022). A Leap of Academic Faith and Resilience: Nontraditional International Students Pursuing Higher Education in the United States. *Journal of International Students*, 12(2), 283–301. <https://doi.org/10.32674/jis.v12i2.1986>
- Hunter-Johnson, Y. & Niu, Y. (2019). Bahamians as international adult learners determined for academic success: Challenges and required support system. *Journal of International Students*, 9(4), 1038–1054. <https://doi.org/10.32674/jis.v9i4.606>
- Jenkins, S. J., & Boyd, L. D. (2020). Perceived barriers to academic success for international students studying dental hygiene in the U.S. *Journal of Dental Education*, 84(1), 81–87. <https://doi.org/10.21815/JDE.019.163>
- Jeremiah, K. (2012). *Understanding Approaches to Teaching Critical Thinking in High School Classrooms*. ProQuest Dissertations Publishing.
- Jiang, L., & Kosar, H. (2020). The Pedagogy of Studying Abroad: A Case Study of Chinese Students in the Netherlands. *European Journal of Higher Education*, 10(2), 202–216.
- Jiang, L., Zhang, L. J., & May, S. (2019). Implementing English-medium instruction (EMI)

- in China: Teachers' practices and perceptions, and students' learning motivation and needs. *International Journal of Bilingual Education and Bilingualism*, 22(2), 107–119. <https://doi.org/10.1080/13670050.2016.1231166>
- Jonassen, D., Strobel, J., & Lee, C. B. (2006). Everyday problem solving in engineering: Lessons for engineering educators. *Journal of Engineering Education* (Washington, D.C.), 95(2), 139–151. <https://doi.org/10.1002/j.2168-9830.2006.tb00885.x>
- Jones, A. (2005). Culture and Context: Critical Thinking and Student Learning in Introductory Macroeconomics. *Studies in Higher Education*, 30(3), 339–354.
- Judith P. (2012). Subjectivity statement. In L. M. Given (Ed.). *The sage encyclopedia of qualitative research methods* (pp. 1-3). Sage.
- Kasworm, C. E., Rose, A. D., & Ross-Gordon, J. M. (2010). *Handbook of adult and continuing education* (2010 edition). SAGE.
- Kawar, K., Walters, J., & Fine, J. (2019). Narrative production in Arabic-speaking adolescents with and without hearing loss. *Journal of Deaf Studies and Deaf Education*, 24(3), 255–269. <https://doi.org/10.1093/deafed/eny048>
- Kitchenham, A. (2008). The evolution of John Mezirow's transformative learning theory. *Journal of Transformative Education*, 6(2), 104–123. <https://doi.org/10.1177/1541344608322678>
- Kloss, R. J. (1994). A nudge is best: Helping students through the Perry scheme of intellectual development. *College Teaching*, 42(4), 151–158.
- Knefelkamp, L. (1974). Developmental instruction: Fostering intellectual and personal growth of college students. ProQuest Dissertations Publishing.
- Knight, J., & de Wit, H. (1997). *Internationalisation of HE in Asia pacific countries*, European Association for International Education, Amsterdam.
- Knight, J. (2003). Updated definition of internationalization. *International Higher Education*,

- (33). <https://doi.org/10.6017/ihe.2003.33.7391>
- Knight, J. (2008). *Higher education in turmoil. The changing world of internationalization*. Rotterdam: Sense Publishers.
- Knowles, M. S. (1975). *Self-directed learning*. Association Press.
- Knowles, Holton III, E. F., & Swanson, R. A. (2005). Beyond Andragogy. In *The Adult Learner* (pp. 216–242). Routledge. <https://doi.org/10.4324/9780080481913-15>
- Kridel, C., Bullough Jr., R. V., & Goodlad, J. I. (2007). *Stories of the eight-year study: Reexamining secondary education in America*. State Univ. of New York Pr.
- Lam, C. (2013). *Childhood, philosophy and open society implications for education in Confucian heritage cultures*. Springer Singapore. <https://doi.org/10.1007/978-981-4451-06-2>
- Lan, X., et al. (2009). Keeping their attention: Classroom practices associated with behavioral engagement in first grade mathematics classes in China and the United States. *Early Childhood Research Quarterly*, 24(2), 198–211.
<https://doi.org/10.1016/j.ecresq.2009.03.002>
- Leggo. (2011). Narrative Inquiry: Attending to the Art of Discourse. *Language & Literacy (Kingston, Ont.)*, 10(1). <https://doi.org/10.20360/G2SG6Q>
- Li, G., Sun, Z., & Jee, Y. (2019). The more technology, the better? A comparison of teacher-student interaction in high and low technology use elementary EFL classrooms in China. *System (Linköping)*, 84, 24–40. <https://doi.org/10.1016/j.system.2019.05.003>
- Li, Y. (2013). First year ESL students developing critical thinking: Challenging the stereotypes. *Journal of Education and Training Studies*, 1(2), 186–196.
- Li, Y., Yao, M., Song, F., Fu, J., & Chen, X. (2019). Building a just world: The effects of service-learning on social justice beliefs of Chinese college students. *Educational Psychology*, 39(5), 591–616.

- Lincoln, & Guba, E. G. (1986). But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New Directions for Program Evaluation*, 1986(30), 73–84.
<https://doi.org/10.1002/ev.1427>
- Lindeman, E. (1989). *The meaning of adult education*. Oklahoma Research Center for Continuing Professional and Higher Education.
- Lipman, M. (1988). Critical thinking-what can it be? *Educational Leadership*, 46(1), 38-43.
- Liu, D., & Vogel, L. R. (2016). Mitigating transitional challenges of Chinese students in U.S. higher education. *Higher Education Studies*, 6(3), 100-113.
- Liu, H., Xu, Y., & Lu, H. (2020). Online English reading instruction in the ESL classroom based on constructivism. *Journal of Educational Technology Systems*, 48(4), 539–552. <https://doi.org/10.1177/0047239519899341>
- Lu, S., & Singh, M. (2017). Debating the Capabilities of “Chinese Students” for Thinking Critically in Anglophone Universities. *Education Sciences*, 7.
- Lu, Y., & Jover, G. (2019). An anthropocosmic view: What Confucian traditions can teach us about the past and future of Chinese higher education. *Higher Education: The International Journal of Higher Education Research*, 77(3), 423–436.
- Lucas, K. J. (2019). Chinese graduate student understandings and struggles with critical thinking: A narrative-case study. *International Journal for the Scholarship of Teaching and Learning*, 13(1).
- Ma, W., & Luke, A. (2014). *East Meets West in Teacher Preparation: Crossing Chinese and American Borders*. Teachers College Press.
- Ma, Y. (2020). *Ambitious and anxious: How Chinese college students succeed and struggle in American higher education*. Columbia University Press.
- Mak, J. S. C. (2013). How do students from China studying at U.S. engineering graduate degree programs develop along the Perry scheme. ProQuest LLC.

