Transitions across the multi-worlds: 
Experiences of Chinese international doctoral students in STEM fields

Yibo Yang

This dissertation is the report of an investigation submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy at Murdoch University.

2019
Declaration of authorship

I declare that this dissertation is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary institution.

\[ \frac{1}{k+1} - \frac{1}{k} \]

Yibo Yang
Dedications

To Siyang.

Travelling through this space together, you grow up, and I grow up.

To China. To Australia.

To all Chinese students in Australia.
Abstract

The focus of the study is the nature of experiences of Chinese international doctoral students (CIDS) in science, technology, engineering, and mathematics (STEM) fields and the influences that facilitate or constrain their positive and on-time completion of a PhD abroad. Situated in the research, social, and cultural contexts, this narrative inquiry uses a conceptual framework that incorporates a three-dimensional space (continuity, interaction, and situation dimensions) and a multi-world model (research, personal, and social worlds) to interpret CIDS’ experiences. Positioning myself as an insider and an outsider in this research, I generated data through interviews and focus groups with 38 CIDS over a 2.5-year period. To maximise experiences in the research, the participants were at different points in their PhD study and in different locations around Australia.

The study identified six patterns of congruence or difference and the corresponding transitions across participants’ multi-worlds, which were reported individually with both cross-case and within-case narratives. The study also identified socio-cultural, psychosocial, socio-relational, linguistic, socio-economic, institutional, and gender borders that may constrain CIDS’ PhD study in specific situations.

Evidence shows congruence facilitates academic and personal growth, but difference does not necessarily mean constraint when differences are respected and understood. Rather, it is how the transitions occur that is important for the success of transnational and transcultural PhD study. When border transitions are smooth or manageable, students may grow into competent, confident, and calm researchers; when transitions are difficult or resisted, students experience problematic relationships which may constrain their research progress and, in the worst scenario, may lead to attrition. To better facilitate the PhD abroad, communication (referred to as agentic communication) between significant agents in students’ multi-worlds is important to prevent the escalation of minor issues. Loneliness may occur during the PhD abroad, but an integrated philosophy developed by students facilitates their academic success and personal transformation. This study contributes to the literature on international doctoral students’ experiences with conceptual, empirical, methodological, and practical implications.
Acknowledgements

This is a blessed doctoral journey abroad because of you all in company.

My gratitude to my supervisors is beyond words that can possibly express. Emeritus Professor Simone Volet has been a great source of inspiration through numerous moments of intensive discussion and hearty smiles. Associate Professor Caroline Mansfield generously enriched my knowledge and expanded my networks. Associate Professor Judith MacCallum has a heart that is wide as an ocean and a brain that is sharp as a whip. Without her gentle guidance and strong support, I might not have been able to go through the hardness to complete this dissertation.

My gratitude also goes to Professor Bernard Dell, who has been mentoring me throughout this journey with his wisdom, vision, and insight. I heartily thank twelve academics whose name I could not possibly put here because of their contribution to this project. Their wisdom shed invaluable light on my research and inspired my personal growth. I would also like to thank my doctoral colleagues during the PhD. Without this harmonious and supportive community, the memories of this journey would not be so precious and pleasant.

Gratefully, I would like to acknowledge my doctoral participants who selflessly supported me and co-constructed this study. Thank you for allowing me to step into your world and spending hours, in many cases again and again, sharing with me your experiences and perspectives. And your persistence sustained my persistence.

I would also like to acknowledge the Australian Department of Education and Training for granting me the Endeavour Postgraduate Scholarship. Without the financial support, nothing about this PhD research might have happened.

Last, and foremost in my heart, my gratitude goes to my parents, my husband, and my son. My parents have always been my emotional support and the reservoir of wisdom. My husband, as a professor himself, never had a doubt that his wife could achieve her PhD abroad and return home on time. Thank you for the trust. And my dear son, Siyang, is the one I wish to dedicate this dissertation to. Your gentle smile brightened each of my days in the past eighteen years. Thank you for the company along this journey of life.
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Chapter 1 Introduction

This chapter first presents a brief overview, research questions, and the significance of this doctoral research project. Then it moves on to examine the broad social and cultural contexts in which this study is situated. The chapter also provides reflection on the researcher’s positionality in the inquiry and clarification of specific terms to be used in the study. It ends with an introduction to the overall structure of this doctoral dissertation.

An overview

This dissertation is a narrative inquiry that aims to gain insight into the nature of Chinese international doctoral students’ (CIDS) experiences and major influences that facilitate or constrain CIDS’ positive and timely completion of a PhD programme in STEM fields in Australia. The aim of the project on which this dissertation is based is to enhance mutual and reciprocal understanding of the CIDS population for policy-makers, higher institutions, and educational practitioners in both host and home countries. This study also hopes to enhance the sustainable growth of international doctoral education in the broad context of the internationalisation of higher education.

To reveal CIDS’ authentic experiences, this study used interviews and focus groups for in-depth investigation and over time. Drawing on the extant literature, this dissertation develops a three-dimensional multi-world conceptual framework and investigates the relationships between individuals’ research, personal, and social worlds, which co-construct CIDS’ international study experiences. This dissertation reports six patterns of congruence or difference between an individual’s multi-worlds and the corresponding patterns of transitions in the form of both cross-case and within-case analyses. In the discussion, the dissertation highlights the importance of agentic communication for crossing the borders that may constrain students’ successful completion of a PhD abroad.
Research questions

This dissertation addresses the following two research questions:

1) What is the nature of the experiences of Chinese international students’ PhD study in STEM fields in Australia?
2) What, how, and why certain factors facilitate or constrain Chinese international STEM students’ positive and on-time completion of their PhD study abroad?

This study is set against a backdrop of a growing number of student sojourners from mainland China studying in Anglophone countries, such as the UK, the USA, Canada, and Australia, as well as other major non-Anglophone OECD countries. Echoing the trend, the literature on Chinese international students’ experiences and challenges in living and studying abroad has been mushrooming in the recent decade. However, there is still a dearth of studies on Chinese students at the doctoral level, even less on those in STEM fields (Ye & Edwards, 2017). The experiences of these doctoral students have been almost invisible in the literature, regardless of their potential significant role in global scientific research and technological innovation, which becomes the motive for the first research question.

For the second research question, the focus on CIDS’ positive and timely completion of a PhD study abroad derived from my personal anecdotal experiences and the extant literature in the fields of PhD education and of international students in general. My previous contact with Chinese doctoral students in STEM fields in western institutions left me with an impression that most of them achieved their PhD degree on time regardless of the stress and pressure. Differently, the literature reported a high doctoral attrition rate in main Anglophone countries (Gardner, 2007; Lovitts, 2001; McAlpine & Norton, 2006), which has become a pressing concern for educational practitioners, institutions, and policy makers over time. Another large body of literature addressed psychological issues that seem to be epidemic across the doctoral and international student population (e.g., Barry, Woods, Warnecke, Stirling, & Martin, 2018; Han, Han, Luo, Jacobs, & Jean-Baptiste, 2013). Hence, this doctoral research embarked on investigating how international doctoral students from one cultural background
experienced their study and life experiences in a cross-cultural and transnational educational context and the factors which facilitate and constrain PhD completion.

The significance of the research

As the first study to investigate the experiences of Chinese STEM PhD students holistically and longitudinally across Australia over a two and a half year period, this doctoral study has its significance in empirical, conceptual, and methodological contributions to the literature as well as practical implications for policy makers, education practitioners, and Chinese international doctoral students.

Empirically, this study revealed the PhD study abroad experiences of 38 Chinese students in eight higher education institutions from five Australian states. The study followed most of the students till they completed their doctoral programme. This dissertation reported both cross-case analyses and within-case analyses to capture diversity and depth of CIDS’ experiences over time.

Conceptually, this study developed a three-dimensional multi-world framework, which enabled holistic understanding and interpretation of the heterogeneity and homogeneity of international doctoral students’ experiences. This conceptual framework is generic in nature and open to different theoretical perspectives, which could be of use for future research in similar fields.

Methodologically, this study showcased an example for future research on how a researcher positioned herself as both an insider and an outsider in relation to the researched population and generated genuine in-depth data out of the rapport. This study also contributed a research design that combined focus groups, cross-sectional, and longitudinal interviews across year ranges of PhD and locations of PhD study, which maximised the spectrum and diversity of experiences.

In addition, with the global migration of talented people pursuing better education opportunities in STEM fields (Han, Stocking, Gebbie, & Appelbaum, 2015), higher education institutions face the challenge of how to cultivate these bright and creative minds from other cultural backgrounds. This point has its global significance because scientists, engineers, and mathematicians make significant contributions to an
economy and build up the foundational wealth of a nation (Roberts, 2002), which positions practical implications of this study.

**Social and cultural contexts of the research**

This section first gives an account of social context of this research. Then it provides a brief overview of the Chinese cultural context in which Chinese students are embedded before they embark on a study abroad journey. The section ends with an examination of the background of Chinese international doctoral students in STEM fields. The last two parts aim to explain the “who-they-are” question at the commencement of this study.

**The social contexts**

This study is situated in three main contexts: the social context for international students in the host country, that of the home country, and the insufficiency of holistic understandings on international doctoral students in STEM fields.

The first context relates to the major host countries for international students in the trend of globalisation and internationalisation. Altbach and Knight (2007, p.290) indicate that globalisation is “the economic, political, and societal forces pushing twenty-first century higher education towards greater international involvement.” Knight (2008, p.1) argues that internationalisation is “changing the world of higher education, and globalisation is changing the world of internationalization.”

Since the late 1990s, most western Anglophone countries including the UK, the USA, Canada, and Australia experienced policy changes in dramatically increasing the size of international students in their higher institutions (Gu & Schweisfurth, 2011). This increase generated huge sums of export revenue to add to the annual GDP in these countries. For example, Australian Bureau of Statistics (2017) shows international education activity contributed AU$28.0 billion to the economy in the fiscal year 2016-2017, which was a 16.1% increase from the earnings of the previous year, following a similar upward trend since 2012 (AU$16.9 billion). China was the top source country for Australia, contributing 31.5% in total that fiscal year.
In a report commissioned by the Australian Government Department of Education and Training (Deloitte Access Economics, 2015), researchers pointed out besides economic benefits from international students, there were also social and cultural benefits flowing from improved cultural literacy, stronger cultural linkages and enhanced cultural capital generated both in Australia and in source countries. They also found the significant role and contribution of international education to the Australian economy and society was not necessarily widely appreciated. Therefore, they appealed to raise community awareness of the broader benefits brought through international education, particularly on the social and cultural benefits rather than just its role in the economy.

However, the streaming-in of Chinese students seems to have brought on much confusion at the host university level, in particular for the education practitioners who have to deal with Chinese students on a daily basis. A large body of literature addresses their problematic issues with Chinese international students due to ideological, cultural, linguistic, and educational differences between China and western countries (e.g., Fang, Clarke & Wei, 2016; Singh, 2009; Singh & Chen, 2012). Satisfactory and positive educational experiences are important to the sustainable development of international higher education (Ammigan & Jones, 2018; Marginson, 2018), but it seems how to achieve this goal is yet to be researched in more depth.

The second social context of the research is the home country, or the source country, of international students. For this current study, the home country refers to China. Over the past decade, China has experienced two waves of talent migration: studying abroad and “brain boomerang” or “Haigui” (Liu et al., 2015, p.2). Student migration, both outbound and return, exhibited a fast-increasing tendency and has gradually become a normalized social phenomenon. The Chinese Ministry of Education (2017) statistics show 4.04 million Chinese students went abroad to study from 1978 to 2015, with an annual growth rate of 19.06% on average. The Ministry also reports that being attracted by the country’s economy and the job market, roughly 70-80% of students abroad are returning to China in recent years. The total number of returnees has reached 2.2 million from 1978 to 2015.

However, between the two high notes of leaving and returning, something has been missing in literature and in reports: the experiences of studying abroad. In another
word, how students experience their study abroad period has remained largely untold or unknown. We may know pieces or fragments, but there has been a lack of holistic understanding to the whole. In 2017, a Chinese songwriter and singer, Pu Shu, described this situation in a new release, *the Innocent Years* (清白之年): *We go overseas, we sing in whispers, but no one tells how it is* (此身越重洋，轻描时光漫长，低唱语焉不详) (https://www.youtube.com/watch?v=bf8xXjq7qMQ).

Taking the doctorate as an example, Ministry of Education (2017) statistics on Chinese doctoral returnees shows that they spend on average 46.3 months (3.8 years) to complete their overseas doctoral degree from major destinations for Chinese doctoral students, such as the USA, the UK, Australia, Japan, France, and Germany. However, for this lengthy period of study abroad, the “no-one-tells-how-it-is” situation builds up one question, “*How have they been doing out there?*” The extant literature mainly addresses certain specific aspects of their experiences, such as linguistic issues (Cortazzi & Jin, 1997; Brown, 2008), academic writing (Singh & Fu, 2008), identity (Ye & Edwards, 2015, 2017; Ye, 2018), psychological well-being (Han et al., 2013), and academic adaptation (Borg et al., 2010; McClure, 2007). The contrast between the increasing number of Chinese students going overseas and the lack of holistic understanding of their experiences was also my motivation to commence this doctoral project with Chinese international students.

The third context specifically narrowed down the research topic of this study. A cursory review of the literature reveals that research with Chinese international students has been dominantly focusing on undergraduates and postgraduates by coursework from social sciences or mixed disciplines (e.g., Choi & Nieminen, 2013; Hail, 2015; Redfern, 2015). However, one-to-one supervisory relationships and laboratory-based research are important features of doctoral education in STEM fields, and are fundamentally different from classroom teaching and course-work based education.

While extensive research has addressed issues related to international students in general, there is little distinction between the experience of students in undergraduate studies, postgraduate by coursework, or doctoral programmes by research. The lack of distinction also lies in the blurred boundaries between students from different cultural backgrounds.
As shown in Table 1.1, Chinese international doctoral students dominantly choose to study in STEM-related disciplines. Statistics in the table also shows the number of Chinese students studying in STEM fields has been steadily increasing. For example, out of 3,374 Chinese doctoral student enrolments in Australia, 2,329 (or 69%) are in STEM fields in 2014 (Australia Government Department of Education and Training, 2015). The ratio has been following an upward trend in the recent decade, increasing steadily from 58% in 2009 and 64% in 2011. The significant value of these students to the future foremost innovative and scientifically advanced economy of the world has been fully and widely recognized (Han et al., 2015), which exhibits the essentiality of understandings to their PhD study abroad experiences to provide better facilitation and for sustainable growth of international doctoral education. The combination of the unique features of STEM doctoral education, the increase of Chinese international STEM doctoral students, and their role to the future science and technology thus informs the third social context of this research.

Table 1.1 Annual enrolments of Chinese PhD & Doctoral students in STEM courses in the higher education sector in Australia (2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tr>
<td>Broad Field of Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering and Related Technologies</td>
<td>471</td>
<td>634</td>
<td>819</td>
<td>1,020</td>
<td>1,180</td>
<td>1,360</td>
</tr>
<tr>
<td>Information Technology</td>
<td>84</td>
<td>98</td>
<td>126</td>
<td>142</td>
<td>162</td>
<td>184</td>
</tr>
<tr>
<td>Agriculture, Environmental and Related Studies</td>
<td>31</td>
<td>39</td>
<td>52</td>
<td>65</td>
<td>80</td>
<td>84</td>
</tr>
<tr>
<td>Natural and Physical Sciences</td>
<td>244</td>
<td>321</td>
<td>412</td>
<td>512</td>
<td>586</td>
<td>701</td>
</tr>
<tr>
<td>Other Fields</td>
<td>608</td>
<td>727</td>
<td>807</td>
<td>876</td>
<td>973</td>
<td>1,045</td>
</tr>
<tr>
<td>PhD &amp; Doctorate sub-total</td>
<td>1,438</td>
<td>1,819</td>
<td>2,216</td>
<td>2,615</td>
<td>2,981</td>
<td>3,374</td>
</tr>
<tr>
<td>Total enrolments in STEM courses in HE sector</td>
<td>11,175</td>
<td>13,838</td>
<td>15,146</td>
<td>15,818</td>
<td>16,743</td>
<td>18,365</td>
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<tr>
<td>Other Fields in higher education</td>
<td>65,978</td>
<td>76,898</td>
<td>78,892</td>
<td>73,561</td>
<td>69,315</td>
<td>70,837</td>
</tr>
<tr>
<td>Total – all Chinese students in HE sector</td>
<td>77,153</td>
<td>90,736</td>
<td>94,308</td>
<td>89,379</td>
<td>86,058</td>
<td>89,202</td>
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</table>

Source: Department of Education and Training International Student Data, Australian government, Department of Education and Training. This data was extracted from the YTD October 2015 student pivot.
The cultural context

For the current study with mature-age Chinese international doctoral students, it is essential to understand their philosophical perspectives as part of their “being” to be brought to their PhD abroad experiences. This is mainly because research on Chinese cultures consistently finds it is the philosophy, rather than religion, that dominates Chinese values and beliefs (Feng, 1947/2012; Wu, 1986; Lau & Yeung, 1996). In Feng’s (1947/2012) book A Short History of Chinese Philosophy, he explains that Chinese people “have not had much concern with religion because they have had so much concern with philosophy” (p.336), and “in China, philosophy has been every educated person’s concern” (p.333). He argues that the place philosophy has occupied in Chinese civilization has been comparable to that of religion in other civilizations, which sets the foundation for this study to investigate Chinese philosophy as the root cultural context for Chinese international doctoral students.

Fundamental traits of Chinese philosophy

Three basic traits in Chinese philosophy may help us better understand students from China. Though time and environment change over time, some fundamental characteristics may remain.

The first is the connection between education and philosophy. Ru Jia or School of Literati is known in Western literature as the Confucianist School, but the word Ru literally means “literatus” or scholar. Thus, the Western title is somewhat misleading because it misses the implication that the followers of this school were scholars as well as thinkers (Feng, 1947/2012). Kongzi (Confucius, 551-479 B.C.) is regarded as both the first teacher and the first philosopher in China, with students and followers from all walks of life (Wu, 1986). The term Ru Jia not only denotes “Confucian” or “Confucianist” but has a much wider implication with contributions from numerous scholars and thinkers, such as neo-Confucianism, throughout the 2,500 years of the civilization (Wu, 1986). With this integration of education and philosophy, education is important for an individual in this culture. Zhou (2014) finds in her study that Chinese doctoral students in the USA are persistent to achieve their degrees despite perceivable dissatisfaction. The deep-rooted belief in the value of education may partially contribute to this persistence motivation.
The second point is the inseparability of theory and practice in this philosophy. The Chinese character 哲 (Zhe, meaning philosophy, and wisdom), shows the pictographs of mouth and hand, denoting the combination of word and action, or theory and practice. Hence, in his book *Fundamentals of Chinese Philosophy*, Wu (1986, p.8) argues “wisdom” for Chinese means “practical wisdom”, which helps Chinese to make the right decision in particular situations. More importantly, as philosophy aims to enable one to become a better and happier person with moral virtue, Chinese and Aristotle likewise, people applying the philosophy into practical use would strive to transform into “morally worthy persons” (p.8).

Thus, Chinese philosophy is viewed as “both extremely idealistic and extremely realistic” (Feng, 1947/1970, p.340). Feng coined an expression “world-transcending” to describe this philosophy. Here I use a Chinese folktale the Butterfly Lovers, to illustrate this point. The story tells about forbidden love between a lady, Zhu Yingtai, and a man, Liang Shanbo, because of feudal family barriers. When they realized they had no way to be together in life, the man passed away out of a broken heart, and the lady committed suicide on her way to an arranged marriage by jumping into his grave, stricken by an unexpected thunderstorm. This folktale is often compared with Shakespeare’s tragic romance *Romeo and Juliet*. The lovers chose to die if without love, which was the commonality between the two versions of romance. However, the Chinese version did not end there. The climax came when the thunderstorm suddenly vanished, and a rainbow appeared in the sky. From the broken tomb flew out a pair of beautiful butterflies, cavorting over the flowers, flying away together into the blue distance. This story combines this-worldly realism and other-worldly idealism, presenting what Chinese philosophy has striven for.

An understanding of this complexity is essential when attempting to interpret Chinese students. Ruble and Zhang (2013) depicted a complicated picture of stereotypes of Chinese international students in the eyes of American students. Stereotypes range from highly favourable considering they are nice, friendly, and smart to highly unfavourable that views the same cohort as mindless, annoying, and too smart. A deeper understanding of Chinese students’ philosophical standpoints might have helped to ease the conflicting views in the stereotypes.
Then the *third* point is the synthesis nature of Chinese philosophy (Feng, 1947/2012). Though Confucianism has been the dominant school of philosophy in Chinese society, there are Daoism and Buddhism as well as many other philosophical schools holistically fused into the present Chinese value system (Feng, 1947/2012). Yu and Moskal (2018, 2019) conducted a study with Chinese postgraduate students’ engagement with local churches in the U.K. They found the dominant majority who visited churches were not Christians. Their study identified making friends, cultural knowledge, and practicing English as major motivations for these students taking part in the church activities. As Wu (1986) noted, few Chinese today would claim themselves to be religious; instead, Chinese people embrace different philosophies, including western ones, and incorporate these ideas into their way of thinking. For Chinese, the search for truth is the search for the most comprehensive way of interpreting human experiences (Wu, 1986). As a culture represents shared practices and values between the people of a group (Phillips, 2003), though dynamic and constantly changing in nature (Kramsch, 1998), an understanding to these cultural residues from Chinese philosophy may still help us to interpret how CIDS believe and behave while doing a PhD abroad.

**Self-discipline and social commitment**

To understand the foundation of Chinese philosophy, it is important to trace back to Chinese classics due to their steadfast role in shaping Chinese values and beliefs over a history of 2,000 years. As abundant the minutiae of the Chinese philosophical perspectives are, there are some essential philosophical perspectives closely pertinent to Chinese international students in higher institutions. Among a plethora of elements, a decree from one of the earliest classics, *I-Ching*, may present a core philosophy:

> 天行健，君子以自强不息。地势坤，君子以厚德载物。

>(A Junzi constantly strengthens himself with self-discipline just like the constant evolution of the universe. A Junzi devotes himself to social commitment with high moral values just like the generosity of the earth.)

> – *I-ching, or Classic of Changes, late 900 BC, Zhou Dynasty*
Self-discipline and social commitment are the two moral virtues embedded in this decree about Junzi (a noble or decent man). In the Great Learning, one of the Four Books in the Confucianism classics, personal growth, or the cultivation of a Junzi is through a linear order from self-discipline to the social commitment: 格物，至知，诚意，正心，修身，齐家，治国，平天下， roughly translated as investigation, knowledge, sincerity, mindset, self-cultivation, clan harmony, governance, and then aspired after the world peace. Of central importance in this line is self-cultivation, which is further accentuated in the teaching: 自天子以至於庶人，壹是皆以齐身为本 (From the king down to the common people, all must take self-cultivation as essential and fundamental). Educated in China with foundational knowledge, Chinese doctoral students are likely to value and believe in self-cultivation, which may motivate them to pursue a PhD abroad (Yang, Volet & Mansfield, 2018) and discipline themselves while doing the PhD abroad.

**The social harmony and relational self**

Lai (2006) perceives that in Confucianism, the cultivation of the self is the cultivation of relationships. She observes that self-cultivation is the development of the self within the social environment, and responsiveness to others is permanently a key theme in morality and moral development. The concept of related-self captures relationality as a basic feature of human life, taking the cultivation of the self as an ongoing process. Within this framework, members of society participate in its moral life through the enrichment of each other.

An illustration of this related-self is embedded in 仁 (Ren), the core of Confucian philosophy. Etymologically, two people make Ren. Ren emphasizes benevolence based on human relatedness, interdependence, and social connectedness. Lai (2006, p.15) argues that ren “is not reducible to any one quality or virtue, or even a set of them. It is realized in different contexts: deference at home, respect in handling public affairs, and doing one’s utmost in interactions with others”. This interdependence can be interpreted as one’s devotion to seeking social harmony. This point can be highly relevant when interpreting how CIDS deal with the relationship with their supervisors and establish social networks in the host community. It would be interesting to explore
what values and beliefs they maintain, and which factors facilitate or constrain their success in the PhD process.

**CIDS at a glance**

Embedded in the contemporary sociocultural contexts, the current generation of Chinese international doctoral students (CIDS) is distinct from previous generations of CIDS, as well as international doctoral students from other countries or cultural backgrounds at least in three aspects (Yang, Volet & Mansfield, 2017).

*First*, the majority of these students are the only child of their parents due to China’s one-child policy implemented from the early 1980s until 2015. The “only child” in psychology is defined as children without siblings, raised singly by their parents. While no previous generation in any society was so overwhelmingly formed by the only children in the majority of families, this post-80s/90s generation has become a unique phenomenon in China, and its unpredictable impact on China’s future has been under examination by researchers in various fields such as anthropology, sociology, economics, and education (e.g., Deutsch, 2006; Fong, 2004; Hesketh, 2005).

*Second*, their personal growth has taken place alongside the rapid economic restoration of China in their childhood and then amidst the fast development of a sustainable knowledge-based economy in their youth. The Chinese government has realised the criticality of having innovators in STEM fields that are equipped for the knowledge economy with broad world visions (Liu et al. 2015). This reality has created an enormous demand for top-level scientists and researchers nationwide. This could be reflected in the government supported Chinese Scholarship Council for research students studying overseas. The quota of the programme had increased from 12,000 in 2011 to 29,000 in 2016 (Chinese Scholarship Council, 2016) when this generation of doctoral students was completing their secondary and tertiary education, which increased their opportunities to study abroad.

*Last but not least*, this generation has also experienced significant cultural reformations while growing up. Confucianism, communism and various western cultural elements have all impacted on the formation of their characters, life aspirations, values, and expectations. Family responsibility, financial improvement,
social reforms, and social mobility have generated constant cultural collisions that worked together or against each other to shape this unique Chinese generation.

When Chinese students decide to study abroad, they normally bring with them in their luggage hopes, dreams, ambition, determination, aspiration, happiness and their culturally embedded values and beliefs. However, along with the path in pursuit of the degree in research and sojourning in the foreign land, they encounter many and often unique challenges with both tangible and intangible stress (Wang et al., 2012). The tangible stress may come from the level of language proficiency, intense study programme, loss of familiar social networks, being away from the food that satisfies their appetite, financial instability, strategies of dealing with housing agencies, childcare arrangements, illness and an unfamiliar medical care system. On the other hand, the intangible stress often derives from the confusion in motivation, sense of identity, sense of belonging, self-efficacy, and the navigation in the new cultural context (Bandura, 2002; Berry, Kim, Minde, & Mok, 1987; Berry, 1997; Caprara et al., 2008; Ward & Kennedy, 1994; Ying & Han, 2006; Ying & Liese, 1994). With the stereotyping that Chinese students are generally strong in academic study (Ruble & Zhang, 2013), they are even under greater pressure to achieve high to match that expectation. The stress accumulated has consistently been found to impede their cultural adjustment, well-being and further on their academic achievement (Ying & Han, 2006).

Therefore, to achieve, this cohort needs to face the potentially stressful and challenging international PhD study experiences as well as the demand for competent scientists and engineers in the context of internationalisation and globalisation. These combined factors add up to the essentiality for this study to aim for enhancing understandings to support better and sustainable international doctoral education.

**Researcher’s positionality**

Qualitative studies have tended to be classified as subjective rather than objective. Stake (2010, p.36) puts it nicely, “the main machine in all research is a human researcher.” Hignett (2005) argues that objectivity in qualitative research is generally not an issue, as the goal is usually not to seek neutrality but to recognize the
researcher’s effect on the research, making explicit how this may affect the interpretation and findings. Therefore, in this section, I will reflect upon my positionality and the effect of this positionality in this study.

My positionality in the study had two folds: one as a Chinese international doctoral student studying in the field of educational psychology in Australia, and the other as a lecturer who has been teaching university students in STEM fields for exactly twenty years when commencing this doctoral project. Hence, I positioned myself as both an insider and an outsider in this study. However, as Lee (2015) revealed, to place a researcher as an insider or an outsider when doing subjective research, particularly when conducting interviews, has been an intriguing question in literature. Therefore, this positioning calls for prudent and rigorous contemplation.

The first point to consider is my strength of empathy in understanding what, how, and why questions in this project. Stake (2010, p.46) conceptualises that “to empathize is to look at things closely, becoming sensitive to, even vicariously experiencing, the feelings, thoughts, and happenings.” Stake argues that empathy is a matter of perceptions rather than emotion, which is sympathy. Empathy and sympathy hardly exist separately, but my rich experiences, similar to my participants in certain aspects but unique in many others, enabled me to perceive things more by empathy, less by sympathy. Informed by Stake’s theory that a qualitative researcher has no choice but to be empathetic by using personal understanding, the experiential understandings from both my own experience and the collections of others’ experiences underpinned this narrative inquiry.

Another point to ponder was my voice in this study. Guba and Lincoln (1994, p.115) argue that in qualitative research, the inquirer’s voice is “that of the passionate participant actively engaged in facilitating the ‘multi-voice’ reconstruction of the researcher’s own construction as well as those of all other participants.” Bearing in mind, I constantly questioned myself how to articulate my voice, and how passionate and active I could be, particularly in the data generating process.

In this study, I position myself as both an insider and an outsider to the participants. Being an insider, I questioned myself how much background and commonalities to share with participants when doing interviews. The factors examined involved the influences of our shared language, personal experiences, communication manners,
cultural background, and social environment. As an outsider, on the other side, I contemplated how to deal with dynamics such as power relationship, intimacy, trust, and respect. My status as an academic at a university in China obviously positioned me at a higher level of the hierarchy ladder when interviewing students. Being a middle-aged female in the field of social sciences may also influence how these participants in STEM fields, mostly in their 20s or early 30s, positioned me during interviews. With my experiences of teaching university students for two decades, I naturally positioned them as learners and showed them respect in undertaking a PhD abroad. Also, with the returning to the status of a doctoral student, I was comfortable to share with them jokes and occasional complaints about challenges of doing a PhD abroad. I wore casual jeans and T-shirts when in contact with them, which positioned me further as their equal. With the precondition of mutual trust and respect, the participants were comfortable in sharing with me their experiences both in academic studies and in social life, and I felt comfortable in probing further when I had questions.

Then in the process of analysing data and presenting the findings, I endeavoured to present the authentic voices of the participants and to ward off having my voice dominating the interpretations. Acknowledging the “intersubjective” quality of narrative inquiry, I have also endeavored to avoid being “overly personal and interpersonal” (Clandinin & Connelly, 2000, p.181). In brief, I believe all participants in the study deserve full respect for their willingness to reveal their experiences. As a researcher, I apply this respect by resting upon a rigorous research schema and ethics when investigating and presenting their experiences.

**Defining terms**

*Chinese international doctoral students (CIDS)*: United Nations Educational, Scientific and Cultural Organization (UNESCO) defines international students as “students who have crossed a national or territorial border for the purposes of education and are now enrolled outside their country of origin” (Institute for Statistics, 2006, p.178). Expanding on this definition, the term refers to doctoral students who are originally from the People’s Republic of China and, by the time of being interviewed for this study, are enrolled in or recently completed a doctoral degree in a university in Australia.
PhD: The Doctor of Philosophy (PhD) is generally defined as the highest academic degree that can be awarded for the original and significant contribution to scientific research (Phillips & Pugh, 2010). To receive the degree, a PhD recipient is expected to be “an authority, in full command of the subject right up to the boundaries of current knowledge, and able to extend them” (Phillips & Pugh, 2010, p.20). The current study focuses on the students who set a PhD degree as the academic goal to achieve.

STEM fields: In 1990s, the term STEM was first proposed by the National Science Foundation of the United States due to the significance of science and technology in the sustainable development of an economy (Portz, 2015). However, organizations, institutes, and researchers have been struggling with a clear definition of the specific disciplines that comprise STEM fields (Koonce, Zhou, Anderson, Hening, & Conley, 2011). Several variations of STEM have been proposed, such as STEMC to incorporate computer science, STEAM to add arts, and STREAM to add reading (Portz, 2015).

For the present study, the term STEM is used solely to refer to the four primary discipline families of Science, Technology, Engineering, and Mathematics. More specifically, the field of Science focuses on natural sciences, or “so-called core sciences” (Gonzalez & Kuenzi, 2012, p.2) (e.g., physics, chemistry, environmental science), and excludes psychology and social sciences (e.g., arts, economics, political science).

Structure of the dissertation

This dissertation has ten chapters, as depicted in the flowchart (Figure 1.1).

Chapter 1 provides an overview of the study. It introduces some fundamental elements, including research questions, significance, and social and cultural contexts of the research. This chapter also examines the researcher’s positionality in the study and clarifies terms used in the dissertation. It ends with a flowchart of this dissertation and the corresponding texts to lead the way for the reading.

Chapter 2 reviews four clusters of literature that relates to PhD study and PhD study abroad experiences. The first is the motivations and external influences of doing PhD and doing it abroad. The other three clusters are about the PhD study itself, structured
with the supervisor-led research context, personal factors to achieve a PhD abroad, and international doctoral students’ socialisation and connectedness in the host communities.

Chapter 3 draws on the conceptualisations and limitations in the literature to develop a conceptual framework that comprises two main components: a _three-dimensional CIS space_ (continuity, situation, and interaction), and a _multi-world_ (research, personal, social) _model_, and two supporting components: _transitions_ and _borders_ within the space and across the multi-worlds. This framework enables this study to holistically examine and interpret the complex phenomenon of transnational PhD study.

Chapter 4 presents the methodology and the research project. The research paradigm set for this study is a narrative qualitative inquiry embedded within sociocultural constructivism. The section that elaborates on the research design and the conduct includes an overview, participants, data collections, trustworthiness, and data analysis processes. The data analysis derives six patterns of congruence or difference and the corresponding transitions across the multi-worlds of participants.

Then Chapters 5 to 9 report the findings from this research. These chapters narrate the six patterns identified from both cross-case and within-case analyses. Each chapter first presents the commonalities of each pattern, and then focuses on a single narrative for an in-depth investigation. The last two patterns are integrated into one chapter to present their commonalities with different outcomes.

Finally, chapter 10 reiterates and discusses major findings, examines the contributions of this study, and moves on to further thoughts for future research, and concludes this narrative inquiry.
Figure 1.1 The flowchart of the dissertation
Chapter 2 Doing a PhD and doing a PhD abroad

Introduction

This chapter reviews previous research on the PhD study and PhD study abroad. Four clusters of literature are identified, which inform the structure of this chapter. The first cluster is about motivations and external influences of students doing PhD and doing it abroad. The other three clusters are about the PhD experience itself, including the supervisor-led small cultures in a research context, personal factors to achieve a PhD abroad, and international doctoral students’ socialisation and connectedness in the host communities. Unless otherwise stated, the literature reviewed in each section of this chapter generally starts with common elements of doing a PhD, and then flows to specific aspects related to doing it abroad.

Motivations and influences for a PhD and a PhD abroad

Over time, the motivations of doing a PhD degree has been changing. The traditional concept of a PhD degree is that a PhD is to qualify a candidate to teach in universities, but with the present situation of limited positions at universities, many of those who have achieved their doctorates will not have opportunities to go into academia (Phillips & Pugh, 2010). With the changing roles of a PhD, the motivations and the influences for choosing to undertake such a programme may need further examination (Guerin, Jayatilaka, & Ranasinghe, 2015).

Research in the motivations of doing a PhD has been extensive and dominantly empirical, using data drawn from a selected discipline or a university in a specific country. This body of literature, in general, identifies motivations within two broad categories: one focuses on personal development as intrinsic motivations (Zhou, 2015), and another on professional development as extrinsic motivations (Clark, 2007; Gill & Hoppe, 2009; Jablonski, 2001). The intrinsic motivational research captures personal satisfaction, self-accomplishment, intrinsic love to research, the joy of study, cognitive interest, the quest for knowledge and intellectual challenge, personal identity,
and self-enrichment (Leonard, Becker, & Coate, 2005; Stiber, 2000). The extrinsic motivational research has identified factors such as entry to academia, improving career prospect, job security, gaining qualifications, skills and expertise, promotion, credibility and recognition, and academic pathways (Churchill & Sanders, 2007; Mokhtar, 2012; Stiber, 2000). While most of this body of literature mingles intrinsic motivations with extrinsic motivations, a strength with Clark (2007) and Mokhtar’s (2012) studies is that they explicitly classified the two categories for clarification.

In addition, there is limited research that distinguishes intrinsic or extrinsic motivations with external influential factors. For example, Brailsford’s (2010) study compounded personal motivational factors with external influences in the decision-making process, though the study identified third-party influences for those educational professionals in the workforce returning to a PhD. These influences could be from friends, family members, colleagues, and other academics. This study focused on professionals already in a teaching career, so the findings may or may not be generalizable to the overall population of doctoral students.

The prior research is mostly qualitative and single-disciplinary based. Disciplines being researched include education (Clark, 2007; Jablonski, 2001; Leonard, Becker & Coate, 2005), history (Brailsford, 2010), and business (Gill & Hoppe, 2009; Stiber, 2000). There are two studies in the field of engineering, each with its special focus. Makhar’s (2012) research is gender-based, with female PhD students in the field of engineering in Malaysia. Apart from these two studies, most of the research has been based in the social sciences and business fields. Given the different research contexts for STEM students who mainly work in laboratories or work stations and with research teams, there are likely to be different motivating factors for students doing a PhD in STEM fields.

One study by Guerin, Jayatilaka, and Ranasinghe (2015) addressed the issue of multi-disciplines. The study used survey data from 405 HDR students in one Australian university, and identified five motives for embarking on the journey. These include 1) the encouragement of friends and family; 2) intrinsic interest in the research topic, the desire to contribute to knowledge in the field and the desire to prove one’s identity at the highest level with a PhD degree; 3) lecturer’s influence in the decision-making; 4) previous research experience; and 5) the prospect of career progression. The study did
not distinguish intrinsic/extrinsic motivations, such as interest in research and career progression, with external influences, such as influences from friends, families, and lecturers as well.

For the international flow of students in the context of internationalisation of higher education, a number of studies have identified some critical “push-pull” factors influencing international students’ choice. This notion of “push-pull model” for international student mobility was first proposed by Altbach (1998), who pointed out that some students were pushed by unfavourable conditions in their home countries and pulled by opportunities and scholarships in host countries.

Drawing on Altbach’s model, later research identified multiple motivators to construct the understanding of the flow of international students. These motivators include quality and variety of education in the host country (Shanka, Quintal, & Taylor, 2006), knowledge about host country (Mazzarol & Soutar, 2002), English-speaking environment (Bodycott, 2009), social and cultural experience (Li & Bray, 2007), and employment expectations after study (Binsardi & Ekwulugo, 2003; Jiani, 2017). Students are also found to have evaluated recognition of gained qualification or the degree value in the home country (Chen, 2008), rankings or the reputation of a university (Wilkins, Balakrishnan, & Huisman, 2012), and particularly the costs (Padlee, Kamaruddin, & Baharun, 2010; Li & Lowe, 2016). More recent studies identified low institution selectivity in a host country as a strong pull factor for Chinese students (Lee, 2017). In addition, Altbach’s macro-level analysis was also integrated with micro-level elements in which student characteristics in the decision-making process were examined (Jiani, 2017).

These studies are dominantly focused on international undergraduate or postgraduate coursework students rather than doctoral level students. Their findings may or may not apply to international doctoral students. Stephan, Franzoni, and Scellato (2015) point out one would expect different variables to play a role for doctoral students. Stephan et al. (2015) take tuition fees and living cost to illustrate the point: while most international undergraduates study on their own expenses, the majority of doctoral students are supported by a scholarship, covering both tuition fees and at least part of their living costs.
With a focus on the location decisions made by international students, Stephan et al.’s (2015) study is of particular relevance to the proposed study. With an extensive survey study, they analysed the location decisions made by international PhD students and postdocs in biology, chemistry, earth and environmental sciences, and material science from 16 countries (mostly European and Anglophone countries; China was excluded as a source country, but those originally from China were included). This study found the prestige of doctoral programmes, career prospects and financial support were highly important factors in pulling students to the United States of America (USA), while lifestyle and international experiences were important in pulling students to European countries. The unavailability of a programme in students’ home country also played a major role in their decision of studying in the USA.

When zooming in to Chinese international students, a few studies have taken into consideration the importance of Chinese traditional cultures and education in the motivation research. Bodycott and Lai (2012) argue that Chinese international students’ decision-making of studying abroad are still influenced by traditional Confucian values. Their study found in the past three decades when China experienced dramatic sociocultural and economic changes and reformation, most Chinese parents still upheld the Confucian ideology that stresses the importance of education. These parents were prepared to endure financial, social and emotional hardship to seek quality education for their children. The parents’ values and beliefs passed onto their children so that the pursuit of better education became one of the major motivations of Chinese students studying abroad.

Besides, choosing to go abroad might not be a simple leave-and-go decision for Chinese students themselves to make. Salili, Chiu, and Lai (2001) interpret that Confucian filial piety teaches children to obey their parents, love them, take care of them and particularly stay with them when they are aged. The handful of prior literature incorporating cultural studies with Chinese students’ study mobility, though, has focused on undergraduates or postgraduates by coursework.

In light of the lack of systematic investigation into the motivations and external influential factors with international students’ distinct disciplines and country of origin, Yang, Volet, and Mansfield (2018) addressed the issue to lay the groundwork for the current study being reported in this dissertation (see details in Appendix F).
Drawing on expectancy-value theoretical perspectives, Yang et al.’s (2018) study identified that, for the current generation of Chinese international doctoral students in STEM fields in Australia, enriching life experiences, self-cultivation, broadening perspectives in research, improving career prospects, and contributing to life betterment were major personal motivations to study abroad. This study also found the choice to study abroad was ultimately a personal decision but was also influenced by a range of external factors at both micro and macro levels. The micro level came from family, teacher, and peer influences, whereas the macro level involved institutional cooperation, reputations of supervisors, and financial considerations. The current project takes a longitudinal view and delves into the nuances and subtleties with respect to the diversity and connections in the students’ PhD abroad experiences.

Having examined motivations and influences before doing a PhD, the following sections will scrutinise three bodies of literature relating to doing a PhD and doing it abroad: the supervisor-led research context, personal factors to achieve the goal, and students’ socialisation and connectedness in the host community.

The supervisor-led research context

This part examines the influences of the supervision and the small cultures (Holliday, 1999) in a research context for the academic achievement of doctoral students and international doctoral students.

The supervision

Prior research consistently shows that of central importance to the completion and satisfaction of a PhD is supervision (e.g., Due, Zambrano, Chur-Hansen, Turnbull, & Niess, 2015; McCallin & Nayar, 2012; McCulloch, Kumar, van Schalkwyk, & Wisker, 2016). This suggests an examination of the supervision is essential to constructing the understanding of an individual international student’s experiences.

Somewhat surprisingly, as McCulloch et al. (2016) indicated, there has been limited guidance for doctoral supervision in practice. Kiley and Mullins (2005) found that supervisors were remarkably consistent with their own conceptions of good research but less consistent with what qualities were applicable to make a successful student
researcher. The intense intellectual connection between a supervisor and a PhD student is an intensely personal match, which reflects the supervisor’s own doctoral experiences and personal perspectives on the practice of supervision (Gu, He, & Liu, 2017; Lee, 2008).

With individualised supervisory practice, Gatfield and Alpert (2002) categorised a model with two dimensions in supervision: structure and support. The study yielded four paradigms of supervisory styles: the “laissez-faire” style, where supervisors play a minimum role in both structure and support; the “pastoral” style, where supervisors provide personal support and resources, but not in the structure of the research project; the “directional” style, where supervisors help to organize and manage the project, but not much in personal support or resources; and the “contractual” style, where supervisors perceive both structure and support as essential in doctoral supervision. Each of these supervisory styles embodies not just supervisors and their behaviours, but also the needs of candidates (Taylor & Beasley, 2005). McClure (2005) points out that different students may benefit from different supervisory styles, ranging from a high level of dependency to a high level of autonomy. This is also related to students’ criticality and autonomy in conducting their doctoral research (Cotterall, 2011; Deuchar, 2008; Goode, 2007; Johnson, Lee, & Green, 2000).

Previous research has identified a great number of constraining factors that may impair the supervisory relationship and hinder the progress of doctoral research, be it with local or international students. These factors include irregular meetings with supervisors (Heath, 2002; McClure, 2005), insufficient supervisory time (Goode, 2007, 2010), much delayed or mismatched feedback (Wang & Li, 2011; Can & Walker, 2011), challenges in negotiating differences (Bilecen, 2013), and anxiety caused by email contact (Can & Walker, 2011). In a quantitative study with 355 PhD candidates at an Australian university, Heath (2002) found that students’ satisfaction level would increase if formal or incidental meetings with supervisors were frequent and if the content of meetings could present constructive guidance on the research design, data analysis, literature, and scholarly writing.

The communication between the supervisor and student is identified as key in supervising research and maintaining a sound relationship (Lee, 2008). However, studies also found PhD students do not always have sufficient interpersonal
communication skills in dealing with this sensitive relationship, and most often they are not prepared “for the rigid hierarchy of academia” (Woolston, 2015, p.414) and lack the competency in negotiating differences (Carter, 2012; Winchester-Seeto et al., 2014).

For supervising international PhD candidates, Winchester-Seeto et al. (2014) suggest that it is complex because students bring with them unique linguistic, social, cultural, and educational capital, which might be distinct from the practices in the host institutions. Research identified multiple constraining factors for successful supervision, including language issues (Carter, 2012; McClure, 2005; Winchester-Seeto et al., 2014), cross-cultural issues (Winchester-Seeto et al., 2014), culture-related power distance (Spencer-Oatey, 1997). Research also identified students’ isolation (Le & Gardner, 2010), disconnectedness (Dang & Tran, 2017), and marginalisation from other faculties and peers (McClure, 2007) in the host institutions may further constrain the supervision.

Research revealed individual differences specifically related to cultural background. In a comparative study on the relationship between postgraduates and their supervisors in Britain and China, Spencer-Oatey (1997) found Chinese postgraduates tended to have a closer relationship and greater power distance with their supervisors than their British counterparts. Chinese have greater respect for hierarchy and high power distance in society, and their consideration of inequality in power as normal contrasted with British ideology which upholds egalitarian and low power distance in society (Hofstede, 1986, 2001).

In another study of the relationship between international students and their supervisors, Mitra (2017) found that cultural difference outside academia had no impact on the academic progress of international students, but international students would like to have their home country culture acknowledged in a multi-cultural setting. The study also found the success of supervisory relationship seemed to be dependent upon how much the supervisor and the student exhibited coping behaviour. Mitra argues that developing a human connection between a supervisor and a student is vital for a successful and academically productive advising relationship.

From a constructivist viewpoint, researchers argue that supervisors are also learners, trying to learn about their students’ learning and adjusting their supervision
accordingly (Harland & Scaife, 2010). The idea of reciprocal intercultural supervision in doctoral education is gaining momentum (Soong, Tran, & Hiep, 2015; Zhou & Todman, 2008). In order to develop better mutual understanding, supervisors may develop reciprocal cross-cultural communication skills and the capacity to promote greater agency in their international doctoral students (Soong et al., 2015).

Similarly, Wang and Li (2011) suggested supervisors provide more dialogic and culturally sensitive feedback while supervising international students. This is echoed in Robinson-Pant (2010) and Magyar and Robinson-Pant’s (2011) research that highlighted skills for negotiating different procedures and approaches are critical for doctoral achievement when conducting research and skills to develop a positive supervisory relationship. Nulty, Kiley, and Meyers (2009) suggest while highly successful supervisors tailor their approaches to guiding individuals, the students’ perspectives represent the other equally important contribution necessary in the development of a framework to evaluate supervision excellence.

Overall, these studies highlight the importance of the relationship with supervisors for an international doctoral students’ PhD study. An individual international student’s experiences embedded in this relationship are expected to be diverse due to the diverse styles of supervision.

**Small cultures in a research context**

In 1999, Adrian Holliday coined “large cultures” and “small cultures” for the field of applied linguistics to distinguish between notions of ethnicity or nation from those of any cohesive social groupings. Holliday maintains the concept of small culture does not refer to something smaller in size than large ethnic, national or international cultures; rather, it presents a different paradigm through which to look at social groupings. The focus of a large culture paradigm is what makes cultures as they are, whereas a small culture paradigm is more concerned with how it develops in the process and how it influences individuals within. This small culture approach focuses on activities and processes that assist our understanding of the cohesion of the group, avoiding any tendency to essentialise the interpretation of culture (Tian & Lowe, 2013). For international doctoral students in STEM fields who spend most hours of a day in their laboratories, offices, and work stations, Holliday’s small culture paradigm
may provide a unique theoretical perspective to examine their work context and the corresponding influences.

Pertaining to research students in STEM fields, studies have highlighted the importance of small cultural contexts for students’ academic achievement. Delamont, Parry, and Atkinson (1997) used Bourdieu’s term *habitus* to underline the role of a laboratory culture. Their study investigated the habitus of natural science PhD students in a UK university and reported the significance of the support from the research group as the laboratory culture. In this context, the supervisor provided guidance on the framework and direction of research, while the experienced group members, such as postdoctoral researchers or senior doctoral students, helped the inexperienced PhD students on a daily basis. The researchers found this collective support of the research group functioned as a buffer against failure and in the case where the working relationship with the supervisor broke down, the supportive laboratory culture might rescue the PhD student. The study also reported the mediating role of “pedagogic continuity” (p.535), where doctoral students had the opportunity to pre-establish their knowledge within the broad context of scientific work, but also within the more specific context of their own research group.