- Marshall, J. (2014). *Introduction to comparative and international education*. Los Angeles: Sage. ISBN: 978-1-4462-7320-3.
- McPeck, J.E. (1981). *Critical thinking and education*. Oxford: Martin Robertson.
- Merriam, S., Caffarella, R., & Baumgartner, L. (2007). *Learning in adulthood a comprehensive guide* (3rd ed.). Jossey-Bass.
- Merriam, S. B., & Baumgartner, L. (2020). *Learning in adulthood: A comprehensive guide* (4th ed.). Jossey-Bass.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative Research: A Guide to Design and Implementation*. (4th ed.). John Wiley & Sons, Incorporated.
- Mertova, P. & Webster, L. (2020). *Using narrative inquiry as a research method: An introduction to critical event narrative analysis in research, teaching and professional practice* (2nd ed.). Routledge.
- Mezirow, J. (1978). Perspective transformation. *Adult Education*, 28(2).
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. Jossey-Bass.
- Mezirow, J. (1994). Understanding transformation theory. *Adult Education Quarterly*, 44(4), 222–232. <https://doi.org/10.1177/074171369404400403>
- Mezirow, J. (1996). Contemporary paradigms of learning. *Adult Education Quarterly*, 46(3), 158–172. <https://doi.org/10.1177/074171369604600303>
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, (74), 5–12.
- Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress* (1st ed.). Jossey-Bass.
- Mezirow, J., & Taylor, E. W. (2009). *Transformative learning in practice: insights from community, workplace, and higher education* (1st ed.). Jossey-Bass.
- Michelle, O. (2008). Keeping and using reflective journals in the qualitative research

- process. *The Qualitative Report*, 13, 695-705.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.
- Moon, C., Zhang, S., Larke, P., & James, M. (2020). We are not all the same: A qualitative analysis of the nuanced differences between Chinese and South Korean international graduate students' experiences in the United States. *Journal of International Students*, 10(1), 28–49. <https://doi.org/10.32674/jis.v10i1.770>
- Moore, T. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education*, 38(4), 506-522.
- Morrice, L. (2013). Learning and refugees: Recognizing the darker side of transformative learning. *Adult Education Quarterly*, 63(3), 251–271.
<https://doi.org/10.1177/0741713612465467>
- Murray, J. B. (2012). Educating human nature: “Nature” and “Nurture” in early Confucian moral education. *Journal of Moral Education*, 41(4), 509–527.
- Nejmaoui, N. (2019). Improving EFL learners' critical thinking skills in argumentative writing. *English Language Teaching*, 12(1), 98–109.
- Nicolaides, A., Eschenbacher, S., Buergelt, P. T., Gilpin-Jackson, Y., Welch, M., & Misawa, M. (2022). *The palgrave handbook of learning for transformation*. Springer International Publishing AG. <https://doi.org/10.1007/978-3-030-84694-7>
- Nielson Vargas, E. K. (2017). *A case study of students in a developmental literacy course when participating in a mindfulness-based Intervention*. [Doctoral Dissertation, Texas State University - San Marcos, 10760445] ProQuest Dissertations Publishing.
- Niu, W. (2012). Confucian ideology and creativity. *Journal of Creative Behavior*, 46(4), 274–284.
- Nohl, A. (2015). Typical phases of transformative learning: A practice-based model. *Adult*

- Education Quarterly*, 65(1), 35–49. <https://doi.org/10.1177/0741713614558582>
- Oliver, D. G., Serovich, J. M., & Mason, T. L. (2005). Constraints and opportunities with interview transcription: Towards reflection in qualitative research. *Social Forces*, 84, 1273–1289.
- Overton, M. D. (2017). *“Living It in the day to day”: Narratives of advanced martial artists*. [Doctoral Dissertation, University of Tennessee] TRACE: Tennessee Research and Creative Exchange.
- Parker, J. C. (1984). The preliminary investigation of the validity and reliability of the Parker Cognitive Development Inventory. The University of Iowa, 1984. Dissertation Abstract International, 45, 2849A (University microfilms No.: DA84-28, 277).
- Paton, M. (2005). Is critical analysis foreign to Chinese students? In E. Manalo & G. Wong-Toi (Eds.), *Communication skills in university education: The international dimension* (pp. 1–11). Auckland: Pearson Education.
- Patton, M. Q. (1990). *Qualitative evaluation methods* (2nd ed.). Sage.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Sage.
- Paul, R. (1992). Critical thinking: what, why, and how. *New Directions for Community Colleges*, 77, 3-24. [http://dx. doi.10.1002/cc.36819927703](http://dx.doi.org/10.1002/cc.36819927703)
- Paul, R., & Elder, L. (2001). The miniature guide to critical thinking: Concepts & tools. Foundation Critical Thinking.
- Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years; a scheme*. Holt, Rinehart and Winston.
- Perry, W. G. (1981). *Cognitive and ethical growth: The making of meaning in the modern American college*
- Perry, W. G. (1999). *Forms of intellectual and ethical development in the college years: A scheme*. Jossey-Bass Publishers.