A laboratory is a good representation of international students’ social environment because doctoral students spend a significant portion of their time in the lab. Tanyildiz (2015) suggested that research laboratories present a closed environment among supervisors, students, and other researchers. Moreover, research laboratories have a unique independent structure within the department. They are semi-autonomous groups within the university that receive separate funding and, at times, hire separate personnel. Interestingly, by comparing the ethnic composition of 82 science and engineering laboratories directed by foreign-born faculty with another 82 laboratories in the same department directed by a native faculty member in an American university, Tanyildiz (2015) found strong evidence that labs directed by foreign-born faculty are more likely to be populated by students from the same country of origin. On average, 33% more of the students working in a laboratory is Chinese, Korean or Indian if the laboratory director shares one of these foreign nationalities than if the director is native born. This study draws attention to the effect of affinity on the ethnic composition of research laboratories at the micro level, an affinity that also translates into the ethnic composition of the scientific community at the macro level.
Holliday (1999) points out that each member of a group will bring small culture residues from other educational and cultural experiences. This is important for STEM research students because, in most cases, faculty and students are bound together in research facilities and projects (Fox, 2003). This binding together mainly derives from the funding or a grant where the supervisor is the principal investigator and the student undertakes daily work. It is their co-contribution with their academic experiences that make the achievement. This reflects Holliday’s (1999) notion that a small culture is “a dynamic, ongoing group process which operates in changing circumstances to enable group members to make sense of and operate meaningfully within those circumstances” (p.248).

While these studies provide examples of how small cultural contexts affect students, they also demonstrate challenges faced in studying small cultures. For example, data limitations preclude the studies from identifying the heterogeneity of PhD students within a laboratory or a team. Students have their own cultural and educational background, so they bring their unique social and cultural capital that interacts with and influences the small cultures. This suggests that to fully understand CIDS’ PhD abroad experiences, their differences need to be taken into account together with their small cultural research contexts.

Collectively, these studies outline the critical role of supervisors and the related small cultures in a research context for international doctoral students. The review then turns to examining personal factors in achieving a PhD abroad and how international doctoral students experience socialisation in the host communities.

**Personal factors to achieve a PhD abroad**

As the doctoral student is the one who undertakes a PhD study, this section examines extant research on personal factors that could play a role in doing a PhD and doing it abroad, including perseverance to achieve a PhD and a PhD abroad, challenges that may constrain students’ successful and timely completion of a PhD, how well students could maintain their well-being while doing the PhD, and their expectations for the future.
Perseverance to achieve

Traditionally, to achieve a PhD degree is to be awarded for one’s original, significant, and independent work to make a breakthrough in scientific research, even if it just a small step forward (Phillips & Pugh, 2010). For doctoral students in general, to achieve the goal, they have to embrace both exhaustive intellectual and psychological challenges with three and more years of dedicated commitment (Soong, Tran, & Hiep, 2015; Stubb, Pyhältö, & Lonka, 2011). Doctoral students are often addressed with names such as novice researchers, novice scholars (Li, 2006a, 2006b), apprentice scientists, or novice scientists (Flowerdew & Li, 2007). These names point out that they are learners in scientific research and yet to grow from novice to independent researchers through the journey of doctoral study.

It appears that not every doctoral student has the opportunities to sufficiently grow to achieve the goal. The doctoral attrition rate has been reported consistently high, ranging from 30% to 50% (Lovitts, 2001) or 40% to 70% (Gardner, 2007) in the two North American studies, both with variations of disciplines. The reasons for attrition can be complicated, including lack of financial stability (Golde, 2005), lack of research facilities (Sakurai, Pyhältö, & Lindblom-Ylänne, 2012), time issues (Lovitts, 2001), dissatisfaction with the programme, psychosocial costs, and disenchantment (Golde, 2005; Lovitts, 2001; Rudd, 1985). Though the reasons can be multi-faceted and multi-layered, Lovitts (2001) points out, in most cases, it can be conveniently attributed to students’ lack of academic ability. Lovitts argues that taking this as the sole explanation of attrition would be ignoring the real factors that hinder students’ persistence and perseverance.

Whatsoever, when students withdraw, the cost to society, university and departments is substantial, but it is much worse for the individual students, who suffer most emotionally, professionally, and financially if they have to leave without a degree (Lovitts, 2001). They may find their hopes, dreams, and aspirations shattered. Golde (2005) further indicates that “those factors that spur attrition in some students may also inflict damage on those who persist” (p.670).

For international doctoral students, the toughness of this journey is double-layered with doing the PhD and doing it transnationally, trans-culturally, and trans-educational systems (Bilecen, 2012, 2013). It was not surprising that the literature generally points
to the challenges, difficulties and problematic aspects of doing a PhD abroad, such as cross-cultural communication and linguistic issues (Borg et al., 2010; Le & Gardner, 2010; Ye & Edwards, 2015). However, some research and statistics indicated higher completion rates and lower drop-out rates of international students than their local counterparts (Council of Graduate Schools, 2008).

Several studies have attempted to interpret the perseverance of international doctoral students. Barron, Baum and Conway’s (2007) study on the initial expectations of international postgraduates revealed that they expected that studying abroad could be academically challenging but ultimately rewarding. Le and Gardner’s (2010) study on Asian international doctoral students in STEM fields at an American university found these students were “motivated, research-driven, hard-working, self-efficient, and modest individuals” (p.260) despite perceived challenges and adversities along the PhD.

Of particular relevance to the current study is Zhou’s (2014) study on Chinese STEM doctoral students. Zhou (2014) identified four major factors affecting Chinese doctoral students’ perseverance despite their perceived dissatisfaction: 1) intrinsic interest in research, 2) optimism in American doctoral education, 3) the utility value of a PhD for permanent residency, and 4) high social cost of quitting. The study also found Confucian cultural beliefs in malleability, the importance of effort, interdependent self, and filial piety shaped these motivations. Zhou’s study draws on expectancy-value achievement motivation theory and is situated in one north American institutional context with a small sample (n=6) at a single time point. It is highly worthwhile to scrutinise factors facilitating or constraining perseverance in doing a PhD abroad in other cultural and educational settings over time and with a larger sample size. Using alternative theoretical perspectives and methodologies would allow examination of the complexity, nuances, and subtleties of doctoral study abroad experiences.

In addition, for female international doctoral students in STEM fields, they may encounter a third layer of challenges due to the gendered barriers in the traditionally masculine science and engineering cultures (Dutta, 2015). Due to the scarcity of research in this respect, female international doctoral students’ life has been described as invisible to the outside (Kenway & Bullen, 2003; Anderson, 2012). Dutta (2015) identified recruitment and retention of female doctoral students as key issues in STEM
fields, particularly in engineering. Taking a theoretical perspective based on the concepts of sustainability and liminality, Dutta’s study with 49 participants from South Asia, East Asia, the Middle East, and Africa exposed the perseverance and agency of female international doctoral students as “empowered individuals” (p.340) in constructing inclusion in mainstream cultures. They were able to reengineer their professional efficacy rather than staying powerless and invisible in the challenging male-dominated context. Though this research is revealing, it included participants differing in cultural backgrounds and experiences.

**Challenges that constrain**

The literature shows three key challenges that may constrain students’ achievement in a PhD study or a PhD abroad study. The challenges are respectively linguistic proficiency, scholarly writing competence, and establishing a professional identity.

*Challenges with linguistic proficiency and intercultural social self-efficacy*: Linguistic proficiency is a problem for non-English speaking international students studying in Anglophone institutions. The gravity of the problem can be revealed in the link between their language and anxiety, which has been a focus in research (Brown, 2008). International students have to reach a certain level in tests like International English Language Testing System (IELTS) or the Graduate Record Examination (GRE) before enrollment, but while abroad, the majority are not confident in their oral communication when using English as a medium (Lovitts, 2001) and suffer feelings of “anxiety, shame, and inferiority” (Brown, 2008, p.75). In this vein, research finds positive correlation between intercultural social self-efficacy and self-esteem among international students (Mak, Bodycott, & Ramburuth, 2015).

For international doctoral education that features one-to-one supervisory relationships in a cross-cultural context, linguistic proficiency and social self-efficacy is of particular importance. The communication issues between a non-native English-speaking student and an English-speaking-only supervisor has long been targeted as one of the key issues that may constrain a student’s academic achievement (Carter, 2012; Cheng, Myles, & Curtis, 2004; Cortazzi & Jin, 1997, 2013; Kim, 2006; Meng, Zhu, & Cao, 2017; Xu, 1991). Bloom, Karp, and Cohen (1998) found miscommunication was discouraging for international doctoral students because their
research skills and talents could be overshadowed by language insufficiency. Lovitts (2001) found that those students who had difficulty understanding others or being understood by others might worry that their professors viewed them as *stupid* so that their sense of insecurity would increase.

Some other research identified a strong link between language proficiency and human agency among international students (Sawir, Marginson, Forbes-Mewett, Nyland, & Ramia, 2012). Researchers argue international students can transform into bilingual and bi-culturally competent individuals with an investment of effort needed to break language and sociocultural barriers (Berry, Phinney, Sam, & Vedder, 2006). Students with international study experiences can be highly successful in terms of overall development and achievement with their accumulated social and cultural capital in a broad global context (Masten, 2014).

*Challenges with scholarly writing competence:* The challenge of academic writing applies to both domestic and international doctoral students (Chang & Tsai, 2014; Yu & Lee, 2013; Kwan, 2013). For doctoral students in general, to achieve the degree, they need to learn how to write up a doctoral dissertation (Guerin et al., 2013), how to publish in professional peer-reviewed journals (Kwan, 2013; Mason, 2018), and in some cases, how to write grant proposals (Cheng, 2014).

Publications have also become tickets to academia upon graduation and an indicator of their knowledge contribution and accumulation (Sheldon, 2018). The importance of publications impact back on doctoral students and doctoral education (Ding, 2001). In China, most research-intensive universities applied “publish SCI (Science Citation Index) papers or no degree” requirements for doctoral candidates (Li, 2016). In Australia, though the award of a doctoral degree by research is essentially based on the quality of the final thesis (Kiley, 2009; Mullins & Kiley, 2002), students in STEM fields are expected to publish journal articles under doctoral supervisory facilitation (Li, 2006a, 2006b; Kwan, 2013).

With the contexts and the demand, extant research has consistently reported concerns about the challenges of improving the skills in scholarly writing among doctoral students, as they are so called novice researchers, novice scientists, and thus novice academic writers (Can & Walker, 2011; Fergie, Beeke, McKenna, & Crème, 2011; Maher, Feldon, Timmerman, & Chao, 2014). How to facilitate these novice
researchers and scientists in reporting and publishing their projects is considered as a substantial challenge for supervisors (Can & Walker, 2011; Kwan, 2013).

For international doctoral students, both language proficiency and new academic writing conventions may constrain their scholarly writing competence (Flowerdew & Li, 2007; Li & Flowerdew, 2007). English has been the language dominating the world of science and the scholastic reservoir (Chang & Tsai, 2014; Yu & Lee, 2013; Marginson, 2018). Besides, international students may experience different academic writing conventions between home and host institutions or educational systems (Bitchner & Basturkmen, 2006; Elliot, Baumfield, & Reid, 2016). Winchester-Seeto et al. (2014) identified that difficulty in mastering academic writing may increase dramatically if students experienced different academic norms in their prior academic study environments. Besides the quality of writing, lack of ability to write reasonably rapidly has been understood for decades as another major cause of delay in completing a PhD abroad (Rudd, 1985). It was reported that difficulty in writing could lead to embarrassment, frustration, or humiliation among international doctoral students (Elliot, Baumfield, & Reid, 2016).

To better facilitate international doctoral students, Magyar and Robinson-Pant (2011) suggest that supervisors might take a more critical and holistic approach towards the internationalisation of education instead of grumbling at international doctoral students’ English language and academic writing skills. Singh and Fu (2008) also suggest that supervisors might negotiate explicitly the nature of the writing expected and appreciate the causes of the problems due to academic background differences when advising international postgraduates. Egege and Kutieleh (2004) argue that direct and explicit instruction on western educational conventions can enhance confidence in writing and make international doctoral students feel their own educational values are not compromised.

Challenges with establishing professional identity: Doing a PhD is like an academic apprenticeship with a process that establishes a candidate’s professional identity in research and in academia. The identity could be undermined if the PhD is not completed (Harland & Scaife, 2010). The journey for doctoral students to establish their professional identity could be of confusion with constant loss of directions (McAlpine & Amundsen, 2009).
To better facilitate doctoral students establishing academic identities, McAlpine, Jazvac-Martek, and Hopwood (2009) found that both formal and semi-formal research activities might help. They suggest that both formal and semi-formal activities may develop a researcher identity. These activities can become a catalytic agent in the transformation from an apprentice to an independent researcher. Formal activities involve submitting a dissertation or thesis, submitting funding applications, submitting journal articles or conference papers, teaching as a teacher assistant and working as a research assistant; whereas semi-formal engagement include attending workshops, attending research meetings, conference or non-conference presentations, attending someone else’s oral defense, and meeting with supervisor(s).

For international doctoral students, research found that upon completion of a PhD abroad, students have accumulated a great amount of newly acquired human capital to shape their professional identity (Kim, Bankart, & Isdell, 2011; Zhang, 2016). This capital consists of academic knowledge, professional skills, cultural and social experiences, and new international networks.

However, international doctoral students may have specific factors that could either positively facilitate or negatively constrain their identity development. Park, Chuang, and Hald (2018) identified four impact factors with Asian STEM doctoral students in an American research university: previous education and work experience, STEM disciplinary skills and knowledge acquisition, English language proficiency, and socialisation with peers and supervisors. Among the four influencers, academic socialisation was identified as the most crucial factor for Asian students, and the language proficiency only applies to international students.

Thus far, the literature shows multi-faceted challenges that may constrain an international doctoral student’s successful completion of a PhD. The next section will move on to examine what literature reveals about doctoral students’ psychological well-being in the undertaking.

**Maintaining well-being**

encompasses multifaceted domains that involve self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life and personal growth.

The psychological welling of PhD candidates has been of great concern in research, and the review of relevant literature shows a not-so-optimistic scenario. For example, Levecque, Anseel, Beuckelaer, Van der Heyden, and Gisle’s (2017) quantitative study shows PhD students are about 2.5 times more likely than highly educated people in the general population to be at risk of depression and other common psychiatric disorders. Barry, Woods, Warnecke, Stirling, and Matin’s (2018) mixed method study similarly reports doctoral candidates in an Australian university reported “higher levels of depression, anxiety and stress than age-matched general population normative data” (p.468).

A survey study with 5,700 doctoral students worldwide shows most of them are passionate about their research, but many “suffer for it” (Woolston, 2017, p.549). The survey reveals over one-quarter of respondents have concerns about psychological well-being, and 45% of those (n=709) disclosed that they sought help for anxiety or depression as a consequence of doing a PhD. Among these 709 students, 35% sought help within the institution, and 32% from elsewhere; 18% students felt they were unsupported when seeking help from their university, and 5% revealed they thought of seeking help, but there was none available. In this survey, the stresses that cause anxiety or depression mainly involve maintaining work-life balance (55%), future career path (55%), financial issues (50%), insufficient funding (49%), competitive post-doc peers (31%), mental health (28%), and imposter syndrome (24%). One participant mentioned in the survey’s comment section, “You’re expected to take responsibility, but you aren’t given control over a lot of issues.” This echoes Ryff’s theory that lack of environmental mastery and autonomy bring harm to students’ psychological well-being.

Then it is not so surprising that the concern has been more serious towards the psychological well-being of international doctoral students (Jiang, 2010; Yakunina & Weigold, 2011; Wei, Liao, Heppner, Chao, & Ku, 2012; Han, Han, Luo, Jacobs, & Jean-Baptiste, 2013; Shim, Freund, Stopsack, Kammerer, & Barnow, 2014; Liao & Wei, 2014; Bonn & Tafarodi, 2014; Redfern, 2015; Woolston, 2017). This is mainly because both doing a PhD and studying abroad involves challenges and stresses in life,
such as functioning ineffectively in scientific research and cross-cultural operations. It is also perceived as taking a “rollercoaster of confidence and emotions” (Christie, Tett, Cree, Hounsell, & McCune, 2008, p.225), so the doctoral journey involves challenges both in the brain and in emotions (Cotterall, 2013).

Pertinent to the current study, Han et al. (2013) conducted a survey (n=130) on Chinese students’ psychological well-being at Yale University in 2009. Although Chinese students were only 3.1% of the total number of students at Yale, they represented the largest body of international students on campus. The participants were dominantly doctoral students (55.8%). This study revealed 45% reported symptoms of depression, and another 29% reported anxiety. In this study, the stresses were reported to be related to concerns for health, low exercise time, and in particular, a poor relationship with one’s supervisor. About 27% of respondents were not aware of the availability of mental health and counselling services on campus. This is consistent with other research showing Asian international students’ low intention to seek counselling (Yakunina & Weigold, 2011). As Chinese traditional culture places a strong emphasis on academic success and students carry family expectations, research commonly put this heritage culture as the main contributor to the psychological complications of Chinese international students (Wei et al., 2012; Han et al., 2013; Redfern, 2015).

In a systematic review of 18 studies with East Asian international students, Chinese as the majority, Li, Wang, and Xiao (2014) found depression was the most frequently reported variable (six studies, or 33.3%), followed by acculturation (five studies, or 27.8%). They identified that psychological well-being of East Asian international students is closely related with the length of stay in the host country, English proficiency, attitudes toward seeking help, depression, and acculturation.

Current understandings on how Chinese international students deal with their psychological issues are mainly quantitative (Li et al., 2014), blurring distinctions between disciplines and levels of study programmes. A qualitative study that distinguishes these diversities would be able to delve into the nuances. As Woolston (2017) suggests, “Survey responses can only go so far, and sometimes there is a deeper story beneath the data” (p.552). This appeals for a qualitative study to focus on Chinese students at a specific level and in specific disciplines.
Expectations for the future

Research indicates doctoral students’ expectations of a future career and destination could be related to their PhD study abroad experiences (Winchester-Seeto et al., 2014; Ugwu & Adamuti-Trache, 2017). For doctoral students worldwide, Woolston’s (2017) survey showed that a common high expectation to find a position in academia was against the backdrop of a global dearth of university research positions. The study (n = 5,700) found a majority of respondents (52%) expected to work in academia, another 22% expecting to work in industry, 9% in the medical sector, 9% in government, 4% in non-profit organizations, and another 5% unidentified. The study reveals a general concern about the uncertain future that awaits upon doctoral graduation.

For international sojourning doctoral students, this uncertainty of the future is also related to a stay-or-return question pending upon graduation. Research has long shown that through three to five years of doctoral study abroad, the acquisition of useful skills and professional expertise opens the route to a promising future career for international doctoral students (Rudd, 1985). The where-to-go question does not solely belong to students because researchers and policy makers are also concerned about doctoral graduate mobility, which brings about larger issues such as brain drain (Cao, 2008), brain gain (Stephan, Franzoni, & Scellato, 2015), brain circulation (Li & Lowe, 2016) and brain race (Bijwaard & Wang, 2016; Li & Lowe, 2016) in a global context.

In a study with international STEM postgraduates in the USA, Han et al. (2015) identified job opportunities, quality of life, professional networks and financial income as major factors for graduates remaining in the USA. In comparison, family was the only dominant factor (above 70%) that pulled them to return to the home country, dwarfing all other factors such as cultural reasons and job opportunities (30% and below).

For Chinese international doctoral students, besides expectations to work in academia, family considerations, and the research environment, Pan’s (2014) study suggest the concept of root might play a role in their decision-making. While being away from home and studying in a western sociocultural context, Chinese students experience being “uprooted, disoriented, or maybe lost” (p.93). This may enhance a traditional Chinese concept, 落叶归根 (a falling leaf will return to its root), a metaphor to
describe a sojourning individual is like a falling leaf drifting in the wind, explaining why a person may want to return to where he or she belongs.

The findings of Lee, McMahon, and Watson’s (2018) study on career decisions of Chinese doctoral students in Australia are consistent with the return-to-the-root concept. Their study highlighted Chinese students’ concern to balance competing influences to maintain harmony by negotiating personal aspirations with family expectations and societal constraints. The study interpreted that the negotiation of values, beliefs, and practices revealed the interrelatedness of the self and the environment. This relationship was influenced by “a tripartite of Confucian, Buddhist and Taoist philosophies” (p. 37). This study is among the rare few that identified the influence of philosophy on Chinese international students.

Socialisation and connectedness

Socialisation in a novel context and the connectedness with host communities have been a key focus in the literature about international students, which is to be reviewed in this section.

Acculturation and marginalisation

Research (e.g., Berry & Annis, 1974; Graves, 1967) has long used acculturation to conceptualise the socialisation experiences of new arrivals in an unfamiliar sociocultural context. John Berry (1984, 1997, 2005) generally defines acculturation as a process of cultural and psychological changes that involve various forms of mutual accommodation, leading to some longer-term psychological and sociocultural adaptations between two or more cultural groups and their individual members. Berry (1984) argues acculturation occurs whenever two cultural groups come into contact with each other, and the changes occur in both groups, but usually, the dominant group changes less than the other side does.

Berry (2005) uses terms integration, assimilation, separation, and marginalisation to describe strategies and outcomes depending on how immigrants engage in intercultural contact and how they maintain their cultural heritage and identity. His research found those pursuing integration experienced less acculturative stress and
achieved better adaptations than those who were marginalised; those who experienced assimilation and separation had intermediate levels of stress and adaptation.

The concept of acculturation has been widely adopted in research on international students (e.g., Kashima & Loh, 2006; Shafaei, Nejati, Quazi, & von der Heidt, 2015; Zheng, Sang, & Wang, 2004). Though both international students and host communities may change along with the acculturation process, students need more psychological, sociocultural, and linguistic adaptations (Lewthwaite, 1996; Meng, Zhu, & Cao, 2017; Wang et al., 2012) for socialising and connecting with new sociocultural contexts (Brown & Holloway, 2008; Brown, 2009).

For international doctoral students, the socialisation is an unusual double-layered one in the host community, which is to add academic socialisation to the socialisation in the common sense (Akobirova, 2011; Golde, 1996, 2005). Mitra’s (2017) study exemplifies the importance of acculturation into the host academic culture for the academic success of international doctoral students.

Marginalisation has been the key word in describing Asian doctoral students in Anglophone institutions. Sato and Hodge (2009) found Asian international postgraduate students felt marginalised and had difficulties engaging in social activities with their “white” peers in North American universities. Some other studies (Evans & Stevenson, 2011; Sakurai, Pyhältö, & Lindblom-Ylänne, 2012) also found East Asian international doctoral students tend to rely more on their supervisors than on other peers. A consequence is that when these students experience difficulties with supervisors, there seems to be not much other close collegial support available, leading to a sense of being marginalised or isolated. Difficulties in oral communication with others in English (Brown, 2008) or feeling stereotyped (Ruble & Zhang, 2013) deteriorated the situation, resulting in negative emotions such as disappointment, not belonging, fatigue, and losing motivation (McAlpine, Jazvac-Martek, & Hopwood, 2009).

In Elliot, Baumfield, and Reid’s (2016) study with international doctoral students in the UK, researchers reported their participants creatively used the “third space” as a coping mechanism for socialisation. In their study, the third space refers to “the informal spaces that foster personal learning, enjoyment and development through friendships, social activities and wider support networks” (p.1189). Their participants
referred to diverse activities they pursued outside PhD life, such as volunteering, going to pubs, and playing tennis in a club. These students perceived these activities as intercultural experiences, enjoyable and socially rewarding. Noteworthily, the study has a mixed ethnicity of participants (n=14) from different parts of Europe, America, Asia, and Africa, whereas prior research (Rosenthal, Russell, & Thomson, 2006) has shown students from East Asia have a distinct pattern of socialisation from those from other areas. Nevertheless, the concept of the third space suggests an important area for further research.

With respect to Chinese international doctoral students, some research (e.g., Ye & Edwards, 2015, 2017; Ye, 2018) argues that these students proactively use various coping strategies and agency to meet challenges and adapt to a different academic, social, and cultural environment. Other research findings identify Chinese students’ intensive focus on the academic research, “almost to the exclusion of everything else” (Borg et al., 2010, p.191). This exclusive focus on research is identified as resulting in Chinese international doctoral students’ isolation and marginalisation in their academic acculturation experiences, in particular in the student-supervisor relationship in the first six months (Le & Gardner, 2010; McClure, 2005, 2007). For those who put sole focus on the research project, socialisation with the host society might seem to be secondary. Due et al. (2015) explain international doctoral students have diverse expectations for their host country and university, so they do not have similar priorities in their study abroad schedule.

With the nature of international doctoral education, researchers argue it is important to consider the socialisation experiences specific to individual academic disciplines because the locus of the doctoral student experience is within the discipline, rather than the institution (Golde, 2005; Le & Gardner, 2010). In connection with the concept of small cultures (Holliday, 1999) in a research centre or a laboratory, it deserves further research on specific fields of the doctoral study.