- Peshkin, A. (1988). In search of subjectivity-one's own. *Educational Researcher*, 17(7), 17-21.
- Pinnegar, S., & Daynes, J. (2007). Locating narrative inquiry historically: Thematics in the turn to narrative. In Clandinin, D. J. (Ed.), *Handbook of narrative inquiry: Mapping a Methodology* (pp. 3-34). Sage Publications, Inc.
- Polkinghorne, D. E. (1995). Narrative configuration in qualitative analysis. *International Journal of Qualitative Studies in Education*, 8(1), 5-23.
- Pu, S., & Evans, M. (2019). Critical Thinking in the Context of Chinese Postgraduate Students' Thesis Writing: A Positioning Theory Perspective. *Language, Culture and Curriculum*, 32(1), 50–62.
- Reichenbach, B.R. (2001). Introduction to critical thinking. New York, NY: McGraw-Hill Higher Education.
- Riessman, C. K. (2008). *Narrative methods for the human sciences*. SAGE Publications, Inc.
- Rolls, L. & Relf, M. (2006). Bracketing interviews: Addressing methodological challenges in qualitative interviewing in bereavement and palliative care. *Mortality*, 11(3), 286-305.
doi: 10.1080/13576270600774893
- Ross-Gordon, J. M., Rose, A. D., & Kasworm, C. E. (2017). *Foundations of adult and continuing education*. Jossey-Bass.
- Ross-Gordon, J. M., Rose, A. D., & Kasworm, C. E. (2016). *Foundations of Adult and Continuing Education*. John Wiley & Sons, Incorporated.
- Ruan, Z., & Toom, A. (2020). From perceived discrepancies to intentional efforts: Understanding English department teachers' agency in classroom instruction in a changing curricular landscape. *Teaching and Teacher Education*, 92, 103074–.
<https://doi.org/10.1016/j.tate.2020.103074>

- Ryan, J., & Louie, K. (2007). False dichotomy? ‘Western’ and ‘Confucian’ concepts of scholarship and learning. *Educational Philosophy and Theory*, 39(4), 404-417.
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Saito, N. (2009). Ourselves in translation: Stanley Cavell and philosophy as autobiography. *Journal of Philosophy of Education*, 43(2), 253–267.
- Saputra, M. D., Joyoatmojo, S., Wardani, D. K., & Sangka, K. B. (2019). Developing Critical-Thinking Skills through the Collaboration of Jigsaw Model with Problem-Based Learning Model. *International Journal of Instruction*, 12(1), 1077-1094.
- Scally, J., & Jiang, M. (2020). “I Wish I Knew How to Socialize with Native Speakers”: Supporting Authentic Linguistic and Cultural Experiences for Chinese TESOL Students in the UK. *Journal of Further and Higher Education*, 44(10), 1335–1348.
- Schroeder, S. M., & Terras, K. L. (2015). Advising Experiences and Needs of Online, Cohort, and Classroom Adult Graduate Learners. *NACADA Journal*, 35(1), 42–55.
- Shao, G., et al. (2012). Mathematics classroom instruction in China viewed from a historical perspective. In R. Huang, & Y. Li (Eds.), *How Chinese Teach Mathematics and Improve Teaching* (pp. 26–43). Routledge. <https://doi.org/10.4324/9780203110119-10>
- Shapiro, N. S. (1985). Rhetorical maturity and Perry’s scheme of cognitive complexity. In *the Annual Meeting of the Conference on College Composition and Communication (36th, Minneapolis)*
- Sharif, M. K., & Osterling, J. P. (2011). China’s re-emergence: Sociolinguistic challenges faced by Chinese international students enrolled in U.S. Universities. *International Research and Review*, 1(1), 65-74.
- Shi, P., & Michael, E. (2019). Critical thinking in the context of Chinese postgraduate

- students' thesis writing: a positioning theory perspective, *Language, Culture and Curriculum*, 32(1), 50-62, DOI: 10.1080/07908318.2018.1442473
- Simpson, S. T. (2008). Western EFL teachers and East-West classroom-culture conflicts. *RELJ Journal*, 39(3), 381–394. <https://doi.org/10.1177/0033688208096847>
- Song, X. (2020). “Chinese Students Syndrome” in Australia: Colonial modernity and the possibilities of alternative framing. *Higher Education*, 79(4), 605–618. <https://doi.org/10.1007/s10734-019-00426-z>
- Squire, C. (2008). Approaches to narrative research. ESRC National Centre for Research Methods Review Paper.
- Stasiak, L. Y. (2017). *Stress, anxiety, and social emotional learning in education: Perceptions of undergraduate, pre-service, and practicing teachers*. [Doctoral Dissertation, Lesley University, 10257863] ProQuest Dissertations Publishing
- Sternberg, R. J. (1986). *Critical thinking: Its nature, measurement, and improvement*. National Institute of Education.
- Stevens-Long, J., Schapiro, S., & McClintock, C. (2012). Passionate Scholars: Transformative Learning in Doctoral Education. *Adult Education Quarterly*, 62(2), 180–198. <https://doi.org/10.1177/0741713611402046>
- Stonewater, J. K., & And Others. (1981). Hearing how students “make meaning”: Listening through Perry's ears.
- Sun, Q., Kang, H., Chang, B., & Lausch, D. (2019). Teaching international students from Confucian heritage culture countries: Perspectives from three U.S. Host Campuses. *Asia Pacific Education Review*, 20(4), 559–572.
- Tan, C. (2017). A Confucian Conception of Critical Thinking. *Journal of Philosophy of Education*, 51(1), 331–343.
- Tan, C. (2016). *Educational borrowing in China: looking West or looking East?* Routledge.