**Loneliness and connectedness**

The widely researched scenario of Asian international doctoral students’ marginalisation leads to another concern in the literature: loneliness. The very nature of academic research predetermines the journey towards the PhD degree as a lonely
one because the contribution to the field needs to be original, different from what has been done before (Rudd, 1985). With the dual identities of an international student and a PhD student, international doctoral students are likely to experience double-layered loneliness.

Sawir, Marginson, Deumert, Nyland, and Ramia (2007) found that two-thirds of international students in a major Australian university experienced problems of loneliness and isolation, particularly in the early months of study abroad. The researchers identified three types of loneliness: personal loneliness due to the loss of contact with families, social loneliness due to the loss of networks, and cultural loneliness due to the loss of the preferred cultural environment. To ease the loneliness, Yu and Moskal (2018, 2019) found many Chinese international students in the UK turned to Christian churches rather than host institutions for social networks, friendship, and support even though most of them were not Christians.

The challenges to develop intercultural relationships on university campuses (Kudo, Volet, & Whitsed, 2018) and the missing friendship between local and international students (McKenzie & Baldassar, 2017) often lead to one consequence: retreating into a comfort zone by connections with one’s own ethnic community.

On one side, research on international studies suggest that participation in co-national networks is a comfortable, familiar and less stressful approach to ease students’ study abroad challenges (Rosenthal, Russell, & Thomson, 2006; Gu, 2009). Bochner, McLeod and Lin’s (1977) early study reminds us that the co-national bond is of vital importance to international students’ emotional needs. Gu (2009) argues there is the necessity for international Chinese students to have someone around that shares and understands the same culture. These studies show the establishment of a co-national network provides sense of security, academic and life support, social connection, and a means of sharing knowledge of the host community.

On the other side, Berry (1997) points out that if this connection with co-nationals or co-culturals becomes the sole form of social engagement or develops into an intolerance towards the host culture, then adaptation to that new culture will be inhibited. In an Australian quantitative study with international undergraduate and postgraduate students (Rosenthal et al., 2006), researchers found a positive relationship between Asian students’ sense of connectedness and their social
engagement with Australians, while social mixing with co-culturals was unrelated. They interpreted social connectedness was related to students’ cultural background and communication skills in the new culture and their evaluation of their perceived academic progress. In the same vein, Wang, Wei, and Chen’s (2015) survey with Chinese international students in the USA also identified a social connection with local mainstream society could better predict life satisfaction than that with their local Chinese community.

Modern technologies have made connections with families at home easier, available, and affordable for international students. Bacigalupe and Bräuninger (2017) conducted a qualitative study (n=14) on the impact of mediated family communication on international students’ well-being in Spain. The results suggest that the use of communication technologies maintains a close family relationship, fosters a sense of connectedness, and promotes better adaptation to the new environment. The participants in their study reported strengthened physical, emotional, and social well-being through a mediated family connection.

Together, these studies indicate that international doctoral students may experience marginalisation and isolation when doing a PhD abroad. The literature also shows co-national networks may alleviate the loneliness and bring other benefits but may also hinder students’ adaptation to the new cultural context.

**Chapter summary**

This chapter has presented a review of relevant literature on the doctoral study abroad experiences from two stages (before the PhD and during the PhD) and three relevant facades (the supervisor-led small cultures in a research context, personal factors to achieve a PhD abroad, and socialisation and connectedness with the local community). These four bodies of literature – motivations, the context, the individual, and socialisation – are important to construct the overall background understanding of the complex phenomenon of PhD study abroad experiences.

The literature reveals that research on Chinese students’ PhD study abroad experiences could be complex, multi-faceted, and multi-layered. A holistic perspective and conceptual framework may help in understanding and interpretation. Different
fundamentals collectively establish students’ strength to complete the PhD and to achieve their goals.

There is a strong case for this study to investigate the journey of Chinese international doctoral students in STEM fields in Australia. These students may become one of the major forces in the contribution to the foremost innovative and scientifically advanced economies in the world, but there is still a lack of extant empirical and conceptual evidence to understand how they experience their PhD abroad. Correspondingly there is a lack of understanding of how to better facilitate their success in the timely completion of their PhD abroad. The unique experiences of these students throughout their doctoral study deserve to be explored and better understood, and their voices deserve to be heard by the world.
Chapter 3 The conceptual framework

Introduction

The aim of this chapter is to develop a conceptual framework that may help to address the research questions of this study. Informed by the literature, a three-dimensional multi-world conceptual framework is presented to underpin understanding and interpretation of the experiences of Chinese international doctoral students in STEM fields.

Conceptualisations and limitations

The literature review in the previous chapter suggests three main lines of investigation in the research on international doctoral students’ experiences. The first focuses on the supervisor-led small cultures in a research context that underlines the importance of both supervisors and small cultures to the academic success of international doctoral students. This involves individualised supervisory styles (Kiley & Mullins, 2005; Gu, He, & Liu, 2017), supervisor-student communication (Lee, 2008; Woolston, 2015), and other influencers related to the supervisor-student relationship (Goode, 2007; Heath, 2002). The concept of reciprocity in cross-cultural supervision has gradually gained momentum in research (Magyar & Robinson-Pant, 2011; Soong, Tran & Hiep, 2015; Zhou & Todman, 2008). For students in STEM fields, research conceptualised their laboratory culture, or habitus, to investigate the work environment, norms in the laboratory, and teamwork (Delamont et al., 1997; Fox, 2003; Tanyildiz, 2015).

The second line of literature focuses on personal factors to achieve a PhD abroad and underscores challenges and tensions. It involves a high attrition rate and the perseverance of transnational doctoral students in conducting research (Lovitts, 2001; Le & Gardner, 2010; McAlpine & Amundsen, 2009; Ye & Edwards, 2015, 2017; Zhou, 2014, 2015). International doctoral students also need to face the challenges of linguistic proficiency (Cortazzi & Jin, 2013; Meng, Zhu & Cao, 2017), scholarly writing competence (Flowerdew & Li, 2007; Li, 2006a, 2006b), and establishing
professional identity in a novel research context (Kim, Bankart, & Isdell, 2011; McAlpine, Jazvac-Marteck, & Hopwood, 2009; Park et al., 2018). How students exercise agency in navigating through the transnational doctoral study attracted some attention (Levecque et al., 2017; Soong, Tran & Hiep, 2015), but of greater concern in research has been the psychological well-being of international doctoral students due to the high demand of doctoral research in STEM fields (Han et al., 2013; Li, Wang, & Xiao, 2014). With the high value of these students for the future science and technological innovation, their expectations to the future relate to concepts such as brain drain, brain gain, brain race, and brain circulation in a global context (Cao, 2008; Li & Lowe, 2016).

Then the third line of research conceptualises the social aspect of international doctoral students in the host community. Both their social acculturation and social connectedness have been examined in the literature (Akobirova, 2011; Golde, 2005; Le & Gardner, 2010; McClure, 2005, 2007). Marginalisation and disconnection of international doctoral students, in particular those from East Asian countries, in an Anglophone host country have been reported as the major phenomena in prior research (Baumfield & Reid, 2016; Borg et al., 2010; Sawir et al., 2007).

In brief, what these and other studies highlight is the inherent difficulty of achieving a PhD and achieving a PhD in a cross-cultural context. Key determinants in the successful completion of a PhD involve contextual facilitation and an individual’s perseverance, agency, and skills for acculturation.

To further develop research on the experiences of international doctoral students, new areas of conceptualisation are necessary. Three areas that inform further study are identified below and these provide the rationale for the development of the conceptual framework for this current study.

First, the literature has yet to conceptualise the dynamic and developmental nature of international doctoral student experiences. Most empirical work has adopted one-off interviews as the main data source, be it with quantitative or qualitative methods (Li, Wang & Xiao, 2014). This has limited the understandings of the dynamic nature of student experiences that is characterized by changes and development over time during the doctoral study in the novel sociocultural context (Kiley, 1999). In this sense,
what is strikingly missing from research is the conceptualisation of the evolving nature of the experiences of international doctoral students over time.

Second, the literature has yet to expand the scope of conceptualisations in research on the complex phenomenon of international doctoral study in the context of education internationalisation. International undergraduate and postgraduate students by coursework have been studied significantly more fully than those doctoral students that are characterized by research. To date, concepts and theories used to study international doctoral students have mainly involved motivations (Yang, Volet, & Mansfield, 2018), persistence (Zhou, 2014), expectations (Barron, Baum, & Conway, 2007), identity (Ye & Edwards, 2017), culture shock and adaptation (Najjar, 2015), acculturation (Xiang, 2015), and cosmopolitanism (Bilecen, 2013). Some important concepts used in studies on international undergraduate students and postgraduates by coursework are yet to be adopted to enrich understandings of doctoral students. These concepts include but not limited to agency (Gu & Schweisfurth, 2011; Gu, Schweisfurth & Day, 2010), transformation (Brown, 2009), emotion (Gu & Schweisfurth, 2011), meaning-in-life (Pan, 2011), loneliness (Sawir et al., 2007), pastoral care (Sawir et al., 2009), and reciprocal communication (Zhou & Todman, 2008). The absence of these concepts in research on international doctoral students may indicate some important dimensions have been missing at the micro individual level, the meso transitioning level (Zhang, 2016), and the macro contextual level that constitute student experiences.

Finally, the conceptualisations of international doctoral student experiences are yet to address the interactive nature of the doctoral study. This involves interactions with supervisors, teams, academic networks, social networks, and others that may have an influence on the doctoral study abroad. Research has thus far been mostly drawn on single concepts to address specific factors or issues (e.g., psychological well-being, motivation, adjustment, identity), and less about dynamic and agentic interactions with the context. Knowledge regarding the nature of international doctoral student experiences can be considered as fragmental rather than as a natural whole system.

Therefore, unfolding a holistic landscape of international doctoral student experiences has been a consistently felt but hardly addressed issue in the literature (Ye, 2018; Zhang, 2016). To address this issue and the research questions of this study, it is
essential to develop a conceptual framework that may capture the complex, dynamic, and interactive nature of the international doctoral study.

**Constructing a CIS space and a multi-world framework**

As addressed in the previous section, a conceptual framework was developed to enable a holistic understanding of the complex, dynamic, and interactive nature of international doctoral student experiences.

As Figure 3.1 depicts, the conceptual framework comprises two major components: a *three-dimensional space* that extends along continuity, situation, and interaction (CIS) axles, and a *multi-world model* that includes the research, personal, and social worlds of international doctoral students. This framework also has two minor components: *transitions* that occur within the space and across the multi-worlds, and *borders* that emerge in between each of the worlds to be surmounted.

For this study, the three-dimensional CIS space is to address the dynamic, developmental, and interactive nature of international doctoral student studying abroad experiences. The formation of the CIS space is grounded in Dewey’s (1938) perspectives that education is constructed by student experiences. The CIS space also draws on Clandinin and Connelly’s (2000) metaphorical three-dimensional narrative inquiry space that allows an inquiry to go backward and forward, inward and outward.

The multi-world model is to address the complex and interactive nature of doctoral study abroad experiences. This model is adapted from Phelan, Davidson, and Cao’s (1991) high schoolers’ Multiple Worlds framework, but with a focus on mature adults, the current study pulls out the personal space of doctoral students as one of the worlds that interplays and interweaves with students’ research and social worlds. An investigation on how students make transitions and what/how borders exist between the worlds enables this study to identify factors that may facilitate or constrain CIDS’ positive and on-time completion of their PhD study abroad. In brief, this model allows the current study to conduct a holistic examination by incorporating and integrating multiple theoretical perspectives to interpret the multi-layered and multi-faceted doctoral study abroad experiences. The rest of this chapter will elaborate each component in this conceptual framework.
Figure 3.1 The three-dimensional multi-world conceptual framework
Component I: The three-dimensional CIS space

This study perceives the nature of international doctoral student experiences are developmental, interactive, and situative within sociocultural and small research contexts.

The study first draws on John Dewey’s (1938) two principles to conceptualise experiences in an educational setting: continuity and interaction. The principle of continuity of experience means that “every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after” (p.35). The principle of interaction “assigns equal rights to both factors in experience – objective and internal conditions (p.42)”; or in other words, it underlines the co-existence and the interplay of personal factors with the external environment. This principle reveals a reality that individuals live “in a series of situations” (p.43) which are constructed with continual and interactive experiences.

Although Deweyan principles do not articulate situation as the third principle, Clandinin and Connelly (2000) argue that experiences occur in specific places or sequences of places, thus pulling the notion of space (situation) out as a third dimension to formulate the three-dimensional inquiry space with past, present, and future (continuity) and personal and social (interaction) as the other two dimensions. Deweyan theories and this three-dimensional space provide a foundation for “thinking of experience ‘beyond the black box’” (Clandinin & Connelly, 2000, p.50), and make it possible to interpret “why a person does so,” which delves deeper than “because this person does so.” Empirical studies have applied Dewey’s principles and Clandinin and Connelly’s three-dimensional space to explore, for example, the identity formation of Chinese doctoral students in relation to study abroad (Ye & Edwards, 2017) and teachers’ professional knowledge landscapes (Clandinin & Connelly, 1996).

Drawing on previous research, this study uses three dimensions to frame the experiences of Chinese international doctoral students (Figure 3.1), with Continuity along one dimension, Interaction along a second dimension, and Situation along a third, thus forming a three-dimensional CIS space. This CIS space enables a researcher to examine CIDS’ experiences with a continuous dimension that originates from the Pre-PhD background, motivations, and external influences, occurs during the journey
of the PhD, and flows on to the future outcomes. Their experiences also have an interactive dimension that reveals the aspects that facilitate or constrain CIDS’ successful completion of PhD abroad. And the situative dimension reveals CIDS’ motivations, expectations, values, beliefs, and actions all occur in specific contexts or spaces. The strength of this three-dimensional CIS space is that it allows the narrative inquiry to examine students’ experiences inward and outward, backward and forward (Clandinin & Connelly, 2000) and situated within the social and cultural contexts.

**Component II: The multi-world model**

The second component of the conceptual framework encompasses students’ academic, personal, and social worlds and transitions across the worlds. This study views the three bodies of literature on international doctoral students (the research context, personal factors, and socialisation and connectedness) as three interrelated “worlds” situated within the CIS space. The conceptualisation of the multi-worlds provides a holistic framework to understand doctoral study abroad experiences, stressing both individual and collective agency that are important in doctoral education (McAlpine & Amundsen, 2009).

**Roots of the model**

Pertinent to this framework is Phelan and her colleagues’ Multiple Worlds model for students at school (Phelan, Davidson, & Cao, 1991; Phelan, Davidson, & Yu, 1993; Davidson & Phelan, 1999). Their model highlights the interrelationship between students and their family world, peer world, and school world. Each of these worlds has its norms, values, beliefs, expectations, and actions. Their work was based on classroom high school students in the United States of America, where racial differences and cultural barriers were salient factors for students’ engagement at school (Davidson & Phelan, 1999). Hence, how students made transitions each day between the school, the family and the peers became a key issue for their study, which was why students were positioned as individuals that made transitions between different worlds on a daily basis.

The current framework departs from Phelan et al.’s model in three ways. First, this study combines Phelan et al.’s “family world” and “peer world” into a “social world”.
This is because international doctoral students are away from home when pursuing a PhD study abroad. Second, this framework replaces Phelan et al.’s “school world” with “research world”. The grounding for this replacement is because a PhD in STEM fields is to conduct research in laboratories by nature rather than doing coursework in classrooms. Finally, a “personal world” is added to the model. This is to take account of an individual’s agentic nature that plays an important role in achieving one’s PhD abroad. The formation of the personal world in this framework is because doctoral students, at their mature age, have established their internal world with their values, beliefs, motivations, and expectations, and can take agentic actions to shape rather than just be shaped by the contexts (McAlpine & Amundsen, 2009). Their agency and competency are as important as external factors for their successful completion of PhD, such as institutional support and an academic community with sound relationships (Hopwood, 2010a, 2010b; Hopwood & Sutherland, 2009).

Definitions of the worlds

Though the multi-world model is generic for research on international students in general, the definitions given below are specific for the current study on the experiences of international doctoral students in STEM fields.

In this study, the research world refers to the space for conducting academic activities to achieve a PhD, a small context with its distinctive research culture where doctoral students conduct their academic study and research. It involves both perceptible aspects and imperceptible aspects (McAlpine, Jazvac-Martek & Hopwood, 2009). The perceptible aspects may include the project, supervisor(s), peers, institutional support, funding, research facilities, and external links; whereas the imperceptible aspects may involve cooperation, facilitation, communication, and time (Fox, 2003; Heath, 2002; Tanyildiz, 2015; Wilks, 2006). Hence a research world, distinctive of individual small cultures in a research context, has its norms and expectations for the attainment of a PhD, and is underpinned by values and beliefs about the process and the standard in achieving a PhD.

The personal world refers to the socioculturally constructed personal space of students, characterizing their inner spiritual world and their personal agency. In this space, international doctoral students cultivate their values and beliefs, shape their identity,
form their motivations and expectations, and act to achieve their goal of a PhD degree. It involves what they bring from their pre-PhD experiences into their PhD, such as values, beliefs, and expectations; it also involves how they develop themselves in the process of doing a PhD, such as growing into independent researchers and mature adults (Lovitts, 2008). It is in this world that an individual gathers personal capital and social capital so as to become an active agent traversing from the personal world to other worlds to attain the PhD abroad.

The social world refers to a collective social space from both academic and social networks that co-construct students’ PhD experience. It requires emotional resonance from families, peers, supervisors, other staff, social friends, involved in the socialisation, within and without shared motivations, expectations, cultural values and beliefs in the social contexts (Gu & Schweisfurth, 2015). It is not only about the music, games, romance, social, research, and future; it is also about, even more importantly, the communication and the accommodation of different cultures, customs, and thoughts in both academic and social settings. Broader academic space outside of pure academic work is an important part of the social world for international doctoral students, thus enriching both research and social worlds with diverse small cultures.

The shared space in the conceptualised multi-worlds presents CIDS in this study with three identities: personal, professional, and sociocultural identities. Through the experiences of international education, students draw on multiple identities and “fashion new forms of hybrid identity” (Marginson, 2014, p.6). In this study, such a student is an individual human being, a PhD candidate in STEM fields, and an international student from China. Due to the unique traits as scientific researchers in the global context, most often their professional identity goes beyond personal and cultural identities, but the latter two are as important in constructing their self-identities, which adds complexity to the process of this intellectual venture (Elliot, Baumfield, & Reid, 2016).

Transitions across and borders in-between

In this model, the multi-worlds are all interconnected and intertwined, partly contingent upon and partly independent of each other. Between the worlds, there are overlapping areas as an experiential interface for transitions to occur and lines in-
between as borders for students to cross. An examination of how these transitions and borders function and impact on achieving or not achieving the goal – the completion of PhD abroad – can be used to address the research questions of this study. For students to reach for the goal, it is likely that the contribution of each world differs, the links between each world function differently, and factors in each world exist and operate differently. These differences suggest potentially different PhD abroad journeys and outcomes for each CIDS.

Building upon the understandings of how students’ encounter differences across their family, peers and school worlds, Davidson and Phelan (1999) identified patterns of students from different cultural and ethnic backgrounds transitioning across in school settings. Their patterns were about congruence, difference, and corresponding transitions across students’ multi-worlds. Davidson and Phelan’s patterns may or may not apply to international doctoral students in STEM fields in this study, but similar to their focus, the present study is interested in the congruence, differences, negotiations, transitions, and facilitation of the sociocultural components across students’ multi-worlds. Hence their line of thoughts in typology provides a feasible conceptual lens to examine data collected in this study, and to identify unique patterns of STEM-related CIDS’ PhD study abroad experiences.

From a cultural compatibility theoretical perspective, Davidson and Phelan (1999) conceptualised differences as borders or boundaries that impeded students’ engagement with the school. Their study identified sociocultural, socioeconomic, psychosocial, linguistic, gender, heterosexist, socio-physiological, and school structural borders. Due to the nature of doctoral study in STEM fields and the characteristics of Chinese students, this current study starts with a consideration of sociocultural (Hopwood, 2010), psychosocial (Posselt, 2018; Poyrazli, Arbona, Nora, McPherson, & Pisecco, 2002), socio-physiological (Winchester-Seeto et al., 2014), emotional (Gu, 2015), linguistic (Flowerdew & Li, 2007), gender (Dutta, 2015), and institutional borders (McAlpine, Jazvac-Martek, & Hopwood, 2009), but leaves the avenue open for further identification of differences through rigorous data analysis.

Hypothetically, harmonious/congruent interrelationships, or smooth transitions, between the worlds enable multilateral growth and sustainability, whereas incongruent relationships may cause negative impacts. The best-case scenario with congruence,
smooth transitions, and almost invisible borders could lead to a high-achieving and on-time completion of PhD, and afterwards, long-term cooperation with and contribution to the host institution and the host society. The worst-case scenario from incongruent worlds, difficult transitions, and unsurmountable borders could result in a damaged drop-out PhD student, bringing both perceivable and unperceivable negative effects into the future (Gardner, 2007; Lovitts, 2001; Sakurai, Pyhältö, & Lindblom-Ylänne, 2012). However, the spectrum between the two extreme scenarios may involve many variations. Thus, how the differences and transitions within the three-dimensional CIS space and between the multi-worlds occur and function to construct the nature of international doctoral students’ experiences becomes a focus in the study.

Chapter summary

To summarize, drawing on the conceptualisations and limitations in the literature, this chapter developed a conceptual framework to address the research questions in this study. This framework proposed a combination of a three-dimensional CIS space (continuity, interaction, and situation) and a multi-world model (research, personal, and social), together with transitions and borders within the space and across the worlds. In this framework, differences or borders occur because each world has its norms, motivations, expectations, values, beliefs, and actions, which prompts or constrains transitions between the multi-worlds along the continuity, interaction, and situation dimensions. This framework allows this study to adopt a dynamic and developmental perspective to examine the nuances and complexities of the nature of international doctoral students’ study abroad experiences in depth and over time.
Chapter 4 The methodology

Introduction

The purpose of this chapter is to describe the research paradigm and the research design of this study. The research paradigm section discusses the philosophy underpinning the study: the nature of the qualitative study, sociocultural constructionism as the epistemological stance, and the use of narrative inquiry as methodology. The research design section presents an overview of the project, which includes a CIDS Study with cross-sectional and longitudinal data from students and a supplementary study with supervisors. This section also presents details of the method – participants, data collection, trustworthiness, and data analysis – that allow the construction of the findings of the research.

The research paradigm

Given that this research seeks to understand and interpret experiences based on participants’ perception and interpretation, it is reasonably situated in a research paradigm with a qualitative approach that foregrounds interpretivism and constructionism traditions with a narrative inquiry for the methodological stance.

A paradigm shapes how a researcher views and functions in the world (Denzin & Lincoln, 2000). According to Guba and Lincoln (1994), a research paradigm is about “a set of basic beliefs (or metaphysics)” that impacts on “ultimates or first principles” (p.107). This reveals how a researcher thinks about and makes sense of the nature of the world, and also helps to evaluate the researcher’s position in research (Patton, 2015).

The research paradigm also defines for a researcher what the research is all about and what falls within and outside the limits of legitimate inquiry (Guba & Lincoln, 1994). The basic components involve three fundamental and interconnected questions related to ontology, epistemology, and methodology. Respectively, the ontology question asks what the form and nature of reality are and therefore, what there is that can be known
about. The *epistemology* question asks what the nature of the relationship is between the researcher and what can be known. The *methodological* question asks how the researcher goes about finding out whatever he or she believes can be known. Thus, the methodological question cannot be reduced to a question of methods and methods must be fitted to a predetermined methodology. This section is about the contemplation on these questions.

**The qualitative research**

Given the nature of the research questions proposed for the current study, a qualitative research approach informed and framed the research process. The ontology and epistemology in the science of qualitative research are about the nature of being (Packer, 2011), which resonates with the purpose of this current study. According to Denzin and Lincoln (2000, p.3), “qualitative research is a situated activity that locates the observer in the world,” and “qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena regarding the meanings people bring to them.”

From this perspective, the nature of this study was determined to be qualitative because it was me, as researcher, who was situated in the CIDS’ position to interpret the complex doctoral study abroad experiences from their perspectives and to understand their congruence and transitions across research, personal, and social worlds within a continuity-interaction-situation framework.

Four characteristics of a qualitative study, identified by Stake (2010), have been guiding the conduct of this study:

1) *Interpretive*. A qualitative study acknowledges that findings and reports are interactions between a researcher and the subject being researched. It also draws the meanings from different perspectives. As data in this study all came from first-hand interviews with a diverse range of CIDS over time in different disciplines and geographical locations, the researcher was able to capture multiple meanings from diversified individual experiences to derive empowered interpretations.