- Tan, C. (2017). A Confucian conception of critical thinking. *Journal of Philosophy of Education, 51*(1), 331–343.
- Tan, J. k., & Goh, J.W. (2006). Why do they not talk? Towards an understanding of students' cross-cultural encounters from an individualism/collectivism perspective. *International Education Journal, 7*(5), 651-667.
- Tang, L. (2016). Exploration on Cultivation of Critical Thinking in College Intensive Reading Course. *English Language Teaching, 9*(3), 18–23.
- Tang, X., Collier, D. A., & Witt, A. (2018). Qualitative study on Chinese students' perception of U.S. university life. *Journal of International Students, 8*(1), 151–174.
<https://doi.org/10.5281/zenodo.1134279>
- Tankersley, K. (2005). *Literacy Strategies for Grades 4-12: Reinforcing the Threads of Reading*. Association for Supervision & Curriculum Development.
- Taylor, E. W. (1998). *The theory and practice of transformative learning: A critical review*.
- Taylor, E. & Cranton, P. (2012). *The handbook of transformative learning: Theory, research, and practice*. (1st ed.). Jossey-Bass.
- Tennant, M., & Pogson, P. (2002). *Learning and change in the adult years: A developmental perspective*. Jossey-Bass (Wiley).
- Thakkar, D. (2011). Social and cultural contexts of Chinese learners: Teaching strategies for American educators. *Multicultural Education, 19*(1), 51–54.
- The U.S. Department of Labor, Office of Disability Employment Policy. (2012, February). *Skills to Pay the Bills: Problem Solving and Critical Thinking*.
<https://www.dol.gov/sites/dolgov/files/odep/topics/youth/softskills/problem.pdf>
- Tian, J., & Low, G. D. (2011). Critical Thinking and Chinese University Students: A Review of the Evidence. *Language, Culture and Curriculum, 24*(1), 61–76.
- Tracy, S. J. (2010). Qualitative quality: Eight “Big-Tent” criteria for excellent qualitative

- research. *Qualitative Inquiry*, 16(10), 837–851.
<https://doi.org/10.1177/1077800410383121>
- Tran, T. T. (2013). Is the learning approach of students from the Confucian heritage culture problematic? *Educational Research for Policy and Practice*, 12(1), 57–65.
<https://doi.org/10.1007/s10671-012-9131-3>
- Tu, Y. (2011). Citizenship with Chinese characteristics? An investigation into Chinese university students' civic perceptions and civic participation. *Frontiers of Education in China*, 6(3), 426–448.
- Tung, M. L. (2016). The roots of the challenge: Undergraduate Chinese students adjusting to American college life. *International Journal of Higher Education*, 5(3).
<https://doi.org/10.1590/S0004-282X2012000500009>
- Turner, Y. (2006). Students from mainland China and critical thinking in postgraduate business and management degrees: Teasing out tensions of culture, style and substance. *International Journal of Management Education*, 5(1), 3-11.
- Tyner, Jonathan, "The Decision-making Process: Experiences of New International Graduate Students Enrolled in U.S. Higher Education. " PhD diss., Texas State University, 2019.
<https://www.proquest.com/docview/2358405987?pq-origsite=gscholar&fromopenview=true>
- Valdez, G. (2015). U.S. higher education classroom experiences of undergraduate Chinese international students. *Journal of International Students*, 5(2), 188-200.
- Wang, C. (2020). Educating the cosmopolitan citizen in Confucian classical education in contemporary China. *Chinese Education & Society*, 53(1–2), 36–46.
- Wang, C., Zhang, X., & Yao, M. (2019). Enhancing Chinese College Students' Transfer of Learning through Service-Learning. *Studies in Higher Education*, 44(8), 1316–1331.
- Wang, S. (2017). An Exploration into Research on Critical Thinking and Its Cultivation: An

- Overview. *Theory and Practice in Language Studies*, 7(12), 1266–1280.
<https://doi.org/10.17507/tpls.0712.14>
- Wang, Q. (2012). Classroom teaching strategies of improving the English majors' self-instruction in newly--promoted university in China. *Theory & Practice in Language Studies*, 2(3), 475–482. <https://doi.org/10.4304/tpls.2.3.475-482>
- Wang, C., Zhang, X., & Yao, M. (2019). Enhancing Chinese College Students' Transfer of Learning through Service-Learning. *Studies in Higher Education*, 44(8), 1316–1331.
- Wang, J., Wang, D., Chen, Y., Zhou, Q., Xie, H., Chen, J., & Li, Y. (2017). The effect of an evidence-based medicine course on medical student critical thinking. *Journal of Evidence-Based Medicine*, 10(4), 287–292. <https://doi.org/10.1111/jebm.12254>
- Wen, Q., & Zhou, Y., (2006). Comment on the development of thinking ability among English majors. *Foreign Language Research*, 5, 76-80.
- Xie, X. (2008). *Interactions during teacher-fronted class time of English classes in a Chinese university* (Unpublished Ph.D. thesis). Victoria University of Wellington, Wellington, New Zealand.
- Will, N. L. (2016). From isolation to inclusion: Learning of the experiences of Chinese international students in U.S. *Journal of International Students*, 6(4), 1069-1075.
- Windschitl, M. (2002). Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural and political challenges facing teachers. *Review of Educational Research*, 72, 131 –75.
- Wu, H., Garza, E., & Guzman, N. (2015). International student's challenge and adjustment to college. *Education Research International*, 2015, 1–9.
<https://doi.org/10.1155/2015/202753>
- Wu, H. (2011). Critical thinking: semantic discrimination and concept network. *Yan'an University Journal*, 33(1), 5-17.

- Wu, M., & Hu, Y. (2020). Transitioning to an Independent Researcher: Reconciling the Conceptual Conflicts in Cross-Cultural Doctoral Supervision. *Studies in Continuing Education*, 42(3), 333–348.
- Wu, H., & Watkins, D. A. (2017). The influence of Confucianism on the transformative learning of Chinese learners. *Adult Education Quarterly*, 67(1), 57-75.
- Xu, L., & Grant, B. (2017). International Doctoral Students' Becoming: A Dialogic Perspective. *Innovations in Education and Teaching International*, 54(6), 570–579.
- Yan, L. (2018). *Understanding Critical Thinking in American Higher Education: From Chinese International and Domestic STEM Students' Perspectives*. (10838052) [Doctoral dissertation, Iowa State University] ProQuest Dissertations Publishing.
- Yang, R. (2011). Self and the other in the Confucian cultural context: Implications of China's higher education development for comparative studies. *International Review of Education*, 57(3–4), 337–355.
- Yao, C. W. (2016). "Better English is the better mind": Influence of language skills on sense of belonging in Chinese international students. *Journal of College and University Student Housing*, 43(1), 74-89.
- Yi, S., Yun, R., Duan, X., & Lu, Y. (2021). Similar or different? A comparison of traditional classroom and smart classroom's teaching behavior in China. *Journal of Educational Technology Systems*, 49(4), 461–486. <https://doi.org/10.1177/0047239521988999>
- Zhang, H., & Lambert, V. (2008). Critical thinking dispositions and learning styles of baccalaureate nursing students from China. *Nursing & Health Sciences*, 10(3), 175–181. <https://doi.org/10.1111/j.1442-2018.2008.00393.x>
- Zhang, L. (1995). *The construction of a Chinese language Cognitive Development Inventory and its use in a cross-cultural study of the Perry scheme*. (9536271) [Doctoral dissertation, the University of Iowa] ProQuest Dissertations Publishing.

- Zhang, L. (1999). A comparison of U.S. and Chinese university students' cognitive development: The cross-cultural applicability of Perry's theory. *The Journal of Psychology*, 133(4), 425–439. <https://doi.org/10.1080/00223989909599753>
- Zhang, L. (2004). The Perry Scheme: Across cultures, across approaches to the study of human psychology. *Journal of Adult Development*, 11(2), 123–138. <https://doi.org/10.1023/B:JADE.0000024545.11904.81>
- Zhang, L. (2009). *Engaging university learners in critical thinking to stimulate collaborative learning: Perceptions of American and Chinese students*. ProQuest Dissertations Publishing.
- Zhang, L., & Kim, S. (2018). Critical Thinking Cultivation in Chinese College English Classes. *English Language Teaching*, 11(8), 1–6.
- Zhang, T. (2017). Why Do Chinese Postgraduates Struggle with Critical Thinking? Some Clues from the Higher Education Curriculum in China. *Journal of Further and Higher Education*, 41(6), 857–871.
- Zhang, X. (2009). An Interface between critical thinking and reading-to-writing instruction. *Beijing International Studies University Journal*, 10, 73-78.
- Zhang, Y. (2016). International students in transition: Voices of Chinese doctoral students in a U.S. research university. *Journal of International Students*, 6(1), 175-194.
- Zhang, X. (2020). *Comparing Two Generations of Chinese International Students Studying in the United States*. [Doctoral Dissertation, The Pennsylvania State University, 28778326] ProQuest Dissertations Publishing.
- Zhang, Y. (2016). International students in transition: Voices of Chinese doctoral students in a U.S. Research university. *Journal of International Students*, 6(1), 175–194. <https://doi.org/10.32674/jis.v6i1.487>

- Zhou, B. (2020). *A Study of Task-Based Language Instruction in Flipped English as Foreign Language Classrooms in China*. [Doctoral Dissertation, University of Hawai'i at Manoa, 28262590] ProQuest Dissertations Publishing.
- Zhu, J., & Cox, M. F. (2015). Epistemological development profiles of Chinese engineering doctoral students in U.S. institutions: An application of Perry's theory. *Journal of Engineering Education*, 104(3), 345–362. <https://doi.org/10.1002/jee.20080>

APPENDICES

APPENDIX A

Participant Recruitment via Wechat

Hello!

My name is Sally/Shuaipu Jiang. I am a Chinese international doctoral student working on my doctoral dissertation. This is an invitation message to ask if you would be interested in participating qualitative interviews about your experience of developing critical thinking while studying in the doctoral programs in the U.S.

If you agree to participate in the research study, the participant and I would either meet in person or via Zoom depending on the preference of the participant. I will conduct interviews about participant's experiences of the critical thinking development. Each interview will last approximately 30 to 60 minutes. If after the first interview, more information are needed, I will schedule one or two follow-up interviews with you to ensure rich enough stories of you are collected. The information will be collected using an audio recording device which will store without identifying information in the UTK google drive, which is monitored by UT OIT. If you know of individuals who are Chinese international doctoral students and you believe that they would be willing to consider participating in my study, please provide them the contact information provided at the end of this message.

Thank you for your consideration of this request.

Contact Information:

Wechat ID: tue85201

Phone Number: 865-387-7733

E-mail: sjiang18@vols.utk.edu

APPENDIX B

Demographic Information Survey

Please answer the following questions. The questions are on the left and the space on the right is for you to fill in your answers.

What is your preferred pseudonym?	Answer:
What is your gender?	Answer:
What is your age?	Answer:
What is your major?	Answer:
Which year are you in your doctoral program?	Answer:
How long have you been to the U.S.?	Answer:
What is the first degree you pursued in the U.S.?	Answer:

APPENDIX C

Informed Consent Statement

A Narrative Inquiry on Chinese International Doctoral Students' Perspectives on Developing Critical Thinking in the U.S.

My name is Shuaipu Jiang. I am a Ph.D. student at the University of Tennessee doing my dissertation study. I would like to invite you to participate in my research project for my dissertation. The aim of my project is to present the experiences and stories of how Chinese international doctoral students develop critical thinking.

Describe the participant involvement

I will conduct a narrative interview to collect research data, which will last 30-60 minutes. I plan to transcribe the interview, analyze it and in the end write my dissertation about it. Any Chinese international doctoral students who study in a university in the United States of America will be qualified to participate as long as the student could provide his or her perspectives and thoughts in critical thinking development. If further information is needed, one or two follow-up interviews will be conducted after the first narrative interview, which will last 30-60 minutes each.

Potential risks

There is a risk of loss of confidentiality. The researcher will store all the data of participants in UTK google drive, which is monitored by UT OIT to protect the participants. The researcher will remove any identifier information of the participants, such as names, places, and other identifiers. Even after all the process of precaution and sterilizing, there is still a possibility that the identity of the participant might be exposed. Though the researcher tries best to protect the confidentiality of the participant, there will be some risks of harm on the participant if the information about him or her leaks. Based on the content of what the participant says, it might induce certain consequence on him or her from the school, friends, classmates, and faculty members.

Benefits and Contribution

There are no direct benefits to research participants. There is not enough literature about Chinese international doctoral students' experiences and stories of critical thinking development in Western universities. It will help fill in this missing piece in the field of adult education. Also, it will be meaningful to present the perspectives of the participants. For the participants, it is interesting and meaningful to have a chance to retrospect, reflect, summarize, record, and narrate their learning experiences. The interview itself might be an interesting experience for the participants. Also, it might be beneficial for the participants' future learning experiences because of the reflections on former learning experiences. The participants have a chance to think about the learning experiences and maybe further improve their learning in the future. Moreover, the study will educate other Chinese international students on the development of critical thinking, which will benefit their learning in the West.