2) *Experiential*. A qualitative study views reality as a human construction and strives to be naturalistic. This means such a study does not intervene or arrange
to get data. This present study is by nature empirical and fieldwork oriented, structured with semi-open interview schedules to understand CIDS’ PhD abroad experiences in its natural setting, with no intervention in design or actual practice.

3) **Situational.** It highlights the uniqueness and importance of contexts for a qualitative study. Stake (2010) argues that “each place and time has a uniqueness that works against generalization” (p.15). Hence a qualitative study is “holistic more than elementalistic” (p.15) even though the overall experiences are constructed with elements. This current study considers contexts have significant influences on personal motivations, expectations, values, beliefs, and actions. Therefore, the conceptual framework of CIDS’ three-dimensional multi-worlds is incorporated within sociocultural and small research contexts to enable a holistic understanding.

4) **Personalistic.** This features a researcher’s empathy to understand individual perception in a qualitative study. “It seeks uniqueness more than commonality; it honors diversity” (Stake, 2010, p.15). My experiences of teaching students in STEM fields in China and studying as an international doctoral student in Australia allowed me to perceive individual differences among the group. My experiences also empowered me an empathy to understand other CIDS’ experiences. In the overall process, each participant was respected as a unique individual with unique experiences. In return, each of them unfolded a different story in front of me, giving the scope, richness, and depth of diversity for this dissertation.

Among the four characteristics, Stake considers “interpretive” as the most distinctive feature, which situates this study in interpretivism. The major motive is, as Stake (2010) puts it, qualitative research is “a struggle with meanings” (p.38). Stake brings up that all research requires interpretation and interpretive research is an investigation that relies heavily on observers defining and redefining the meanings of what they see and hear. Pertinent to this study, it is the interpretation of the researcher that makes the CIDS’ worlds visible and understood by the world.

Having briefly sketched the basic tenets of qualitative research, the following part moves on to a brief overview of sociocultural constructionism as the epistemological stance of this study.
**Sociocultural constructionism**

Epistemology is about a theory of knowledge construction based on a researcher’s worldviews (Saldaña, 2015). In another word, it is about how we know what we know. Given my own multi-worlds embedded in my education, work experiences, and life experiences in various educational, sociocultural and geographical contexts, perspectives drawn from sociocultural constructionism is acknowledged as the most relative to my worldviews and thereby, applied to the current research.

A clarification of the relationship between this research and me is considered as essential because, as Saldaña (2015) explains, an epistemology reveals a researcher’s lens to look at the world, an angle to position him/herself in the world, and a filter to understand the world. These are all related to a researcher’s biography, experiences, values and beliefs, and individual thinking patterns. These factors in combination contribute to how a researcher constructs the knowledge through complex, multifaceted, and multidimensional approaches, which consciously or subconsciously frame one’s observations of the world.

Sociocultural constructionism is built upon theories in constructionism and sociocultural perspectives. Constructionism is to view that all meaningful reality, or knowledge, is constructed out of interactions between human beings and their world, and developed and transmitted within a sociocultural context (Adams, 2006; Crotty, 1998). With this constructionist view, this study agrees meaning is not discovered but constructed by human beings as they engage with the world they are interpreting (Crotty, 1998).

Further to this and drawing on Piaget’s socio-cognitive conflict theory and Vygotsky’s (1978) sociocultural theory, Palinscar (1998) conceptualises that sociocultural constructionism is concerned with the contextualized individual. The context in this perspective contains social, historical, and cultural contexts, as well as the individual’s small immediate context. In this perspective, a focus is put on the interdependence of social and individual processes in the co-construction of knowledge.

Thus, a reflection on how my worldviews were shaped may examine how this co-construction of knowledge helped me to interpret how CIDS’ co-constructed their experiences within the small research context and the large sociocultural context.
Personally, I moved back and forth in the north and south of China in my childhood and youthhood and then sojourned in the United Kingdom and Australia, all with my families. While my outlooks developed over time and space, the contact with different people in different social cultures at an early age enabled me to view the world both as an insider and an outsider, to believe in the interactive influences of individuals and the context, and to respect differences and diversities.

My first cultural encounter occurred at the age of seven when I moved from a north-eastern city to a small ancient town in south-western China. Recollecting memories back then, everything around was different in my eyes. The local people spoke a different language, alien to the ears. They had a different style of cuisine with an enormous amount of hot chili and spicy pepper as major seasonings, which was sufficient enough to set the tongue on fire with one bite. The most annoying was the schoolmates who had different norms of behaviour in and out of class, so I, as a young girl, had to catch up much more beyond book knowledge in the novel context. Sometimes those mischievous kids around made me feel confused about how to speak and act.

Luckily, I experienced pleasant congruence and smooth transitions after the initial culture shock. Mom often recalled that I had learned to speak the local language and started to enjoy the local food in a couple of months. It was before long that I had mixed well with mates at school and in the neighbourhood, having great fun and running around in the ancient town. The place was once an important conjuncture along the Silk Road. The town’s over 2,000 years of history was fascinating and left endless myths for us to explore. It seemed that each pebble stone on the street had a timeworn story to tell; each antique tea house hiding behind a bamboo forest had traces of being populated with some ancient poets of fame or generals of a feat.

And the tea was one of the best memories of the town. It was jasmine green tea traditionally made and used by the local families and tea houses. To the southwest of the town, there were miles and miles of tea trees and jasmine plants grown in the mountains. Each year in April, tea farmers picked newly budded tender leaves from the tip of tea trees, and jasmine farmers picked jasmine buds between 4 to 5 o’clock in the afternoon, both bringing them to town for sale. Then the dusk of the small town was suffused with a warm fragrance of toasting green tea with jasmine, spreading out
from delicately-carved wooden windows and wide-open wooden doors. The produce of the season would last year long for the local families to consume.

Back then it would have never been expected that the memory of the jasmine tea would one day be connected with my research with cultures and acculturation. In this study that involves cross-cultural issues, I was sensitive to the representativeness of tea and coffee for different cultures. Students in this study frequently described their preference for tea or coffee and used that to refer to their acculturation experiences with the local community. For instance, when a student mentioned that he still did not like to drink coffee after a long-stay in Australia, he meant he was staying away from the local culture. And I understood him. The research is empirical and evidence-based, but if without the empathy, I might have adopted another lens, another angle, or another filter in the process of co-constructing the knowledge with my participants. I might have missed those nuances and subtleties in the complexity of the CIDS’ PhD study abroad experiences.

My positive acculturation experiences at an early age cultivated my lifelong curiosity and respect for different peoples and cultures in China or elsewhere. It also enabled me to be critical when in contact with cultural studies such as Hofstede’s theories in categorising cultures. To me, cultures in China are as much diversified as those in the holistically named western world. For the same reason, each student from China is a unique individual, sharing similarities while maintaining differences.

Up to this point, the section has briefly discussed the ontological and epistemology of the study. As these are related to a researcher’s worldviews, a slice of my life experience was used as an exemplification on how my perspectives developed and, in turn, influenced my research. This reflection alerts me to position myself appropriately to maintain the trustworthiness in this study. The following section moves on to a brief overview of the methodological stance of this study.

**Narrative inquiry**

Given this study is, first, to reveal the nature of CIDS’ experience in their research, personal, and social worlds, and second, to investigate the facilitating and constraining factors for the success of their PhD abroad, narrative inquiry – an expressive embodiment of our experience, a mode of communication, and a form for
understanding the world and ultimately ourselves (Brockmeier & Carbaugu, 2001) – is considered as the most appropriate methodology to fulfil the purposes.

Attributing to John Dewey (1859-1952), narratives to uncover students’ experience in education was put on the research agenda on philosophical grounds. Hinchman and Hinchman (1997) defines narratives in social sciences as “discourses with a clear sequential order that connect events in a meaningful way for a definite audience and thus offer insights about the world and/or people’s experiences of it” (xvi). Narrative inquiry has been increasingly adopted in research on educational experience (Connelly & Clandinin, 1990) and other social science fields (Bochner, 2001), and has begun to be used as a research method in the field of doctoral education (Hopwood & Paulson, 2012; Soong, Tran, & Hiep, 2015). It also has been applied to a number of research studies on international students’ experience (e.g., Ploner, 2015; Soong, Tran, & Hiep, 2015; Ye & Edwards, 2015, 2017).

Narrative is one of the many qualitative methodologies that can be used in collecting data, analyzing data, and reporting findings (McAlpine, 2016). Given the strength that narratives may reveal experiences and events that are chronological, meaningful, and inherently social (Elliott, 2005), narratives may make connections between events, show the influence of the passage of time and the context, and illustrate how an individual’s motivations and expectations influence their actual experiences (Chen, McAlpine, & Amundsen, 2015). It has the idiosyncratic features of an individual’s personal account from a naturalist stance, and the shared ones from a sociocultural perspective (McAlpine, 2016). McAlpine (2016, p.33) further narrates,

Narratives incorporate temporality, a social context, complicating events, and an evaluative conclusion that together make a coherent story. Most important, the narrator or protagonist is an active agent not a dupe in the account... Through the construction and recounting of narrative, individuals form and re-form who they have been, are presently and hope to become.

The argument for the use of narrative inquiry in this study is that humans are “storytelling organisms” who “lead storied lives” both individually and socially (Connelly & Clandinin, 1990, p.2). With this approach, qualitative researchers collect these stories and narrate the stories as an inquiry to human experiences. This can be translated into a research perspective for this present study that life can be understood
through “a recounting and reconstruction of the life story or biographical narrative” (Ye & Edwards, 2017). Coherent, consistent, and systematic narratives allow us to understand how an individual may “make sense of events and actions in their lives with themselves as the agents of their lives” (McAlpine, 2016, p.34), whereas causality is a central element adding to the coherence of a narrative (Elliott, 2005). Noteworthily, narratives are never “context-free and they cannot be constructed (by the teller/narrator), or received (by the listener/reader) as suspended in midair” (Goodson & Gill, 2014, p.71). Thus narrated stories may be more or less “mediated representations” (Ai, 2017) of the participants’ subjective recounts and interpreted as reflecting back on their experiences.

In this study, each CIDS’ experience, physically or intellectually, is viewed as relating to his/her family and educational background and sociocultural influences. This perspective echoes the three-dimensional conceptual framework that considers continuity, interaction, and situation as intercepted and united principles. While studying abroad, CIDS’ experience is influenced by newly encountered factors and situations that form their individual experiences over time. The narrative inquiry examines different interactions and situations succeeding one another, and very often some elements are carried from the earlier to the later ones. For instance, what CIDS have acquired as a strategy in one situation may become an instrument that helps to deal effectively with the situations that follow.

In addition, this study also adopts Saldaña’s (2015) viewpoint to construct themes of CIDS’ experience that are “statements and theoretical constructs that provide more narrative grounding to the story of lived experience” (p.74). Thematic analysis enables a researcher to “detect similar experiences across a range of participants… and most importantly, the essences and essentials of the phenomenon – the bottom line, bare necessities, or must-haves that define it” (p.74).

Having examined the ontological, epistemological, and methodological stances in this study, the following section moves onward to present this project’s research design, including the undertaking and considerations in ensuring the rigor in the research.
The research design

This section begins with an overview of the CIDS Study, the core study in this project, followed by an introduction to the participants and the data collection process. Then it gives a brief description of a study with supervisors that supplemented the CIDS Study and complemented my understandings of the experiences of the CIDS. This section moves on with an examination of the trustworthiness of the study. The last part is a description of the data analysis process.

An overview of the CIDS Study

The CIDS Study involved a combination of cross-sectional, longitudinal, and focus group studies. It aimed to address research questions on the nature of CIDS’ PhD abroad experiences and the facilitating or constraining factors that impacted their successful completion of the PhD abroad. The cross-sectional design extended the spectrum of CIDS’ diverse experiences; the longitudinal approach scrutinised the change and the evolution of elements over time; whereas focus groups maximised the depth of data through participants’ interactions and collective engagement. The combination of interviews with students at different stages of their study (cross-sectional and focus groups) with interviews of some individuals as they progressed through their journey (longitudinal) was expected to generate a rich dataset for a comprehensive study of CIDS’ experience at different stages of their PhD study and in different contexts.

The cross-sectional approach: The cross-sectional study involved two phases with 38 individual interviews from the east to the west coast across Australia. Phase I was a preliminary study in nature. It was designed to generate initial understanding of the experiences of CIDS and to capture major themes cross the population for further research. It comprised of 11 individual interviews. Then in Phase II, another 17 individuals were interviewed with a more focused interview schedule, using key items and statements generated from Phase I as an operational instrument and prompts.

The focus groups: This study conducted three focus groups, one in Phase I and two in Phase II. The focus groups at both phases confirmed Richards and Morse’s (2013)
viewpoint that the focus group data could be exceptionally different from individual interview data, which solidified the strength of this study.

The three groups were situated at three universities in two Australian states. Focus Group 1 (FG1) involved four PhD candidates from two schools of a university. They were co-national friends and were doing a PhD under different supervisors. Focus Group 2 (FG2) comprised three PhD candidates under one supervisor in another university. Because of their research focus, their research centre was located in a geographically remote town. These students were among a handful of Chinese PhD students in the centre. Focus Group 3 (FG3) had three students from a third university. They shared a rental house at the time, and two of them were under the same supervisor.

The longitudinal approach: Following the first round of interviews in Phase I & II and focus groups, 17 PhD candidates from both phases were followed up with their consent. The follow-up interviews were conducted at an interval of approximately nine months. Eight of them were followed up for a third interview. This longitudinal study lasted 2.5 years. Over time, students differed in the year stage of their PhD. Most interviews were conducted person-to-person, but some follow-ups were conducted online when travelling long distances across Australia was not possible. This investigation allowed the study to examine how CIDS’ PhD abroad experiences changed and evolved over time.

Participants

Overall, 38 Chinese PhD students in STEM fields contributed to the CIDS Study. To reveal the diversity of experiences, the participants were differentiated by the PhD year range, institutional research context, and geographical locations. This study focused on the first-generation international Chinese students originally from Mainland China.

Due to the qualitative nature of this narrative inquiry, only a relatively small number of students were involved. Hence, this study does not claim representativeness of all Chinese international doctoral students in STEM fields, though it is able to provide in-depth understandings of some commonalities of the present CIDS population in Australia.
Recruitment

The recruitment process for this study was challenging but also rewarding. Personally, as a new international PhD candidate and a stranger in a foreign country, I had few acquaintances and hardly knew anyone that could be my participants when commencing this project. Besides, my host university was located in Perth, so-called the remotest city in the world because it was several thousand kilometres away from any other major cities. Regardless of these challenges, methods that involved emails, personal networks, social networks, and snowballing were used to recruit an appropriate number and representation of participants across Australia.

The first method was to email potential participants. Primarily, I browsed several university websites, identified schools and research centres in STEM fields, and noted down Chinese PhD students’ names and contacts. Then I sent out about two dozen emails, introducing myself and the project, inviting them to an interview on their study experiences in Australia. Unexpectedly, only two students from Melbourne replied, but fortunately, the replies were both positive.

The second method was through personal networks. An acquaintance professor in Melbourne circulated my interview invitation among his students. One of the students, Lin (pseudonym), responded positively and invited another three Chinese PhD students from the same university. Therefore, my first trip to Melbourne started with the expectation of six students to be the participants.

The third method, social networks, was not in the original research design but played a key role in recruitment. It was when interviewing Lin I learned that he was the vice president of a dynamic Chinese association for doctoral students on the east coast. After that I attended several of their events, where the president introduced my project and me, as a researcher, to the audience. At one symposium, the number in the audience reached over 400, and the majority were Chinese PhD students in STEM fields. This and other similar established social networks offered me great opportunities in expanding the range of participants. The expansion was significantly meaningful because it efficiently avoided the effect of small research culture, or laboratory culture (Cumming, 2009a, 2009b), thus avoiding the closeness and inter-influence of peers working in the same laboratory, office, or team to impact the trustworthiness of data collected.
The fourth method was snowballing. As many participants took this study as meaningful and significant, on my request, they invited their co-national friends to join the project. This snowballing method proved to be most effective for the establishment of rapport because of a trusted agent was involved before each first meeting.

As mentioned previously, the recruitment process was challenging but rewarding in that the diversity of students’ situated experiences over time offered me the freedom to investigate typical, representative, or exceptional cases to fortify the scope and depth of this study.

Demographical information

Participants in both phases included first year PhD candidates through to those who had recently completed the PhD across Australia. The broad range of participants, both in the years of experiences and in location, was designed to be wide to maximise the experiences to be researched.

Table 4.1 presents a summary of the demographic information of the 38 student participants, with details shown in Appendix A. While not claiming to represent the population, it does give an indication of the demographic characteristics of Chinese doctoral students in STEM fields in Australia.
Table 4.1 *Summary of the demographic information of participants in CIDS Study (n=38)*

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3 &amp; above</th>
<th>Graduate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td><strong>Family Background</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low SES</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Mid-High SES</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td><strong>Commencement age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>26-30</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Single</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td><strong>Previous degree</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Master</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td><strong>Work experiences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>31</td>
</tr>
</tbody>
</table>

*Year range of participants:* The participants were across various stages of PhD programmes when in the first round of interviews (n=34, or 89.5%). The other four (10.5%) were graduates who had recently completed their PhD (within three years) by the time of interview. These graduates stayed in academia as early career researchers. Over time in the longitudinal study, these students differed in their year range, and the majority had completed their PhD study (Table 4.2).

The study was designed to invite participants ranging broadly to maximise the spectrum of CIDS’ experiences and perceptions. This principle was also applied to the longitudinal study to examine the changes and factors in different contexts and situations over time.
Table 4.2 Summary of the stage of PhD of participants in the longitudinal study

<table>
<thead>
<tr>
<th>Stage of PhD</th>
<th>Interview II</th>
<th>Interview III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1/2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Year 2/3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Year 3 &amp; above</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Graduate</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>8</td>
</tr>
</tbody>
</table>

Location of participants: As shown in Table 4.3, the participants studied at eight Australian universities. These universities represent a diversity concerning levels of research intensity and internationalisation shown in the numbers of doctoral completion, commencement, and international commencement in 2016. They are located in four Australian states from the east to the west coast, namely, Queensland, Victoria, South Australia, and Western Australia, representing a diversity defined by location.

Gender ratio: In this study, nine participants (23%) were female students. With disciplinary characteristics (Dutta, 2015), this percentage represents the usual gender ratio in STEM fields.

Family background: Based on students’ report, nine students came from low socio-economic status (low SES) family background, and the others were from middle or high socio-economic status (mid-high SES) families.

In this study, low SES family refers to those who lived in poor rural areas in China. As reported by participants, a commonality of such families was that parents (in some cases both) were illiterate or with primary education only and normally struggled financially for a living. Somehow, they still managed to afford an education for their children. In comparison, mid-high SES family refers to those excluded from the first category, including both urban households and well-off rural ones. Due to the fast-changing social mobility in China in recent decades, there was difficulty in explicitly distinguishing middle class from high class, so the two were classified as one category.
Table 4.3 *The commencement and completion of Doctorate by research (2016 full year) in the universities included in the study*

<table>
<thead>
<tr>
<th>University</th>
<th>Completion</th>
<th>Commencement</th>
<th>International Commencement</th>
<th>Ratio of International Commencement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monash University</td>
<td>716</td>
<td>893</td>
<td>429</td>
<td>48.0%</td>
</tr>
<tr>
<td>The University of Melbourne</td>
<td>755</td>
<td>832</td>
<td>364</td>
<td>43.7%</td>
</tr>
<tr>
<td>The University of Queensland</td>
<td>731</td>
<td>830</td>
<td>381</td>
<td>45.9%</td>
</tr>
<tr>
<td>The University of Western Australia</td>
<td>349</td>
<td>393</td>
<td>142</td>
<td>36.1%</td>
</tr>
<tr>
<td>Curtin University of Technology</td>
<td>261</td>
<td>366</td>
<td>138</td>
<td>37.7%</td>
</tr>
<tr>
<td>The University of Adelaide</td>
<td>333</td>
<td>364</td>
<td>125</td>
<td>34.3%</td>
</tr>
<tr>
<td>La Trobe University</td>
<td>181</td>
<td>240</td>
<td>73</td>
<td>30.4%</td>
</tr>
<tr>
<td>Murdoch University</td>
<td>110</td>
<td>122</td>
<td>44</td>
<td>36.1%</td>
</tr>
</tbody>
</table>

*Source of data: Australian Government, Department of Education and Training. ([https://docs.education.gov.au](https://docs.education.gov.au))*

*Marital status:* At the time of the first interviews, 11 were married, and the other 27 participants were single. Among the married participants, ten lived with their spouse in Australia, and the other one left his family in China. Five of the couples had a child. Among the spouses, four were doing their PhDs, and the others stayed at home or had
casual jobs except for the one who stayed in China working with a permanent position in business.

*Education prior to the PhD:* The average age of participants was 25.24, ranging from 21 to 30, when they commenced their PhD. Out of 38, 14 participants had their bachelor’s degree and started the PhD at an average age of 23.45, whereas the other 24 participants who had master’s degrees started the PhD at 25.9. This reveals that doctoral students in STEM fields generally commenced their PhD at a young age.

Besides, some students had previous study abroad experiences before their PhD. Seven participants received their previous degree from Australia, one from New Zealand and another one from England.

*Previous working experiences:* Seven participants had working experiences before their PhD. Among them, three worked in academia for two years (two in China, another in New Zealand), and the other four had short-term experiences of working in the industry, the longest being 3.5 years.

In brief, the demographical information shows *diversity* was the key word to describe the background of this cohort, which extended the diversity of students’ experiences in this study.

**Data collection**

In light of the paucity of research on CIDS to date, in-depth conversational-style interviews were perceived as the most suitable method of data collection. This is because interviews allow a researcher to “enter into the other person’s perspective” and to find out things “we cannot directly observe and to understand what we’ve observed” (Patton, 2015, p.426), which fits an interpretive investigation and the research questions of this study.

This section presents how this study developed and conducted interviews in three steps: 1) drafting the interview, 2) piloting the questions, and 3) conducting the interviews (Wilkinson & Birmingham, 2003). Extra methods of data collection are described at the end of this section.
**Drafting the interview**

Three types of documents were prepared for interviews – information letters, consent forms, and interview schedules. In detail, the following files were composed: 1) information letters for students (in both English and Chinese versions) and for supervisors (in English version) (see Appendix B); 2) consent forms for students and supervisor (see Appendix C); and 3) interview questions for students and supervisors (Appendix D). These materials were attached to the Human Research Ethics Application Form, and the application was approved at the university level.

Each participant was sent an information letter via email before the first interview to seek their willingness to participate. Once they agreed, a hard copy of the information letter was provided on site and a consent form signed for me to keep.

Essentially, this study adopted a semi-structured interview method. Some questions were pre-designed but still leaving sufficient flexibility and space to allow participants to shape the flow of reflection on their experiences. In other words, semi-structured interview schedules and prompts were used to explore themes spontaneously raised by participants.

**Piloting the questions**

After drafting materials for data collection, I first conducted three pilot interviews with three Chinese doctoral students in STEM fields at my host university. They were informed that they would not be included as participants in this project; meanwhile, they were encouraged to give me critical feedback on interview questions and the way I raised questions.

The pilot interviews offered me a chance to reflect and revise interview questions. They also enabled me to improve interview skills and the confidence to orchestrate and facilitate the inquiry process (Guba & Lincoln, 1994). This is consistent with Wilkinson and Birmingham’s (2003) argument that piloting is crucial in that it assists in eliminating ambiguous questions and in generating useful feedback on the structure and the flow of the intended interview.
Conducting the interviews

In the CIDS Study, I conducted 28 first-round individual interviews, three focus groups, 17 second-round interviews, and eight third-round interviews. In the three focus groups, four participants in the first one and three in the other two, students interacted with each other and generated rich details of complex experiences and the reasoning behind their actions, beliefs, perceptions, and attitudes (Powell & Single, 1996). In the longitudinal study, most participants were followed up until they achieved the PhD degree. The intervals, approximately nine months each, had a few variations to capture special opportunities. For example, a participant in Melbourne visited Perth six months after the first interview, and we had a follow-up interview after his conference.

As suggested by Miles, Huberman and Saldaña, (2014, p.56) “usually, study participants and researchers need to reach some explicit agreements about shared expectations,” a revelatory procedure was strictly applied in this study in accordance with the principle of “fully informed consent” in a rigorous study (Guba & Lincoln, 1994, p.114). Participants were explicitly informed to be under no obligation to answer all interview questions.

Participants were also informed that they could withdraw from interviews at any time without needing to provide an explanation. “Honor their consent to participate, and honor their choice to withdraw” (Saldaña, 2015, p. 81). In actual practice, no participants withdrew halfway during interviews.

In the longitudinal process, most participants had been extremely supportive. However, when I sent out messages for follow-up interviews, a few participants did not reply, and a few others replied that they were currently busy and would contact me later. With a commitment made in the Information Letter, I did not ask a second time if they did not follow up in contacting me. The reduced response resulted in a decrease in numbers for the longitudinal study.