Confidentiality

I will download a software named Audacity to audio record the in-person interviews or record the zoom interviews using the record function in the zoom app if participants choose to have zoom interviews. Only the audio file of the recording will be used whereas the video file will be deleted immediately after the interview. I will not store the data on my personal computer to protect my participants as much as I could. Instead, I will store the data on my UT Google Drive that is monitored by UT OIT. After the completion of this dissertation project, the research data will be maintained according to UTK's Research Data policy. This is a minimum of three years after the closure of the research study by the PI. I will follow the policy and after the required time duration, I will delete the whole project including the transcripts and recorded interviews. In the transcripts, I will delete any information about place, names, parents, friends, and others that might expose the identity of the participants. Also, I will use a pseudonym to refer to individual participant.

Contact information

If you have questions about the study and wish to contact me further, I can be reached at sjiang18@vols.utk.edu. Furthermore, the contact information of my faculty advisor is qsun8@utk.edu. If you have questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Participation

Being in this study is up to you. You can say no now or leave the study later. Either way your decision won't affect your grades or your standing with the university.

CONSENT

I have read the above information. I agree to participate in this study.

APPENDIX D

Interview Protocol

INTERVIEW GUIDE

A Narrative Inquiry on Chinese International Doctoral Students' Perspectives on Developing Critical Thinking in the U.S.

Beginning Script

Before we start, I would like to give you an opportunity to go over the informed consent statement with me and ask any questions you have about it or this study.

- Go over informed consent statement.
 - Highlight the confidentiality section
 - Use of pseudonyms
 - Ask if they have a preferred pseudonym
 - Highlight the voluntary participation and withdraw section

Now that we have gone over the informed consent statement, I would like to tell you a little bit about myself and what this study is about. I am a Ph.D. student in the adult learning program at the University of Tennessee. I am a Chinese international student since the year 2012. I am interested in the learning experience of Chinese doctoral international students in universities in America. The purpose of this study is to explore your perspectives, perceptions, and thoughts of your experience of developing critical thinking in your doctoral program. The reason that I am interested in your experience is due to the criteria that you embody; you are: (a) an adult learner and (b) a Chinese international doctoral student. Your story is missing from the research literature on Chinese international students and critical thinking development, which is a crucial piece to a larger puzzle. This study may also inform, aid, and benefit other current and prospective Chinese international doctoral students and their parents.

I will use an audio recording device for this interview. Is that okay with you? Also, I would like to take brief notes to make sure that I am not missing anything important that may come out of this interview. Is that okay with you?

Prompt: I am very interested in the story of your life and who you are as a person. Please share your life story as much as you feel like sharing. It could be an introduction about yourself, your background, your learning experience at your university, your past learning experience, why you chose to come to the United States to study, and any other information you want to share with me. Or it could be any other information that I have not listed here.

Questions:

1. Please tell me the story of your life?
请给我讲讲你的人生故事？
2. Please tell me the story of your educational experiences?
请给我讲讲你的教育经历的故事？

Prompt: Specifically, regarding your doctoral studies, I am particularly interested in your experiences about critical thinking. The concept of critical thinking is talked about and valued in American education. It is a controversial concept that no consensus on the definition of critical thinking has reached in academia. Various definitions existed. However, there are some common agreements of the definitions of critical thinking.

First, critical thinking involves the use of reasoning and rationality. For instance, as one of the pioneer critical thinking experts in the U.S., Robert Ennis (1991) defined critical thinking as “reasonable reflective thinking that is focused on deciding what to believe or do” (p. 8). This definition emphasizes reasonableness (which could be roughly understood as rationality). Paul (1992) stated that critical thinking involves discernment of the elements of reasoning and rational judgment, contrasting simple information recall with rote memorization.

Second, critical thinking involves judgment. Facione (1990) defined critical thinking as a judgment. “We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Facione, 1990, p. 2). Lipman (1988) concurred, believing it is narrow to hold the outcomes of critical thinking simply as decisions and solutions; however, judgment is the outcome of critical thinking by covering making decisions, solving problems, and learning new concepts. Lipman (1988) articulated that “I will argue that critical thinking is skillful, responsible thinking that facilitates good judgment because it (1) relies upon criteria, (2) is self-correcting, and (3) is sensitive to context” (p. 39). Bailin and others echoed: “all aspects of critical thinking centrally involve judgment” (Bailin et al., 1999, p. 280).

Third common agreement is to understand critical thinking as a set of cognitive skills and dispositions. These overlapping understandings of critical thinking include several skills (analysis, interpretation, inference, evaluation, explanation, and self-regulation) as well as several dispositions (such as being far-minded, inquisitive, open-minded, and open to alternative positions). There are corresponding measurements designed to test critical thinking skills and dispositions, which could offer another way of understanding as to what could be viewed as critical thinking skills and dispositions, respectively. The California Critical Thinking Skills Test (CCTST) tests critical thinking skills in the following subcategories: overall reasoning skills, analysis, interpretation, evaluation, explanation, inference, deduction, induction, and numeracy (Insight Assessment). Specifically, CCTST tests overall critical thinking skills, which is “sustained use of critical thinking to form reasoned judgments”; analysis, which is “accurate identification of the problem and decision-critical elements”; interpretation, which is “discovering and determining significance and contextual meaning”; inference, which is “drawing warranted and logical conclusions from reasons and evidence”; evaluation, which is “assessing credibility of claims and the strength of arguments”; explanation, which is “providing the evidence, reasons, assumptions, or rationale for judgments and decisions”; induction, which is “reasoned judgment in ambiguous, risky, and uncertain contexts”; deduction, which is “reasoned judgment in precisely defined, logically rigorous contexts”; and numeracy, which is “sustained use of critical thinking skills in quantitative contexts (quantitative reasoning)” (Insight Assessment, 2021). The California Critical Thinking Disposition Inventory (CCTDI) measures the seven attributes that influence an individual’s capacity to learn and to apply critical thinking skills effectively: the disposition toward truth-seeking or bias, toward open-mindedness or intolerance, toward anticipating possible consequences or being heedless of them, toward proceeding in a systematic or unsystematic way, toward being confident in the powers of reasoning or mistrustful of thinking, toward being inquisitive or resistant to learning, and toward mature and nuanced judgment or toward rigid simplistic thinking (Insight Assessment, 2021).

Truth-seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and cognitive maturity complete the seven scales of the critical thinking disposition. Specifically, truth seeking is “courage to follow reasons and evidence wherever they lead”; open-mindedness is “willingness to consider a variety of alternative opinions”; analyticity is “consistent effort to anticipate consequences”; systematicity is “habit of taking an orderly and organized approach to problem-solving”; confidence in reasoning is “disciplined reliance on well-reasoned judgment”; inquisitiveness is “continuous attention to and desire for learning”; and cognitive maturity is “expectation of making timely, well considered judgments” (Insight Assessment, 2021).

I am interested in learning about your perspectives on the awareness, conceptualization, and understanding of critical thinking. Also, I am interested in learning about your perspectives on how you have developed critical thinking in your Ph.D. program.

Questions:

3. When did you become aware of the concept of critical thinking in the first place, if any? Tell me what happened?
如果有的话，你是什么时候第一次意识到 critical thinking 这个概念的？
4. How do you understand critical thinking?
你是怎样理解 critical thinking 的？
5. How do you define critical thinking?
你是怎样定义 critical thinking 的？
6. How have you developed critical thinking? Tell me your story of how you have developed critical thinking in a holistic account.
你是怎样发展 critical thinking 的？请完整全面的讲述关于你是怎样发展 critical thinking 的故事。

Prompt: Thank you so much for sharing your stories. Are there anything else that you would like to share about your experiences and perspectives?

Ending Script

Thank you for sharing your time and experiences/stories with me. Is there anything else that you would like to add before we conclude this interview?

From here, I will transcribe this interview word for word and send you a copy of the transcript, if you wish, so that you can check to make sure everything was captured accurately and also to provide feedback on anything that was left out. If you have any questions for me, don't hesitate to get in touch with me at the information provided on the informed consent statement, or you may contact my advisor or the IRB compliance officer listed in the informed consent statement as well.

APPENDIX E

Table 3

Mike's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Western contexts	[C1.1] Gained awareness of critical thinking when applied to jobs
[T2] Sufficient understanding of critical thinking	[C2.1] Never blindly believe or blindly follow [C2.2] Conscience (outlier) [C2.3] Empathy (outlier) [C2.4] Balancing [C2.5] Open-mindedness
[T3] Transformation	[C3.1] Before VS After [C3.2] Develop critical thinking through significant life mistakes such as changing advisor and choosing church (outlier)
[T4] Developing critical thinking relied on self as well as others	[C4.1] Develop critical thinking through significant life mistakes such as changing advisor and choosing church (outlier) [C4.2] Independent exploration

APPENDIX F

Table 4

James's Themes and Categories

Theme[T]	Categories [C]
[T1] No specific moment of awareness of critical thinking (Outlier)	[C1.1] Ingrained in mindset as a way of life
[T2] Sufficient understanding of critical thinking	[C2.1] More rational conclusions and choices [C2.2] Detailed and logical analysis of the pros and cons when making decisions [C2.3] Analyzing and summarizing factors and information [C2.4] Opposite is rote learning [C2.5] Emphasize cause and effect [C2.6] Define as analyzing and deducing and making decisions or drawing conclusions
[T3] Amplification	[C3.1] Process of conducting research strengthened critical thinking [C3.2] Gradual process that starts off slow but eventually speeds up [C3.3] Two different aspects that require adaptation
[T4] Developing critical thinking relied on self as well as others	[C4.1] Little guidance from advisor [C4.2] Self-study and independent exploration [C4.3] Communicating with others [C4.4] Not much assistance from classes [C4.5] Deep reflection [C4.6] Construct a framework of knowledge [C4.7] Conduct research [C4.8] Observe and listen more

APPENDIX G

Table 5

K's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Chinese context	[C1.1] Gained awareness when answering reviewers' questions to argue for novelty
[T2] Sufficient understanding of critical thinking	[C2.1] Critical thinking is extremely important for scientific research [C2.2] Ability to discern reliable or not [C2.3] Define as the ability to think independently and to judge or compare the reasonableness based on the rationality [C2.4] Determination to engage in thoughtful contemplation [C2.5] Understanding of critical thinking as the ability to summarize, compare, and reflect [C2.6] Spirit of skepticism
[T3] Amplification	[C3.1] Not much critical thinking changes [C3.2] No significant changes of perception of education and knowledge [C3.3] Improved critical thinking through research process
[T4] Developing critical thinking relied on self as well as others	[C4.1] Little guidance from advisor [C4.2] Develop critical thinking through research process [C4.3] Read a lot of papers [C4.4] Coursework help expand knowledge framework [C4.5] One course helped critical thinking [C4.6] Need someone to guide and induce critical thinking

APPENDIX H

Table 6

Shawn's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Western contexts	[C1.1] First time awareness from an interview
[T2] Sufficient understanding of critical thinking	[C2.1] Not nitpicking or finding faults [C2.2] Reasonableness or rationality [C2.3] Make judgment based on rationality [C2.4] Generalize and induct [C2.5] Deduction [C2.6] Apply [C2.7] Definition as the ability to summarize and analyze a problem based on rational analysis and apply conclusions to new problems
[T3] Transformation	[C3.1] Before VS After [C3.2] First research encountered detours and practice critical thinking unconsciously [C3.3] Changes in views on professors and knowledge
[T4] Developing critical thinking relied on self as well as others	[C4.1] Doing scientific research is extremely helpful for developing critical thinking [C4.2] Attending classes has a moderate impact [C4.3] One class has comparatively big impact [C4.4] Actively engage in thinking [C4.5] Read high-quality literature review and section of future research