A guiding principle throughout interviews was to maintain genuine respect for participants’ experiences without judgement. In conducting interviews for this narrative inquiry, very often after initial questions, I let the conversation flow so as to let their experiences naturally emerge out of the conversations (Gadamer, 1975). It
was the same with focus groups where I acted as a facilitator to introduce the questions, maintain the balance of conversations and stay on the focused questions. But when they raised new topics or new issues, they were encouraged to explain more, discuss in detail, or interactively exchange experiences and perspectives.

**Interview questions:** The interviews were semi-structured with a list of major questions and several prompts embedded. The interviews usually started with self-introductions and an ice-breaking question, for example, “how long have you been here?” This would be followed by questions related to the research questions of this study. For example, “Could you please tell me what motivated you to do a PhD abroad?” “How have you been experiencing your life in Australia?” “How have you been experiencing your academic study so far?” and “What challenges do you have while doing the PhD here?”

Drawing on initial findings in Phase I, a short list form was designed for Phase II interviews (see Appendix C). The list included 16 items that may relate to students’ PhD abroad experiences, for example, personal effort, supervisor(s), research environment, and communication skills. Participants were asked to identify how they perceived the level of importance of each item. Then their identifications were used as a prompt to lead into questions for exploring the reasons behind. For example, “It is interesting that you listed… as the most important factors for the success of your PhD. Could you please tell me more about that?”

For follow-up interviews, major topics or issues mentioned in the previous conversation were also used as stimulus materials to examine the development over time. For example, “Last time you mentioned about… How is that now?”

Overall, the extent to which an interviewee expanded on a particular topic was a matter of personal choice, which meant to stay open to emerging areas of interest to generate rich data (Creswell, 2013).

**The language used in interviews:** The interviews adopted a conversational style with Chinese or English, whichever language the interviewees preferred to use. Most participants spoke in Chinese, but they occasionally used English expressions or terms in conversations. As participants were familiar with jargon in their research fields or expressions picked up from English, such as “comfort zone” (ST27), they had integrated English into their use of the oral expression. This is consistent with Cortazzi,
Pilcher, and Jin’s (2011, p.508) observation that “some concepts are more easily explained in one language rather than another.” The transcriptions retained participants’ originally used language for research and analysis.

**Interview sites:** As this study required me as the researcher to travel to participants’ cities and campuses, the interview sites were mostly suggested by participants at their convenience. The venues included meeting rooms, laboratories, offices, campus coffee shops, or just a bench on campus, wherever they felt comfortable to be interviewed, and we would not be disturbed. The only criterion I requested was that the environment be quiet to ensure the quality of audio recording.

After interviews, many participants invited me to visit their offices and laboratories so that I could understand their research environment. Some also took me on a tour around the campus, or we had lunch together at the canteen. These after-interview activities allowed our conversations to flow openly and augmented my empathy for their experiences.

**Length of interviews:** In the original research design, the length of interviews was 60 minutes each for students. In practice, the actual time varied dramatically from 39 minutes to 210 minutes with students (72 minutes on average).

The difference could have been explained with interviewees’ availability, which was not difficult to justify because of their busy and intensive schedule as researchers in STEM fields. However, with reflection, the difference was also related to other factors, such as the way I approached them, their disposition and the mood, or the rapport and trust between participants and me.

**Additional data**

Not to limit the scope of data, this study also used observation and documents as supplementary input of information. With time passing by, my contacts with the CIDS population occurred almost on a daily basis and expanded to a large number. These contacts allowed me to observe their experiences in a natural setting. Documents collected included participants’ academic website pages, publications, official videos, email exchanges, and my field notes of interviews and observations. The observations and documents were complementary to enhance my understandings of CIDS’ experiences.
A supplementary study with supervisors

The purpose of interviewing supervisors in STEM fields in Australian universities was to enrich and complement my understandings to the CIDS’ doctoral journey in Australia. Though this was a supplementary study by nature, supervisors offered critical insights and perspectives attained through their personal experiences of supervising CIDS over the years. The findings from this supplementary study are summarized (see Appendix E) and some of the supervisors’ insights were used in the discussion of the findings to elaborate specific issues.

The academics worked in STEM fields at six universities in Victoria, New South Wales, and Western Australia. Their academic profiles were diverse. Eight were holding a professorship, including four with distinguished professor titles and three with administrative positions; one was an associate professor; and the other three were senior lecturers. The criterion of recruitment was that they were the principal supervisor or the de facto principal of at least three Chinese doctoral students in STEM fields in Australia, and that they were not the supervisors of student participants in the CIDS Study.

For this special cohort, information letter, consent form, and semi-structured interview questions were pre-designed, as shown in Appendices B, C, and D. Overall, 12 academics were interviewed in this study. The actual length of interviews ranged from 20 minutes to 132 minutes (52.5 minutes on average).

Notably, Guba and Lincoln (1994) remind qualitative researchers to be aware of the role of values in inquiry, as values inevitably influence inquiry outcomes. One of my values in the process was the obligation to safeguard the privacy of participants, considering it was me as a researcher that positioned them as “powerless” and “at-risk” (Guba & Lincoln, 1994, p.114) when they exposed their true self and genuine perspectives in front of me. The one-to-one nature of PhD supervision and the smallness of a specific science field could make it relatively easy to identify an individual in a piece of writing, considering the level of detail of experiences generated through interviews.
Besides, as Miles et al. (2014, p.57) reminded,

*When a researcher voluntarily or involuntarily passes on a participant’s comments to another, often has ‘drying up’ or distorting effects on subsequent data collection; relationships may get strained, and subsequent analyses may be biased.*

To avoid the phenomena of strained relationships and biased analyses by passing on one participant’s comments to another, the small number of supervisor participants were from across Australia, all in different research centres and various STEM disciplines.

Recruiting supervisors separately to students provided further safeguards to privacy and confidentiality as none of the participants had a direct supervision relationship in pairs. The purpose was to avoid a situation where “the close personal interactions required by the methodology may produce special and often sticky problems of confidentiality and anonymity, as well as other interpersonal difficulties” (Guba & Lincoln, 1994, p.115).

These approaches refrained me from casting my subjective opinions or judgment collected from students to their supervisors, or vice versa. This helped me to maintain an unbiased, non-judgemental stance during interviews, which also helped this study to maintain the trustworthiness of the data generated. The following section will further examine the trustworthiness of this study and considerations in this aspect.

**Trustworthiness**

The trustworthiness of qualitative research is assessed with considerations to the relationship with participants, avoiding data bias, triangulation, member checking, and cultural issues in translation (Miles & Huberman, 1994; Miles, Huberman, & Saldaña, 2014), which will be followed by data analysis section.

**Trust and respect**

Ethics in research is intrinsic to constructionism because it takes full account of the researcher’s values and positions as well as participants’ values in the research process (Guba & Lincoln, 1994). For this study, building trust and rapport with participants were considered significant and culturally appropriate when conducting interviews
with both CIDS and supervisors. No culturally, academically or politically sensitive data or material were sought after in the inquiry. It was pre-planned that should any participant experience any unintended distress they would be encouraged to seek support from appropriate personal or professional consultants or services, but this did not occur in this study.

For student participants, the interviews provided an opportunity for reflection or re-construction on their academic study and the overall doctoral journey abroad. Besides, for supervisor participants, the interviews offered them a chance to reflect on their interactions with CIDS in the context of Australian higher education institutions. All conversations, be it with a student or with a supervisor, were based on equal status as much as possible, with my identity as both a doctoral student and a university lecturer.

**Avoiding data bias**

In this study, the accessibility or availability of participants was found to be influenced by CIDS’ geographic distance, isolation in the laboratory, lack of social connection, the intensity of research workload, and an everyday busy schedule with their PhD projects in STEM fields. The “elite bias” was also a potential pitfall because some participants were more “articulate, insightful, attractive, and intellectually responsive informants” (Miles & Huberman, 1994, p.264) than others.

These factors have been carefully put into consideration to avoid data bias. Besides the expansion of locations and multiple approaches to participant recruitment, another approach was to adopt rigorous both cross-case and within-case analyses to avoid generalizing from specific cases or sampling non-representative cases by overreliance on accessible and elite ones (Miles & Huberman, 1994).

**Member checking**

Member checking, or respondent validation, is considered an appropriate method to add to both the internal (authenticity check) and external validity (transferability of findings) (Hignett, 2005). For this purpose, all transcripts and translations were sent back to participants as a process of verification and analysis. Part of thematic interpretations and narratives were also sent to interested participants to seek their feedback (Hignett, 2005) at different stages of the study.
As feedback, participants did not raise questions with the content of transcripts, translations, and interpretations. Instead, several participants sent back revised transcripts or translations with clarifications on some key points they considered as unclearly said and wished to supplement. One participant mentioned his concerns about privacy and confidentiality when reading the transcript, but his concerns were relieved after reading how the data were interpreted and presented.

Cultural issues in translation

Translation is a complex task for a researcher because a language foregrounds the complex system of a culture. A translator is a “producer of research data who shapes the analysis through their identity and experiences” (Squires, 2009, p.279). With combined responsibilities as the researcher, the interviewer, the transcriber, and the translator for this project, I found the intimacy with data enhanced my strength when negotiating with the languages.

The data were transcribed in its original interview language, Chinese or English. That was helpful to recall the scenario when rereading the text for analysis. The transcripts in Chinese gave me sufficient space and time in pondering over the translation and the cultural factors behind the language itself, and to better avoid the ‘lost-in-translation’ effect (Hoffman, 1990).

In the process of translation, a proficient bi-lingual colleague was invited to check the validity of samples of translations (Hofstede, 1980). At the final stage, some native English speaking colleagues were invited to check the fluency of samples of translated quotes. Since all Chinese interviewees spoke fluent and appropriate Chinese in interviews, it was perceived as my obligation as the researcher to translate with fluent and culturally-appropriate English.

In addition, as Walter (2013) suggests, ethical research involves dedication to the accuracy and acknowledgement of data sources, which goes beyond ensuring exposing research participants to harm. Hence, to show respect to ethical research principles, I also committed myself to rigorous data analysis to ensure the quotes used in the dissertation were truthfully translated to portray their original meaning and to ensure the veracity of the findings to be reported in this dissertation. These basic principles and considerations lead to the following section – data analysis.
**Data analysis**

As this study involved two-phase data collections, data analysis has been an ongoing process guided by the research questions and the three-dimensional multi-worlds conceptual framework. Though the data analysis has been a continuously evolving process, for this dissertation, it involved the following four essential phases (Braun & Clarke, 2006; Miles & Huberman, 1994).

*Phase 1: Transcripts, translations, and member checking.* To stay truthful to data, the audio-recorded data were transcribed and translated where necessary. The accumulation of verbatim transcriptions and translations of around 70-hour interviews yielded over 360 pages, or over 220,000 words, as a dataset. All transcripts and translations were sent back to participants as a member checking process as previously mentioned.

Every effort was made to protect privacy and confidentiality so that the chance of participants being identifiable was minimized to the greatest extent. One approach to achieve this was all participants were de-identified with a combination of letters and ordinal numbers (“ST+number” for students and “SP+number” for supervisors). For the six narratives, the participants were given pseudonyms for ease of reading.

*Phase 2: Data coding to unfold the nature of CIDS’ experiences.* The transcripts of student interviews and focus groups in Word format were imported to data analysis software NVivo11 (QSR, http://www.qsrinternational.com/product) for systematic management, organization, and analysis. Then a combination of deductive and inductive coding methods was adopted to address the first research question – the nature of CIDS’ experiences. The analysis of focus groups was dealt with slightly differently from those individual interviews in that chunks of students’ interactions were coded accordingly (Krueger & Casey, 2000; Powell & Single, 1996).

Along the *Continuity* dimension, three stages were set as root categories: Pre-PhD, Within PhD, and Outcomes. In *Pre-PhD*, the categories included motivations to do PhD abroad, influences in the decision-making, family background, pre-PhD educational experiences, and other experiences. The first two categories have been put together as the initial findings of this study in the form of a paper, as shown in Appendix F. In *Within PhD*, the categories involved research world, personal world,
and social world. The motivations, expectations, values, beliefs, and actions were coded and categorised. This set of analysis formed the main body of data for coding to identify themes that revealed the nature of CIDS’ PhD abroad experiences. Then in Outcomes, the categories included personal transformation, professional growth, and future decisions. The data coding for Outcomes was based on participants’ perception of themselves, either at present or in the future.

Within this hierarchical setting, codes were assigned to data chunks that varied from one sentence to a few paragraphs. The line-by-line coding of the thick data summarized the segments and organized the data into meaningful groups for the narrative inquiry. After several rounds of review, comparison, deduction, and grouping of the codes, themes about the nature of CIDS’ experiences gradually emerged. These themes were named and defined.

Then the transcripts of supervisor interviews were imported into the same NVivo project for analysis. Within the same coding scheme, supervisors’ perspectives of CIDS were compared with students’ perspectives to examine similarities, differences, and conflicts. Supervisors’ suggestions on students’ problematic aspects were also coded accordingly.

**Phase 3: Data coding to examine transitions cross the multi-worlds.** The method of drawing matrixes for each CIDS participant was adopted to address the second research question – factors facilitating or constraining the successful PhD abroad. In a matrix, along the row were research, personal, and social worlds to examine the Interaction dimension; along the column were factors along the Situation dimension attuned with sociocultural and research contexts.

Portfolios were created for the 38 students, materials involving demographic information, interview data (cross-sectional, longitudinal, and focus groups), additional materials (emails, website profiles, students’ publications, media reports, and research notes), braced with themes and quotes exported from Phase 2. Each student was examined as an individual case for analysing within the matrix. When comparison across the worlds was completed, two more rows were added at the bottom – key differences and key facilitators – to summarize each case.

Then the matrixes were mapped together for cross-case analysis to identify similarities, differences, and uniqueness that impacted CIDS’ transitions and congruence across
the worlds (the flowchart as shown in Figure 4.1). Six patterns of transitions and congruent/different worlds were identified. These patterns were reviewed to reduce ambiguity and then defined (as shown in Table 4.4). Commonalities across cases in each combination were condensed into themes and concepts for reporting.

Phase 4: Selecting six narratives. At the final stage, six cases were selected to narrate the six patterns of transitions and congruence identified in Phase 3. These cases derived from six participants with longitudinal data and other supporting materials. Among them, five had completed their study, and one was approaching completion at the last interview. For representativeness of the patterns, their data were scrutinised to ensure the cases displayed fundamental features of the definition for each pattern.

The six narratives in this dissertation are introduced in the form of individual trajectories of development from past to future (Ye & Edwards, 2017). The focus is on examining the congruence and transitioning across research, personal, and social worlds within a small research context and a larger social context. The stories are told using participants’ original expressions (translations) and interpreted through the conceptual framework underpinning this study. Each story represents one type of combination of congruence and transitions.

To present appropriate narratives, I familiarized myself with the students’ experiences by rereading the transcripts, re-listening to interview recordings, reviewing the themes and matrixes, and inspecting supporting materials. The narratives were outlined with Continuity dimension, interweaved with the Interactive and Situative dimensions of different worlds. Then quotes were selected to present the six participants’ voices in the inquiry landscape.

In summary, after a rigorous process of transcription, translation, and member checking, three layers of data analysis were conducted for the narrative inquiry. The first layer was a cross-case analysis of all participants to generate themes representing the nature of CIDS’ multi-worlds. The second layer was a combination of within-case and cross-case analysis to examine patterns of transitions and congruence of CIDS’ multi-worlds over time. Then the third layer was an in-depth case study to use narratives for illustrating patterns unfolded in the second layer of analysis. The cross-case analyses verified generalizability of the themes out of the complex phenomenon of CIDS’ PhD abroad, and within-case analyses examined specific factors impacting
CIDS’ experiences across the worlds and over time. Combined, this dissertation endeavoured to present the nature of CIDS’ experiences and their transitions from a holistic three-dimensional multi-worlds perspective through rigorous analysis of the thick data.

**Chapter summary**

This chapter first examined the philosophical perspectives of this study. To find answers for the research questions, I situated this study as narrative qualitative research underpinned by interpretivism and sociocultural constructionism. This chapter then dealt with the fundamentals of the research design, with participants, data, trustworthiness, and data analysis described.

The following five chapters report the findings of this study. The nature of CIDS’ study is explained to reveal the depth, nuances, and complexities being unfolded through this doctoral project. The six categories of congruence or difference, and corresponding transitions identified through data analysis are used to structure the findings chapters, with an exception that the last two categories are combined in the reporting. Respectively, the six patterns include:

- Congruent worlds/Smooth transitions
- Different worlds/Smooth transitions
- Congruent worlds/Border crossings managed
- Different worlds/Border crossings managed
- Different worlds/Border crossings difficult
- Different worlds/Border crossings resisted
Figure 4.1 The flowchart of data analysis.
### Table 4.4 Definitions and examples of the six patterns

<table>
<thead>
<tr>
<th>Congruent worlds</th>
<th>Different worlds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smooth transitions</strong></td>
<td>The motivations, expectations, values, beliefs, and actions are mostly congruent in the three worlds, which enables transitions comparatively smooth.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>“The professors in the school… do match our expectations to master scholars… I bear the Chinese tradition of diligence, working in a small context with other Chinese… Lack of either aspect would not generate such a good outcome.” (ST15)</td>
</tr>
<tr>
<td><strong>Border crossings managed</strong></td>
<td>The motivations, expectations, values, beliefs, and actions are mostly congruent in the three worlds, but the congruence is created with the performance of the personal agency, self-efficacy, and actual skills in navigating transitions.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>“My supervisor is extremely busy, so I learned to be proactive to communicate with him. I would not keep problems to myself or wait for the supervisor to come, as I did before. If I leave the problem there, after one week, it’s still there, so I just go and look for him.” (ST4)</td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>The motivations, expectations, values, beliefs, and actions of the three worlds are different in some respects. However, the differences are understood, tolerated, recognized, valued, or respected, leading to comparatively smooth transitions.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>“The professors in the school… do match our expectations to master scholars… I bear the Chinese tradition of diligence, working in a small context with other Chinese… Lack of either aspect would not generate such a good outcome.” (ST15)</td>
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<td><strong>Example</strong></td>
</tr>
<tr>
<td>Border crossings</td>
<td>The motivations, expectations, values, beliefs, or actions are different in some respects. Differences lead to conflicting ideas and behaviours. Conflicts remain unsolved, leading to escalated complications. Students adapt to the differences and complete the PhD, but with negative emotions.</td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td><strong>Example</strong></td>
</tr>
<tr>
<td>Border crossings</td>
<td>The motivations, expectations, values, beliefs, or actions are different in some respects. Differences lead to conflicting ideas and actions. Conflicts remain unsolved, leading to escalated complications. Students resist to adapt and leave without completion.</td>
</tr>
</tbody>
</table>

*(Table 4.4 continued)*
Chapter 5 Congruent worlds & Smooth transitions

Introduction

This chapter begins the reporting of the findings in the form of six patterns of students’ experiences identified in this study. In this chapter, I first present the cross-case analysis of the first pattern, congruent worlds and smooth transitions, and then move on to a narrative that exemplifies the pattern. In this pattern, the congruence of critical factors in motivations, expectations, values, beliefs, and actions in a broad sense between students’ multi-worlds enabled their smooth transitions. Quotations are drawn from individual interviews unless otherwise stated.

The cross-case analysis

Nine out of 38 participants (ST5, ST7, ST13, ST15, ST17, ST19, ST32, ST35, and ST38) were classified into this category. By the time data collection concluded for the current study, four (ST7, ST13, ST15, and ST32) had completed their PhD in between three to four years, and these four had their first career in academia as postdocs or research fellows in Australia. Interestingly, eight out of the eleven married students in this study were classified into this group. Also, all of them were full scholarship recipients for their international PhD study.

Pre-PhD: Motivations and influences

For the students in this group, both personal development and research career development motivated them to undertake PhD study abroad. Preparedness for the demand of doing research helped many of them with the congruence and the smooth transitions.

The nine participants in this group had a range of motivations for the doctorate abroad. The most commonly mentioned motives involved enriching life experiences, self-cultivation, enhancing competence in research and vision in life, and career
development with international study experiences. A majority also mentioned their interest in research (ST7, ST15, ST17, ST35, ST38). Some specifically spoke of a change of environment or lifestyles by studying and living in another country (ST13, ST32, ST35, ST38). ST5 and ST7 had prior study experiences in the same Australian universities, so they decided upon doing the PhD when they were qualified for application. For ST19, a female student, her motivation to do the PhD abroad was for the opportunity to join her partner who was also doing a PhD in the same host university.

For many, the social influence with a trend of studying abroad apparently played a role in their decision-making. These students were influenced by different factors to pursue a PhD abroad. Some of them were outstanding students at the home university, so they were recommended to pursue a higher degree in research in a more established research context (ST13, ST15, ST17). Some had seen their peers going abroad and achieving a successful career, so they considered study abroad as a path for better opportunities (ST5, ST7, ST35, ST38). For example,

As they said, the world is big, so I wanted to have a look. My home university provided a resourceful CSC website and good consultation for doing PhD abroad. Nearly half of my postgraduate peers chose to do a PhD abroad; Some of my senior peers recommended this supervisor and helped me apply, so the application process was quite smooth. I had several publications during my postgraduate study, which helped my application for the PhD. (ST17, Year 1)

For another example,

When I completed my undergraduate study, I was not in a rush to find a job. I stayed at home for a while, contemplating what to do next. People around me have been going abroad, so I thought I might have a go as well. They called study abroad as a gold-plating process, which was what’s in my mind. That’s the reason I came out. (ST7, Graduate)

These students commonly had prior experiences in research and published in international journals, be it in undergraduate study, postgraduate study, or at work, which enhanced their self-efficacy to pursue scientific research.
ST38 had a paper published in *Science* (impact-factor 37.205, 2016) out of his work in a high-tech company in a cosmopolitan city in China. The publication helped him with the successful application for his PhD in Australia. The narrative below illustrates how this high-achieving participant decided to give up his job for a PhD abroad.

The company where ST38 worked before the PhD was a giant private venture on cutting-edge technologies, covering upstream research to commercialization. Working with a group of high-achieving people with a strong education background, ST38 had seen little space for a breakthrough in self-fulfillment or promotion at work:

> The company was crowded with talents, whereas I was just an ordinary cog. It’s not that you were not clever, there were people cleverer; it’s not that you were not diligent, there were too many talented guys working much harder. (ST38, Year 1)

Besides the sense of the small fish in a big pond (Marsh, 1987) at work, ST38 felt despondent about the high prices in the real estate market in the city where he worked. He realized he could not settle down with his wife with a home of their own. His field in high-tech gave him few options in other inland cities except Beijing and Shanghai, where there were similar issues of high housing prices. Not being able to afford an apartment for his family became a major motive for a PhD abroad. He described it as being “forced to leave”.

> The main reason for deciding to do a PhD abroad was because of the high housing price there. I’ve got married, and I need to see the hope, but the real estate market shows me no hope. Way too high. I was forced to leave. Many of the choices I made were not out of my intention; sometimes I was forced to choose another path. I could not fulfill my potential, so I had to choose another way. I might have gone to Beijing or Shanghai, but there were similar issues (with buying a house to settle down). If I chose other cities, there might not be a job in my research field. So the only choice left for me was to go outside for a change. A change is not necessarily good, but a change is an opportunity. (ST38, Year 1)

After ST38 decided for a change, he contacted an Australian professor. ST38 recounted that by then he was clear where his research interest was, which explained why he chose this particular supervisor in his host university. It seemed that ST38’s resume attracted this professor, so the professor offered ST38 one of two scholarships for a PhD. As ST38 did not pass the entry requirement for English, the professor
sponsored him for a three-month language programme in the university’s language centre. Afterward, ST38 formally commenced his PhD study. Recounting those prior experiences, ST38 reflected that to learn how to write, or “how to tell the story” in the western way of thinking, was another motive of his studying abroad,

The experiences of submitting papers to Nature and Science... were another reason I wanted to study abroad. I wanted to learn the western way of thinking, to see how they tell the story in a scholarly way. We used to put much attention to data analysis, but the subsequent components, how to tell your story, how to do the logic, are as important. (ST38, Year 1)

Thus far, it seemed this group of students’ research background amidst other factors has prepared them for a PhD abroad. The following section examines factors that contributed to the congruence and transitions of their multi-worlds while doing the PhD abroad.

**The PhD: The valued smooth transitions and congruence**

This study found that it was the three-faceted harmonious relationship between students’ multi-worlds that enabled smooth transitions and congruence. The three facets involved supervisor-student, peer-student, and family and academic-social networks. The establishment of the congruence was based on the match of some key expectations, values, and beliefs across their worlds, which further led to students’ general satisfaction and positivity with their study abroad experiences, and in turn facilitated students’ personal growth and academic success.

**Congruent supervisory relationship**

The first key match was students’ persistent effort and supervisors’ dedicated support. ST7 used a Chinese proverb to stress his value and belief, “老师领进门，修行在个人” (It is a teacher’s responsibility to lead into the gate, but it requires an individual’s effort in the process of self-cultivation.) This group similarly valued diligence, focus, persistence, and self-discipline. They were self-motivated and expected to demonstrate high achievement. In action, they commonly immersed themselves in research by intensively working about 10-12 hours a day and six days a
week during their PhD. Some participants described their long working hours without holidays or weekends as a habit formed from their previous studies in China. It seemed that this habit, once formed, lasted well into their PhD.

From students’ recounts, their supervisors presented the same values when dedicately facilitating their PhD research. These students generally revealed they maintained weekly person-to-person meetings with their supervisors unless one party was away. They also had opportunities to approach their supervisors “whenever there is a problem” (ST19, Year 1), be it in person or via email. It appeared that this easy approachability efficiently pushed the research forward, and also established a trusted rapport that suited Chinese students’ culture that harmonious relationship was essential. This rapport was also crucial to timely communication so that minor issues would not accumulate and became unsolvable (field notes).

The narrative below illustrates how ST13’s persistence and his supervisor’s dedication matched to facilitate him from a novice researcher to a successful PhD graduate. ST13 was articulate and reflective in the interview, though he indicated that he did not talk much in daily life. His original words (in translation) were largely used to best present his experiences and perspectives.

With an expectation of achieving a high-quality PhD degree, ST13 had been so dedicated to the research project that the lab had become his entire world during his first year of the PhD. He revealed that his usual workload was more than double in comparison with his PhD fellows. His hard work finally led him to find a breakthrough in his research:

Normally I arrived at eight to nine in the morning and worked till ten or eleven into the night. Other students normally conducted one experiment a day, but in my case, I usually did two or three experiments a day, working on two or three reactors in the meanwhile, controlling the experiments by turns... I was always over 100% workload. It’s quite hard. From Monday to Friday, and weekends, to ensure the number of experiments. During that half a year I did numerous experiments and accumulated a lot. Finally, after all these experiments, I found my breakthrough point. (ST13, Graduate)
ST13 reflected that his supervisor had been dedicatedly and intensively guiding him in the general direction, but also leaving ample space and time for ST13 to explore the unknown so that he could grow to be an independent researcher.

_The professor guided me to establish a solid foundation for doing experiments; then he gradually led me to conduct research projects. He did not give me an exact point of where to break through. It’s just a general direction. With the rich experiences in doing experiments, I was able to identify if there was any difference occurring in the experiments, which could have or have not been discovered before... I had intensive discussions with the professor over the experiments. He questioned me about the differences, and we would test with different methods._

_When I finally found a point to break through, nearly one year has passed. From that point, I built up the overall design for my PhD project. That point opened up a vast field to work on. After finding that point, I was highly motivated and worked more than full time in the lab. My publications started from there. During this process, the professor gave me enormous guidance. The role of supervisors is really significant. Though we are doing PhDs, but we understand very little in research. Though the supervisor might not know where to break through, but he can keep you in the right direction._ (ST13, Graduate)

When ST13 commenced his PhD, he was eager to generate a number of publications out of this PhD. This was because he knew it was an essential requirement to complete a PhD in China and thought he should do the same. When he communicated this with his supervisor in their first meetings, though, he was convinced by the professor that making scientific contributions, “even just a small step forward”, was far more important than the number of publications. Convinced by his supervisor’s insight, ST13 was able to invest himself in the fundamentals of research from the initial stage of his PhD.

When ST13 did have a breakthrough in research, his supervisor strongly facilitated him in academic writing. Though ST13 had already published before, this time he witnessed his professional growth in presenting a novel theory in a high-quality scholarly piece of writing.

_The second stage was when I found a new phenomenon with my breakthrough point, I could not just write it up like that. I have to relate it to an original theory. It’s another_
bottleneck. Then I spent another half a year! During this period, the professor recommended reading some fundamental books in chemistry to solidify my knowledge. He said writing a paper was like building up a high-rise, so you had to solidify your foundation first. The several months’ reading... seemed like a waste of time, but it helped me to go more steadily because 轮刀不费砍柴功 (sharpening a sickle does not waste the time of chopping)... After numerous meetings with the professor, I finally distilled a new theory from this phenomenon and published my first paper in the second year. Writing a paper is like giving birth to a baby, the first one is the most difficult (laugh). The second and third papers were much easier when I got familiar with the process. (ST13, graduate)

In another case, ST19, who initially wanted to do a PhD to be with her partner, changed her motivation six months later. She attributed the change to her supervisor’s positive influences. ST19 revealed that her supervisor had been encouraging and made himself available if she had questions. Most importantly, “he would analyze the questions from my point of view.” This easy communication was significant to her, and it enhanced her confidence.

This growing confidence further enabled ST19’s transformation. She indicated that the supervisor had helped her to set a feasible work plan to complete her PhD, which involved generating several publications so that she could pursue a career in academia after graduation. However, the supervisor had also convinced her not to aim at publications for the long term; rather, as majoring in an engineering field, she was suggested to go for industrial application and scientific contribution. ST19 admitted, “His viewpoints have significantly influenced me and changed my beliefs.” With the transformed motivations, expectations, values, and belief, ST19 was delighted with her growing independence. Though a first-year PhD candidate, she was confident about the PhD and the future.

Now I have changed from being passive to be proactive in research. I was persuaded by my boyfriend to do a PhD abroad, but now I am thinking about what I can achieve out of this PhD. I am no longer just a dependent on my boyfriend. Now I know what I want, which is fantastic. (ST19, Year 1)

Similarly, for the other students in this group, the rapport and the trust with their supervisors enabled their professional and personal growth with confidence and
calmness that was evident during interviews (field notes). Supervision was of central importance to these students’ satisfaction and success with the PhD abroad experiences (Due et al., 2015). It seemed the combination of students’ persistence and supervisor’s dedication facilitated the satisfaction and success. This study found the positive supervisory relationship might reduce potential constraining borders to an extent almost invisible to allow these students’ smooth transitions between their personal and research worlds.

**Congruent peer relationship**

Shared values in work ethics, collaboration, and support between students and other researchers in the small research context was identified as the second key match that enabled these students’ smooth transitions between their multi-worlds. Most students in this group indicated that their everyday support in a laboratory or a workstation in STEM fields came mostly from other doctoral students, postdocs, and researchers in a research centre other than their formal supervisors. They commonly revealed that their lab culture (Tanyildiz, 2015) was positive, collaborative, and caring.

In one case, ST35 recounted his positive experiences with such a congruent research world in his PhD. ST35 exhibited agency and skills to facilitate transitions across the worlds and received friendly and strong support from his peers in the research world, which enabled his academic growth and social integration. The following quote revealed the mutually congenial research context:

*When I have problems, I will go for those academics or peers who have similar research experiences. When I just came, I had a search of what the academics and students have been doing, and what they are interested in. Therefore, when I encounter a problem, I would know who to approach, and at least this person would recommend someone else who may know something about it. Everyone is friendly in offering their expertise. (ST35, Year 2)*

In another case, ST15 also enjoyed working together with a team around him even though each team member had a different research focus. ST15 indicated they were always willing to help each other out in research because “hardly anyone could achieve the best alone.”
Similar to ST35 and ST15, for students in this group, working with a team of researchers meant both knowledge sharing and knowledge continuity (Delamont et al., 1997). Drawing on the experiences from both supervisors and other researchers in their own research group, or their specific research world, these students could gather background theory, ideas, and tools to establish their own innovative ideas and push their research forward.

**Congruent familial and social relationship**

Then the third key match occurred between students’ personal and social worlds. Harmonious relationship and shared values and expectations with families and peers outside the research context contributed to achieving positive experiences. The students in this group were commonly well-supported by families and social networks, both physically and emotionally.

Interestingly and remarkably, eight out of the nine in this group were married before or in the duration of their PhD. The company and the support of a loved one eased their PhD journey abroad, relaxing the intensive mind and comforting against loneliness.

In one case, ST19 was extremely pleased when she arrived three months after her boyfriend’s arrival and found everything had been settled down in their new home. They soon married. When ST19 and her boyfriend realized cooking was a big issue in their daily routine because it interrupted their work schedule, they took turns to return home to cook so that the other one could focus on the work in the office or the lab. ST7 also belonged to this “two PhDs in a couple” phenomenon, and it was common for the married couples to share the daily domestic tasks.

For previously mentioned ST13, when his wife joined him in Australia after the first year, the couple spent some holidays on tours around the state. ST13 mentioned that both of them loved nature, and loved the natural environment in Australia. “That’s quite a comfort in my life,” said ST13. ST32, ST35, ST38 shared similar experiences of having the company of their loved ones to ease the pressure from intensive brainwork.

ST5 and ST15 met their partners while studying abroad and established their new families during the PhD. ST5 indicated her relationship with her boyfriend, later
husband, was a “very deep love” because of this very special experience of doing PhD abroad.

*Our relationship started here, and it was a very deep love. We rely upon each other. We do the shopping and the cooking together. When one’s sick, there’s someone taking care of you. Our relationship is more human, more than a partnership. We help and support each other. This person has entered every piece of your life and understood your soul.* (ST5, Year 1)

Social-wise, none of these students revealed that they had established a connection with the local community, nor had they developed deep-level connections with local students. They all expressed, however, that they found the local people friendly and accommodating. They felt it was easier to make friends with other international students who shared similar experiences of study abroad. Also, sports and games were important ways of socialising with other students from different cultural backgrounds.

*And as I played basketball, I had mates with various backgrounds. They were not necessarily researchers, but they were nice people.* (ST7, Graduate)

Co-national networks were important for this group of students to fill the niche in the social world. Established co-national associations provided an expanded network and also played a role in some students’ growth (ST7, ST17). ST7 revealed the majority in his social networks were co-nationals, and he valued the opportunities to be with them. In the later stage of PhD, ST7 had become the vice president of a dynamic association for Chinese doctoral students and scholars in Australia. He was motivated to get involved in those social activities specifically because of the opportunities to expand academic networks. This enabled him to become acquainted with senior or established researchers in various fields through association events, and they became his role models in the life journey. ST7 learned a philosophy “低头走路，抬头看路” (*Look down while you walk, and put your head up while looking for your path*) from a senior co-national peer when he just commenced his PhD. Since then this philosophy had been guiding him on how to make choices and work steadily to achieve the goal once the choice had been made.

*My life has been more colourful than others because I was the vice president of this association. My major social network was from the association, which gathered some...*
elite scholars in the city. Each president and vice president has been doing outstandingly well... We run seminars regularly and invite some well-established scholars, like a pro-vice-chancellor last time, to communicate with us about research and life. We meet many people through this platform. (ST7, Graduate)

Though it was unlikely every student had such an established academic-social network, other students in this group had their own small social networks. Most of them had co-national PhD peers who worked and lived together. These peers were across both research and social worlds, so they were empathetic and supportive due to many shared experiences and shared expertise. In one scenario, ST13 and his wife lived in a shared rental house with several other PhD students in the same research centre. In another, ST5 started her study abroad experience in the last two years of undergraduate study in the same Australian university, so she had several PhD fellow friends dating back from those undergraduate years. Therefore, their social life, even if it was a BBQ on the beach, had always been filled with endless hot discussions on their research, as indicated by ST13. All these facilitating factors further helped potential constraining borders to be nearly invisible across their research, personal, and social worlds.

Achieving out of the congruence

Whether PhD graduates or PhD candidates, this group of students appeared to be confident, calm, and competent with their identity as academic researchers. The most salient feature across them was their positive perspectives on the experiences of their PhD study and the confidence about the future. They generally maintained their aspirations and ambitions to contribute to scientific and technological innovation. When interviewing ST7, he was about to complete his postdoc work in Australia and return to China for an academic position. ST7 visualized his future with confidence, excitement, and plans:

I have full plans for my future research. If I could have a couple of hardworking students, we will have our original products with significant social values. I have a notebook in which I jotted down whatever occurred to my mind. I am starting to invest in realizing those ideas. (ST7, graduate)
It was evident that the PhD candidates in this group had been transforming into independent and confident researchers with the smooth transitions and the congruence of their multi-worlds. Besides, it was also evident the PhD graduates in this group transformed into high-achievers in research. ST7 and ST15 had nine publications, and ST13 and ST32 had four to conclude their PhD work. There was a consensus that the number of output publications was influenced by the field of research directions and disciplines. Both ST7 and ST15 also revealed modestly that some of their findings attracted interest from the industry and the media, which opened broader publicity as a recognition of their research outcomes.

**Summary**

To sum up, where the evidence showed congruence and smooth transitions across students’ multi-worlds, students had positive PhD abroad experiences, achieved their best, and transformed with confidence and competence.

Experiencing congruence and smoothness did not mean these students had not experienced difficulties, stress, highs, and lows in the process; rather, it meant the immense bilateral or multilateral investment of time and effort in co-constructing the harmonious relationship enabled their growth and achievement.
Shao’s experience\textsuperscript{1}

Shao’s story exemplifies the pattern of students that experienced *Congruent worlds and Smooth transitions* across the multi-worlds. He did experience stresses and ups and downs in his journey of PhD abroad, but the congruence of motivations, expectations, values, and beliefs between the individual and the small cultural research context played significant roles in his transitions. This congruence facilitated him to achieve high success in his doctoral research and output (Table 5.1). The key points of congruence or difference are shown in italics in the table.

**Pre-PhD: An anticipated smooth transition**

Shao’s smooth transition from an undergraduate in China to a PhD candidate in Australia and the congruence of his multi-worlds seemed to have been anticipated due to his pre-PhD academic experiences, supervisory influences, and family influences.

First, Shao completed his undergraduate study in a research-intensive university in China that allowed him to build a solid foundation of knowledge in his chosen field. Upon commencement, Shao had been selected to study in an Honour’s college established for the top three percent of students. This programme provided research involvement for undergraduates, and the faculties and the university supported students’ research activities financially and physically.

Hence his undergraduate experience provided him with opportunities to be systematically trained in scientific research. His three supervisors all had a strong international reputation in the field. It can be presumed that the allocation of Shao to these master researchers was due to his own excellence in academic performance. Since the second year, his potentiality as a researcher had been recognized by his supervisors, which might have illuminated his interest and self-efficacy in scientific research and innovation:

\begin{itemize}
\item Data sources: One three-hour interview two years after his graduation; Shao’s academic website profiles and publications. Quotes in the text were drawn from the interview transcripts.
\end{itemize}
Table 5.1 *Shao’s multi-worlds*

<table>
<thead>
<tr>
<th>Motivations</th>
<th>Personal world</th>
<th>Social world</th>
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<tbody>
<tr>
<td>- choosing talented candidates</td>
<td>- the selected one to do PhD</td>
<td>- high respect for PhD at home context</td>
</tr>
<tr>
<td>- cutting-edge research &amp; innovation</td>
<td>- enriching life experiences</td>
<td></td>
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<tr>
<td></td>
<td>- self-cultivation</td>
<td></td>
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<tr>
<td></td>
<td>- broadening knowledge &amp; competence</td>
<td></td>
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<tr>
<td>Expectations</td>
<td>- completion of the PhD</td>
<td>- families supportive of personal choice</td>
</tr>
<tr>
<td>- collaboration</td>
<td>- cutting-edge research</td>
<td>- science &amp; technological innovation</td>
</tr>
<tr>
<td>- cutting-edge research</td>
<td>- high achievement</td>
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<tr>
<td>- independence</td>
<td>- being recognised</td>
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<tr>
<td></td>
<td>- academic networks</td>
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<tr>
<td></td>
<td>- social contribution</td>
<td></td>
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<tr>
<td>Values/beliefs</td>
<td>- diligence, focus &amp; persistence</td>
<td>- families positive and supportive</td>
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<tr>
<td>- diligence</td>
<td>- positivity</td>
<td>- peers valuing hardworking and high achievement</td>
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<tr>
<td>- innovation</td>
<td>- innovation &amp; collaboration</td>
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<tr>
<td>- rigorous research</td>
<td>- proactivity &amp; initiative</td>
<td>- a multi-culturalism host culture</td>
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<tr>
<td>- balance in life</td>
<td>- social-commitment</td>
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<tr>
<td>- collaboration</td>
<td>- harmonious relationship</td>
<td></td>
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<tr>
<td>- care &amp; respect</td>
<td>- integration</td>
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<tr>
<td>- support &amp; recognition</td>
<td></td>
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<tr>
<td>Actions</td>
<td>- dedicated research</td>
<td>- families supportive</td>
</tr>
<tr>
<td>- independence facilitation</td>
<td>- high output</td>
<td>- supervisors being friendly and philosophically</td>
</tr>
<tr>
<td>- <em>strong supervisory support</em></td>
<td>- integration</td>
<td>inspiring</td>
</tr>
<tr>
<td>- team work</td>
<td>- research in other fields as a hobby</td>
<td>- host community sociocultural inclusive</td>
</tr>
<tr>
<td>- international collaboration</td>
<td>- <em>absorbing philosophical perspectives</em></td>
<td>- strong co-national network</td>
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<tr>
<td>- offering opportunities</td>
<td>- looking for the meaning of life</td>
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<tr>
<td></td>
<td>- an abrupt disruption of incongruence</td>
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<td></td>
<td>- returning to research after the disruption</td>
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Second, Shao’s selection of PhD supervisors and the host university were logically systematic and resourceful. When considering about going further in research after undergraduate study, Shao consulted with academics and peers around about possible options. He applied to several high-ranking universities in the United States of America and Europe and received multiple offers.

Meanwhile, Shao’s undergraduate supervisors at his home university recommended he consider a Chinese academic working in Australia. The Australian supervisory panel suggested to Shao comprised of three high profile researchers. The main supervisor, Professor Smith, was a renowned and pioneer researcher in the field. The second was the Chinese Australian, Associate Professor Lee, who had a high profile of research and rich experiences of international collaboration. The third was a high-profile researcher located in China. Shao recalled his excitement, “I realised how strong the panel was. I might learn a lot from these masters.”

Additionally, both the discipline and the university had high world rankings. Even better, Shao loved the pictures of the Australian campus, which were “blooming with beautiful Jacaranda.” Finally, Shao declined other opportunities, and with high motivations and expectations, he landed in Australia.

Familywise, Shao’s parents had different opinions on him doing a PhD abroad. Initially, his mother was quite hesitant when she learned about Shao’s decision to study for a PhD overseas because she was aware of the tremendous demand of research work. She would rather Shao find a job in Beijing, settling down with a family, a house, and a car, instead of having to travel afar and work so hard. Shao understood his mother’s love and the care about him. “My parents would not expect me to provide for them.” Finance or life-betterment was apparently not a factor in consideration for this well-off family.

Different from the mother’s hesitance, both his father and grandfather, who were influential researchers and engineers, supported Shao’s decision in pursuing his dreams and enriching his life experiences.

My father was quite open-minded. He said it would not work if I just settled down with a settled lifestyle while young. He suggested me to go out for more opportunities. Now I have been going farther and farther away.

My parents would not expect me to provide for them. My father was quite open-minded. He said it would not work if I just settled down with a settled lifestyle while young. He suggested me to go out for more opportunities. Now I have been going farther and farther away.
Shao did his undergraduate study in a north-eastern city, about 2,300 kilometres away from home. Shao breathed a sigh when he described how he had been “going farther and farther away” with the over 8,000 km distance between his home and his PhD institution. While doing undergraduate study, he could only join his families about ten weeks each year in winter and summer vacations; whereas by doing a PhD abroad, the time for this only child of the family to re-join his parents would have been expected to be much less.

**The PhD: Congruence, disruption, and return**

*Congruence with the research world*

The congruence Shao revelled in between his multi-worlds contributed to his academic success in the PhD. After Shao’s presentation for the confirmation of candidature in the fourth month, Professor Smith, the main supervisor, recognized Shao as the cream of the crop by commenting that Shao was the most outstanding student he had ever had, “not one of them”. Shao had published one journal article by then and had eight more before his completion of PhD in three years and two months. As further evidence of the quality of his PhD, Shao was awarded a national award for his thesis.

> After my presentation, my principal supervisor commented, in front of all the attendees, that I was THE most outstanding doctoral student he ever had, not one of them. I was really privileged, and the feeling was complicated. That was positive feedback, and meanwhile, a propelling force. Afterwards, everything went even more smoothly as I gained more experiences along the way.

Upon reflection, Shao attributed his success in the PhD to both contextual and individual factors. He highlighted both the Australian sociocultural context and his small cultural research context. In particular, he expressed the culture in his research centre matched his expectations for high-level scientific research and his values in the diligence:

> There’s the big context interacting with the small context. The big context is that Australia is a very nice country, advanced, with high-level scholars. Our school has only about five professors, but each one of them has a strong academic position
globally. They offer students a different vision and a different platform, which would
inspire the student from both macro-level academic research to micro-level
experiments. They do match our expectations to master scholars. This is what I’ve
learned from Australia. And I bear the Chinese tradition of diligence, working in a
small context with other Chinese. Both aspects were crucial for my study. Lack of
either one would not generate such a good outcome.

In research, Professor Smith nicely role-modeled the qualities of a rigorous researcher.
Shao recalled the moments when the professor discussed research disagreements with
him on an equal basis and how he negotiated his arguments with tons of literature and
research results. Shao viewed these practices as significant in establishing his research
habit. Shao also viewed the opportunities to articulate his points and thoughts
enhanced his self-efficacy as a researcher. The professor had been busy as the dean of
the school but managed to have monthly meetings to supervise Shao’s progress. In the
meetings,

We were like friends chatting about our own perspectives to see which one was more
convincible. It was not that because he was a professor, I had to listen to him.
Therefore, for our meetings, I would bring a huge amount of literature to back up my
ideas. He would listen carefully and reach the conclusion that it’s a systematic review,
‘so we may follow your idea.’ This is a very good research habit. It’s not just
following a senior person without asking why.

Shao’s second supervisor, Associate Professor Lee, worked closely with Shao and
influenced him enormously “in thought, research, and attitude.” Examples could be
collected throughout the interview. One was efficiency. Shao recalled that many times
Lee completed the revision of his paper together with the reading of a pile of literature
while travelling in the air, and sent back to him upon arrival. Another could be
diligence, promptness, and the style. Sometimes Shao sent Lee an email at midnight,
and the response came back after an hour. Even so, Shao could meet Lee in the office
early next morning as Lee had been maintaining a lifestyle of getting up early and
taking a half-hour walk to the office.

Influenced by supervisors as such, Shao was dedicated to his research. He never took
any annual leave during his PhD. He got up at six in the morning to start a day’s work,
and non-stop on weekends. He took several trips to Paris but spent all his time in
conferences and laboratories rather than sightseeing. Most importantly, Shao unfolded that this dedication was because “I enjoyed doing these meaningful things.”

Besides the sound relationship with supervisors, Shao also enjoyed the congruence with other research fellows in the research centre. Because Lee, the chief investigator of the lab, was Chinese by origin, the doctoral students and postdocs in the centre were mostly from China, with the exception of only one local Australian. Shao highly valued this small context working together with empathetic fellow researchers who shared the cultural values and beliefs:

*We felt close to each other because we shared the same language, the background, and we had travelled across the ocean to meet here. We helped each other out in life and in research... Australians like to maintain a good balance between work and life, so they rarely work after hours. But we Chinese brought with us our own tradition, just focused on our business, and worked hard with seven days a week, which was why we could have high output upon the completion of PhD.*

Even better, Shao’s third supervisor offered him opportunities to stay connected with the research context in China. As this supervisor was based in a Chinese university, Shao worked there about one month each year for bridging research. This provided him with insight to reflect on strengths and weaknesses in different research contexts. For example,

*I was not used to the work schedule and the laboratory safety requirements here [in Australia]. It’s quite different if working after hours. I had to apply for the access, and someone must be in company for experiments... There was nothing like this in China... But gradually I understood this actually was the humane factor for the protection of researchers.*

*There’s space for them to improve, though. For example, once a pump in the lab broke down. We had to go through a long process for the application to fix it. If it’s in China, we might have purchased a new one to replace it quickly. But here, it cost us several months. The management was good, but if they could improve efficiency, it would be an ideal place for research.*

Thus far, the congruence of values, beliefs, motivations, expectations, and actions in his personal and research worlds appeared to have contributed to Shao’s outstanding
academic success. He conceded “research is indeed very very difficult”, but perceived that “the achievement derived from a good habit with someone behind you, guiding you and inspiring you.”

**Congruence with the social world**

Shao’s smooth transitions across the social world were also identified as important in contributing to his success. For Shao, this was not reflected in how many social occasions he attended when doing a PhD abroad, but was more about his attitude, perception, and actions in dealing with cultural differences.