APPENDIX I

Table 7

Serene's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Western contexts	[C1.1] First awareness was in undergraduate when preparing for TOEFL
[T2] Sufficient understanding of critical thinking	[C2.1] Critical thinking is very important [C2.2] How to question and how to challenge [C2.3] Definition of critical thinking as making your own judgments after understanding of awareness of something [C2.4] Analyze data statistically or use mathematical models [C2.5] Interpret results [C2.6] Provide insights and evaluate results
[T3] Transformation	[C3.1] Mainly two aspects show improvement of critical thinking that are reading papers and changing advisor [C3.2] Before VS After
[T4] Developing critical thinking relied on self as well as others	[C4.1] Courses does not contribute much to the development of critical thinking [C4.2] Most of critical thinking is improved through self-study [C4.3] Conducting research [C4.4] Advisor's guidance [C4.5] Read and think more [C4.6] Communicate with others

APPENDIX J

Table 8

Joseph's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Chinese context	[C1.1] First time awareness in undergraduate courses
[T2] Sufficient understanding of critical thinking	[C2.1] Novelty and originality in thinking in terms of academic papers [C2.2] Understanding of critical thinking as approaching problems comprehensively, being open minded, and not holding a predetermined stance [C2.3] Define critical thinking as objective, comprehensive, and open form of analysis
[T3] Transformation	[C3.1] Initial struggles and frustration [C3.2] Different standards of doing research in two countries [C3.3] Changes in views on teachers and knowledge
[T4] Developing critical thinking relied on self as well as others	[C4.1] Conducting research [C4.2] Serving as a reviewer [C4.3] Advisor didn't provide much guidance in the beginning [C4.4] Advisor didn't provide specific technical guidance, but offered high level guidance later on [C4.5] Communication [C4.6] Self-study is a significant part of the learning process [C4.7] Classes were too easy and didn't help critical thinking

APPENDIX K

Table 9

Xiaoming's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Western contexts	[C1.1] First awareness when doctoral advisor mentioned it
[T2] Sufficient understanding of critical thinking	[C2.1] Critical thinking is default in subjects like physics and mathematics [C2.2] Definition of critical thinking as the process of carefully examining observations and data, and arriving at conclusions through rational and logical reasoning [C2.3] Understanding critical thinking as using logical reasoning and formulating your own conclusion through observation and data gathering [C2.4] Curiosity and motivation [C2.5] Age is an important factor to consider [C2.6] Culture is an important factor to consider [C2.7] Forcing original non critical thinkers to acquire those traits is unnatural
[T3] Amplification	[C3.1] No transformative process in terms of critical thinking [C3.2] Every aspect of experience of PhD contributes to amplifying critical thinking
[T4] Developing critical thinking relied on self as well as others	[C4.1] Discussions with colleagues [C4.2] Advisor as devil advocate [C4.3] Conduct research [C4.4] Read research papers [C4.5] Amplifies existing abilities based on motivation [C4.6] Some classes help understand thought process and learn logic [C4.7] Environment in the US promotes critical thinking

APPENDIX L

Table 10

Amy's Themes and Categories

Theme[T]	Categories [C]
[T1] Awareness of critical thinking in Western contexts	[C1.1] first awareness during the first semester of doctoral studies
[T2] Sufficient understanding of critical thinking	[C2.1] Freire's theories [C2.2] Understanding of critical thinking as putting forward your own ideas after fully understanding and possessing a foundational knowledge of a particular subject [C2.3] Critical thinking is seeking change rather than accepting things [C2.4] Research aims to give voice to marginalized or overlooked groups [C2.5] Take action [C2.6] Definition of critical thinking as an ever changing process that accompany each individual throughout their life and a continuous process of reflection on society and oneself
[T3] Transformation	[C3.1] Before VS After [C3.2] Gentle transformation [C3.3] Views on knowledge and teachers changed
[T4] Developing critical thinking relied on self as well as others	[C4.1] Attending classes [C4.2] Observation, absorption, and imitation [C4.3] Reading literature [C4.4] Academic conference is beneficial to research and curiosity but not sure how much curiosity takes up in critical thinking [C4.5] Peer support group cultivates critical thinking and especially helps Chinese students

VITA

Shuaipu Jiang (Sally) is a Ph.D. in Educational Psychology from the University of Tennessee. She received her Master's degree in communication management from Temple University, and a Bachelor's degree in Journalism from Minzu University of China.

During the time she pursued the Ph.D., she has received various awards and scholarships from the University of Tennessee multiple times. She also served as a graduate research assistant for a qualitative research grant project for the faculty in counseling, through which she gained hands on experiences of conducting grant research project and improved her qualitative method skills. Additionally, she has served as a graduate research assistant for her Ph.D. advisor to solve various problems, including contributing to research, leadership, management, scholarship, and program launching, operations, and assessments, etc.

Sally presented at international conferences such as AAACE and AERC multiple times. One of the conference organizers complimented her conference presentation saying that she did a great job presenting; she had a great presence that resonated through Zoom, which not everyone can manage; and she was a dream to work with. Her presentations covered contents about Chinese and American teaching philosophies, pedagogies, and instructional methods; critical thinking; holistic human development; STEM education, and international and comparative education. Besides, she published two conference proceedings. She has published several articles in academic journals and two books.

Sally has served as a leader and translator for the Philadelphia Chinese Business Association for many years, bridging communication between the local Chinese and American communities in the police departments, courts, law firms, and immigration offices, etc. She led, organized, and helped Chinese immigrants in Philadelphia in negotiations, zoning meetings, business cases, legal issues, translation and interpretation, government and

Police relations, and community matters. She has made significant contributions to both the Chinese and American communities.

Sally had co-teaching experiences with two professors in her department to teach online graduate level courses at the University of Tennessee. The course content focuses on facilitating change in the educational environment. She monitored class discussions and other activities, gave mini-lectures, and revised the course curriculum and content. She has also been a teacher for many years, instructing various subjects including Chinese, English, SAT math, GRE, GMAT, and TOEFL listening. She always invents fun and effective games to enhance learning and engagement. She is well-liked by her students.

Besides, Sally has been serving as an academic coach, dedicating herself to helping students uncover their unique strengths and characteristics and providing them with customized, high-quality writing guidance.