Interestingly, he explicitly expressed that he did not feel any cultural differences upon landing in Australia. The chance was he had experienced cultural differences when moving across China for undergraduate study, but as explanation for his ease in encountering a new culture, he laid stress upon his value in respecting other cultures:

> Cultural differences exist everywhere, even between families and cities in China. How do we put it? Respect, respect, and respect. If we can respect other people’s habits, nothing really matters. And this respect is mutual, creating a buffer zone in between.

With this value in respect, Shao naturally adopted the concept of “integration” when looking at cultural differences. This could be reflected in his frequent use of the term in English. Shao believed integration was bilateral and was to be together in a natural way rather than one copying another. He used vivid examples to illustrate his points:

> I don’t feel any cultural gap with my Australian supervisor. He does not work on weekends, so I would not bother him on weekends. That’s his habit, and I understand that’s his culture. If we can understand that culture, we are in there. It’s not that he does not work on weekends, we don’t as well. That is not integration. That is copying. For example, they like to walk bare-footed, but we don’t need to do that, do we? Genuine integration is mutual understanding. Integration is naturally being together.

Though Shao did not spend time sightseeing or partying during his PhD, he was quite at ease with his state of socialisation within his research networks and from the perspective of a researcher:

> Researchers are a unique cohort... For us, the integration is to collaborate and to maintain the long-term collaboration. For integration, we need to have shared goals
and are willing to work together. There’s no need to integrate for the sake of integration. And there’s no need to panic and overstate the cultural gaps.

In contrast to his at-ease attitude towards integration, Shao put great emphasis on the mastery of English. He believed that to think with the language could better help one integrate in a natural way, for example, to laugh together and to share jokes. He agreed upon a sentence he read in an Australian booklet for new immigrants, “the most important uniting element is the language, the common language – English.” Shao’s English was good, evidence of which was that he achieved nearly full marks in his IELTS test. Again, he presented an at-ease attitude for this achievement and attributed his high score to the everyday use of English, particularly in academic writing. The self-efficacy in English appeared to have further enabled his comfort on social occasions, though most of which were academic networking.

Shao’s understanding of integration – maintaining each other’s cultural values, beliefs and norms – allowed him to stay calm and relaxed when living abroad. As one of the pleasant outcomes, he maintained sound relationships with others in his rental house, and one of the housemates, a Chinese lady doing her undergraduate study in the same university, fell in love with him and they married. Not surprisingly, the family life in the foreign country added to Shao’s smooth transitions with the social world.

By far, Shao’s maturity and openness enabled the congruence of his personal world with both research and social worlds, which seemed to have guaranteed a successful completion of PhD and a promising future as a high-achieving researcher in the field.

_A disruption: What’s the meaning of me doing this?_

However, in the 2.5 years of his PhD, Shao was determined for a change in his life trajectory, and his action nearly derailed him from his PhD and his potential career as a researcher.

Multiple reasons in aggregation led to this change. Initially, Shao thought he could have completed his PhD by then, following the role model of his main supervisor, but his second supervisor thought differently.

*My principal supervisor used 2.5 years for his PhD degree. I thought of that as well. He said I could graduate early as my work has been done systematically well, with*
many solid outcomes. However, my second supervisor suggested I could explore much deeper and further in this line.

However, Shao had lost the motivation and the interest in going further with the project. He was tired of continuing to do things highly demanding but “not challenging”.

That was a period I lost interest in research. I felt I had done everything I should have done. I have done so much work, what else could be done? Doing research was extremely demanding, but it was not challenging for me, probably because I had been doing well.

On top of those and overwhelmingly, he lost the sense of meaningfulness in his research. He could not satisfy his sense of self-fulfillment, nor the sense of social commitment by doing experiments in the lab and writing for publications in the office.

I felt I was stupid just staying in the lab. I questioned myself why I have been doing this. I did not want to go on. Except for publications, I felt my research was of no use to the society. Who would use my stuff? I lost the sense of existence. I am wasting my time if my research could not help others, or society.

In the interview two years after his graduation, Shao used an expression 年少轻狂 (young and frivolous) to describe himself back then. Now as a senior research fellow, Shao had witnessed the value of his pioneering research, which, together with other researchers’ contribution, had been applied broadly to advance technology and innovation.

What I did was a new field. We were the first team in the world for the initiative. On reflection, it’s regretful that I did not go deeper and further to solidify the foundation. I did not realize that back then, but there’s no chance to return.

However, also back then, he had been well-prepared for a change of his life trajectory because of his persistent interest in economics and finance, which he took as a hobby. He had developed his interest in business since childhood, so he did a minor undergraduate degree in economics and conducted the final year research in efficiency assessment on commercial banks for the minor degree. His talent and competence soon attracted the attention of his supervisor in this project. This supervisor suggested
that he go to Europe for further study in economics. This did not occur because Shao followed his major discipline, but this suggestion seemed to have reinforced Shao’s interest and confidence in this field.

*Finance is my hobby, a deeply loved hobby. For relaxation, other people may go out to have fun, whereas I just pick up a finance book to read. All the books stacked on my shelf in the office was about finance.*

Not surprisingly, when Shao’s passion in his doctoral research project diminished, he turned his focus to this hobby and found himself successful in the field of finance. As a hobby, he had been a research assistant for a high-profile professor in business and mathematics. When Shao decided for a change, the professor suggested two possible directions to him. One was to do a PhD in business, and another was to find a position as an investment analyst in the core centre of an investment bank.

Shao chose the latter option and sent out his applications. After several rounds of interviews, he was offered by the president of the bank a position that carried an extremely attractive salary package and an extremely heavy workload. Upon reflection, Shao was proud of himself,

*You know what, only three applicants went to the last round and were interviewed by the president himself in the headquarter. And I was the chosen one.*

**Back to the PhD**

At that turning-point stage, two critical factors pulled him back to the PhD and the research world. The first was his parents’ opposition to the position. When Shao was about to accept the position, he told his parents of his choice, but his parents’ emotional objection exceedingly surprised him. This pushed him to reevaluate the situation.

*Usually, they would not say no to the things I wanted to do, but not this time. They were worried that I might die of the work demand, which was 90 hours a week, well, including the time in the air. I am the only child of the family. They don’t care how much I earn. What they care about is me. And I don’t want them to worry.*
The second factor was his co-supervisor’s advice. Back to the university, Shao had another conversation with Lee, who suggested to him to continue with his doctoral research. “He asked me to trust him. He told me if I continue with my research, I would definitely excel in the field.” They had had a similar conversation before he travelled for interviews, but that was when Shao was determined to look for other opportunities. “That’s my character. Once I made a decision, I had to try.” But on recalling those moments of dilemma, he appreciated Lee’s understanding, tolerance, and wisdom.

Thus, with the combined impact of familial concerns and supervisory advice, Shao returned to his PhD world. Soon afterwards, he completed his PhD with high recognition in the field at the age of 27. Even before the submission of his thesis, he had received several offers from research centres worldwide, which predicted his further growth and prosperity. Two years later, not long after this interview was conducted, he left for Europe where he worked with an honored laureate, a pioneering figure that reshaped the technology of the field. Nevertheless, he used a Chinese expression “学成归国” (return home with academic establishment/achievement) to depict his ultimate destination. His plan was to return home at 35, allowing himself a few more years to enrich his experiences and competence.

**Further notes: Philosophy matters**

Remarkably, in the interview, Shao stressed the significance of the philosophical perspectives that passed down from his supervisors and guided his growth through his PhD. On reflection, Shao perceived the cultivation of a PhD student was not only about generating research outcomes, but also about nurturing positive outlooks on life and research. He viewed these thoughts and perspectives as invaluable “soft information” an experienced supervisor could pass on to their students. Shao believed supervisors’ experiences were important assets that could only be accumulated through the life journey as an academic. *What is research? What is research all about?* Shao took these questions as philosophical and fundamental in leading a novice researcher to innovation and breakthroughs, and to become a pioneer in a field:

> That’s the innovation in the real sense. That’s the pushing science forward in the real sense. That’s the kind of researcher we need to cultivate, not just followers to solidify the existing knowledge.
Shao revealed that these thoughts were gradually developed through his PhD education. Besides family influence and extensive readings in various fields, his supervisors apparently had a major impact on his philosophical transformation. Shao particularly mentioned that “Lee has travelled so much around the world” to reveal the importance of perspectives accumulated through life experiences. Shao expressed his respect explicitly to Lee in the mentoring aside from research.

Besides personal growth, Shao also stressed the meaningfulness of research and social contribution. The connection of his sense of responsibility with a sense of social commitment appeared to have become part of his value system.

*This is more philosophical. I think the breakthrough in my research is meaningful to society. I just want to make it good. It’s a sense of responsibility, linked with the history and the future.*

Time issues were a cliché for most researchers, and Shao was not an exception. However, he revealed that he had two standards to assess if his life was not spent in vain. One was to do ONE thing which he would cherish when getting old. Another was to benefit the society, the community and the others around. As if to endorse this perspective, when I thanked him for spending three hours in a working day for my interview, he grinned, “*but this is meaningful.*”

**Summary**

After completing undergraduate study in a research-intensive university in China with rich academic and research experience, Shao was recommended to do a PhD in Australia with a high-profile professor who had a long-term partnership with his home university. While doing the PhD abroad, Shao was strongly supported and recognized by his multi-national supervisory panel. Shao also enjoyed the company of a team of co-national fellow PhDs and postdocs who shared the values in diligence and innovation. Shao’s understanding of cultural integration was to maintain and respect each other’s cultural values and beliefs, which allowed him to stay calm and relaxed when living abroad. With motivations, expectations, values, and beliefs in common between his multi-worlds, Shao experienced a smooth transition and congruence to achieve high success.
However, as Shao was so involved in research that he was unable to step back from it and see what possibilities it had for society, he lost the meaningfulness of his project as his output by publications was not tangible to satisfy his sense of social commitment. As he felt finance, his hobby, was more tangible at the time, he decided to change his life trajectory before completion of his PhD. At this point, it was the influence from both his research and social worlds that pulled him back, with reasons Shao speculated as matching his own values and beliefs.
Chapter 6 Different worlds & Smooth transitions

Introduction

This chapter describes the second pattern of CIDS’ experiences, different worlds and smooth transitions, with a more detailed narrative in the second section. In this category, students also had smooth transitions across their multi-worlds while doing PhD abroad. However, some critical aspects in motivations, expectations, values, and beliefs were found to be different across these students’ multi-worlds. The differences were generally understood, recognized, and respected by the agents involved, hence leading to smooth transitions that facilitated CIDS’ steady and solid growth to achieve.

The cross-case analysis

Eight out of 38 participants were classified into this category, respectively ST3, ST6, ST20, ST24, ST26, ST30, ST34, and ST37. By the time data collection concluded, four had completed their PhD, three in academia in Australia and China, and the other one working in the industry in China.

Pre-PhD: Motivations and influences

Multiple motivations and influences were identified for these students. International collaboration played an important role in leading some of them onto the journey of studying abroad. ST6 was initially attracted by his doctoral supervisor when this professor visited his postgraduate research centre in China. ST34 was introduced to the doctoral supervisor by his undergraduate supervisor in the final year project in the UK. In another case, ST30 met his doctoral supervisor while he was in an Australian inter-collegiate summer programme for undergraduate students.

I was in a summer programme at this university, but the supervisor was not the same one. Back then my programme did not go very well, because there were too many students in the group. I was not the outstanding one, or say, there was not much work to do. When it was approaching the end, the coordinator introduced me to the current
doctoral supervisor. We had a couple of talks, and she invited me to come back for the final year project and then for a PhD. That’s it. (ST30, Year 2)

Many earlier returnee academics in Chinese universities also played an important role in inspiring students to do a PhD abroad. Their insights of genuine experiences seemed to have a great impact on triggering both intrinsic and extrinsic motivations, such as in ST37’s case:

*When I was doing undergraduate, I was thinking of going abroad just for different cultural experiences. The reason I decided to do a PhD instead was that I met a haigui (returnee from overseas) professor who introduced me to the possibilities of doing a PhD abroad. He talked about the joy of doing research and the help for career development, so I thought it might be interesting. Then a paper we co-authored got published, so this supervisor here was interested in taking me. I ended up being here due to those coincidences.* (ST37, Year 4.5)

The other four students revealed their desire for career development through studying abroad. ST24 and ST26 indicated their expectations to take academic positions after achieving a PhD degree abroad. ST20 also aimed for enriching his research experiences.

Notably, ST3 was a research fellow in a third country before his PhD, so his expectation of the PhD was to generate a maximum number of publications during his PhD to open up a broader avenue for his future career choices. ST3 started his study abroad journey in New Zealand in the last year of high school, did his undergraduate and became a research fellow there. When the contract was coming to an end, he decided to pursue a PhD degree somewhere else "for a change of the environment.” He searched online, applied to some supervisors, and received a couple of offers. The final factor for his decision-making was a grant of scholarship from an Australian university, “so here I am.”

Thus far, it seemed that these students were prepared for their PhD study abroad with certain research experiences. Their decision-making processes were influenced differently by international collaborations, suggestions of prior supervisors, their interest in research and future career prospects. The motivations and influences of this group were substantially similar to those in the first pattern.
The PhD: Differences and transitions

With different motivations and expectations of the PhD journey abroad, and on encountering different PhD contexts while abroad, the students in this group experienced diverse differences across their multi-worlds. The differences that created borders between the worlds were based on specific situations. Not everyone experienced the same or the same number of differences. This section narrates how the differences occurred and how the circumstances allowed these students’ smooth transitions across the differences.

Differences across the worlds

The study identified six key differences across this group of students’ multi-worlds. The differences that had created borders for students in transitions were related to unmatched expectations, norms, and financial cost.

The first key difference occurred with expectations of the supervisory styles. Though Chinese students would mostly expect intensive supervision and a close relationship with supervisors, most students in this group had a novel experience of maintaining a pure academic relationship with their supervisors (ST6, ST20, ST30, ST34, and ST37). As this is the core of CIDS’ experiences, it will be analyzed in full detail in the next section.

The second key difference was in the unmatched expectation of the independent roles of a PhD candidate between students’ personal and research worlds. Most students (ST3, ST6, ST20, ST24, ST26, and ST34) did not expect that they needed to be multi-functional to progress their research. With experiences in schools and universities before the PhD abroad, these students generally imagined a PhD in a rarefied and sacred atmosphere of academic life. They expected to solidify knowledge, experiment, collect data, and write up for publications in a well-planned schedule. In practice, however, they found themselves most often working as a labourer, a technician, and some other roles. For example, they often needed to carry heavy metals, bang nails, weld a tube, purchase materials, or bargain for the budget, all of which they had never done before. The do-it-yourself culture in Australia was novel to these Chinese students who were used to relying on someone else to get such things done.
The third difference was the unmatched expectation of research resources. For some students, limited research resources limited their research output. In ST3’s case, due to his prior research experience, he considered himself as having had “a thorough understanding of what it’s like to do a PhD.” Unexpectedly, the research centre he landed in was newly established, and he was the first and the only doctoral student during his PhD with his supervisor, an established researcher but a new arrival to Australia. The limited research equipment and funding seriously constrained his progress. In his first year of PhD, the laboratory was still under construction. In the second year, he dreamed of having a large high-speed centrifuge for his experiments but ended up working with a small version, about 1/10 of the ideal size. Consequently, he indicated that he had to give up many of his research designs and ideas when they were impossible to realize without appropriate equipment.

The fourth key difference between students’ multi-worlds was the unexpected loneliness and isolation in a students’ PhD journey. There were different reasons for loneliness. For most of them, they experienced personal, social, and cultural loneliness (Sawir et al., 2007) due to the intensive focus on the PhD work and the lack of social events in the host community. In addition, ST3, ST6, ST30, and ST37 also experienced academic loneliness due to lack of postdocs and fellow PhD students around for teamwork or team support. This academic loneliness constrained the mediating role of “pedagogic continuity” (Delamont et al., 1997, p.535) and left them alone without pre-established knowledge within their specific context of the research group.

ST24 and ST26 also unexpectedly experienced geographical loneliness. While applying for a PhD abroad, they were unaware that their research centre, a branch of a metropolitan university, was located in a remote and lightly populated inland region. While there, social events were basically out of the question. Except for occasional travel to town, they connected with the world mostly through the internet. ST26 said, “I did not realize it was so isolated until I googled the map. I felt difficult before I came, but more difficult after the arrival. It was not like what I’ve imagined about a western country.”

The fifth difference was related to students’ understandings of the sociocultural norms in the social world. When ST20 was asked if there was anything special to recall in
his first two years of PhD, what occurred to him was his first experience of going to a hospital when he had a major injury on the forehead when playing basketball. Presumably, ST20 and his mates were not prepared for such an emergency, and he waited about 40 minutes in the corridor before the bleeding forehead was treated. To make it worse, his overseas student health insurance did not cover the cost. ST20 showed me the scar and considered it as a memory of his PhD.

That initial stage was really difficult. I paid over $600 for the treatment, and you know, the stipend was barely enough to cover my living expenses, and as a PhD student, I could not ask my parents for extra support. (ST20, Year 2)

Then the sixth difference, financial issues, was identified directly as a boundary between students’ multi-worlds. In ST20’s case, it was a temporary financial difficulty. However, ST24, ST26, and ST37 in this group were self-funded for their PhD. They generally relied on their parents’ support for the high tuition fees as international students and maintained part-time jobs to make ends meet. The economic dependence on their parents distinguished these students from other economically independent students in that they put more family factors into considerations when contemplating the future:

... and my family, they have spent so much. It’s impossible to drop halfway. I’ll finish the PhD no matter how difficult it is. (ST26, Year 1)

I have lots of dreams... but first I need to have financial independence. My parents have given me their selfless support; I have to pay that back. I will realize their dreams first, and then... (ST37, Year 4.5)

The six points hitherto in this section have illustrated how unrealistic expectations, realities, and norms created differences, or borders, between students’ research, personal, and social worlds. These borders did not apply to each individual in this group because differences were most often specific and case by case. Nevertheless, understanding of the differences may become critical when similar situations emerge in the CIDS population, for example, in examining the impact of CIDS’ personal, social, cultural, academic, and geographic loneliness.
Transitions across the differences

Despite encountering differences across the worlds, this group of students appeared to be positive and confident, steadily achieving their best and did not panic about the differences. Two aspects emerged out of the data and helped explain how they navigated these differences to enable smooth transitions: the empathy that accommodated differences, and the agency that bridged differences.

The empathy to accommodate differences

The study found the empathy that accommodated differences was always crucial and multi-dimensional in enabling smooth transitions. Students’ recounts revealed their supervisors had a different ethnic and cultural background. Ethnically, the supervisors for this group of students were originally British, German, Chinese, African, and Southeast Asian, and they were the first generation of immigrants to Australia. Many of them had rich study and work experiences overseas. Students did not hide their admiration for their supervisors’ experiences. ST24 said, “My supervisor did his PhD and postdoc in a top American university before coming here. He’s really a fantastic supervisor.” Presumably, the supervisors’ international background, experiences, and perspectives enabled them to develop empathy to understand their international students’ challenges when studying abroad, which helped with the establishment of rapport in the supervisor-student relationship.

This rapport further enabled students’ positive recognition of their supervisors’ different values, beliefs, and behaviours, which developed as a facilitating factor for smooth transitions. ST30’s supervisor was a female professor from Southeast Asia, and ST30 indicated his communication with this supervisor mostly focused on academic aspects. ST30 was the only Chinese student in this supervisor’s group, but he had several co-national PhD fellows around and had seen them maintaining a much closer relationship with their supervisors. However, ST30 enjoyed this academic-only relationship and respected his supervisor’s lifestyles with extensive hobbies rather than intensive research only.

She has the passion for her research, but besides research, she has another kind of life. She would stop for a while each year to enjoy life, to see the world. She is even a Yoga teacher. Rather than devoting her whole self to research, she has many other
hobbies. And she does not push us too hard. We could communicate well, and she offers her suggestions. I think she is a good supervisor. (ST30, Year 2)

Although this group of students spoke of multiple types of unexpectedness and loneliness that might have constrained their transitions, these students presented strong empathy to the differences and touched lightly upon their challenges in life. Having lived abroad for ten years, ST3 still had difficulty in enculturating himself to the western lifestyle and his nostalgia was strongly evident, but he expressed his capability to live with the differences nevertheless.

*I am still doing the three things each day: literature, experiment, and eat and sleep. I kept encouraging myself to work more dedicatedly. A person with self-discipline can work well wherever he is. The context is not that important. It does not make sense to believe the concept that the earlier going overseas, the better one may get used to the life there. This time when I was home, having local food at the street stand, it’s like I had never left, not even for one day. On the contrary, after living overseas for about ten years, I still don’t even like drinking coffee. (ST3, Year 2)*

ST34 also left home early in his late years of high school, but he exhibited a different perspective on differences due to his different overseas experiences. ST34 started his study abroad journey at 16 as a high-schooler in Wales, then an undergraduate in England, and then a PhD in Australia. During this 7-year study abroad period, he spent all his holidays at home. One interpretation is that this rich multi-national experience nurtured his ease to accommodate the differences in his social world.

*I have a moderate social circle. I live in the uni-village, which is quite international. There are a few Chinese PhD peers around. My girlfriend is Chinese. I have lots of common topics with other international PhD peers. It’s all about your preference. The most comfortable way is to stay with other Chinese, of course. It’s a bit more difficult to be with PhDs from other countries, but it’s not that difficult. (ST34, Year 1)*

For the three self-funded students, their supervisors also presented empathy and support to relieve their financial pressure. ST24 and ST26 had part-time jobs some evenings and on weekends to make a living, and they revealed their supervisors were quite understanding in this aspect. ST37 had been working as a coordinator and tutor in summer schools since his second year of PhD. “Thanks to my supervisor’s trust in
giving me this precious opportunity. It was intensive work, but I gained much confidence out of it. Students were pretty positive in the feedback on my teaching.” The work opportunities to increase financial independence appeared to have enhanced these students’ self-esteem as well as self-confidence.

The agency to achieve and to support

Besides empathy, agency was another important factor for this group’s smooth transitions across the worlds. This agency is not unilateral; rather, students recounted much of their supervisors’ persistent support in their PhD.

The supervisory styles this group of students experienced were diverse but being supportive was the commonality. Besides all maintaining regular meetings with supervisors, some of them had opportunities for brief discussions on the progress on a daily basis. Hence these students appeared to have established rapport and trust with their supervisors. With consistent and positive supervisory feedback, the students maintained their motivation, aspiration, and hope to achieve. For example, though some external factors placed constraints on the scope of the work that could be undertaken, ST3 never lost hope with his PhD because of the trust he had with his supervisor.

My supervisor is much busier than me, lecturing, tutoring, administration, but we meet every day. The experiments have been failing all the time till now, but he said just keep going. It’s all about failures and attempts. Some of the ideas might work, so I just kept going. We communicate a lot, and he is a reliable man. (ST3, Year 2)

ST30 and his supervisor also exemplified the importance of the bilateral agency in facilitating transitions. When ST30 proposed a change of research direction with his newly discovered research interest after the commencement of PhD, he received very positive feedback and support from his supervisor. Both of them lacked the foundation in this new direction, so the supervisor invited an external academic to join the supervisory panel for extra support on ST30’s research. Consequently, ST30 exhibited strong agency and intrinsic motivation in self-regulating his research.

In the beginning, I wanted to do a project in environmental microbiology, but I was not strong in doing experiments. In the six months between my undergraduate and the doctoral study, I found my interest in data mining, so I proposed a change in topic
upon arrival – to use data mining in environmental research. My supervisor was pleased and agreed immediately. She asked another supervisor with expertise in data mining to join the supervisory panel. She also supported me to join workshops and seminars in the School of Computer Science. For the past one and half year, we meet every Tuesday, and the project is progressing well as planned. (ST30, Year 2)

Students’ self-adjustment to the values, beliefs, and norms in the novel context was also evident. An interesting finding was this group of students’ common use of the expression “朝九晚五” (from nine to five) in describing their work environment and the schedule. Data showed that in practice these students generally maintained long working hours in research. For example, ST24 and ST26 often worked till midnight in their office to make up the time spent on casual jobs and to meet the demand for research. This difference between the value and the action was interesting to reveal their selectivity in adapting to new concepts in the new context.

Other evidence of students’ agentic self-adjustment was their acceptance of the concept of “colleague-like” relationship with their supervisors. This was a learned concept through their PhD study experiences and daily interactions with their supervisors, probably also with other colleagues around. The relationship between teachers and students in China has always been highly hierarchical, be it in the old time or at present. Hence it was particularly interesting to see that these students were so much at ease and comfortable when practicing the newly picked-up way of dealing with this relation.

This point was important because it allowed students to present their ideas to supervisors on an equal status instead of just following, obeying, and listening. These students were aware that their ideas were respected and valued, and they were allowed and tolerated to make mistakes. With positive recognition and feedback, these students were evidently self-motivated in taking on the challenges of scientific innovation and advancement.

*Transformation out of the differences*

The evidence suggests that this group of students experienced a transformation that grew out of the differences. In reality, challenges and difficulties, or borders, existed all the time, such as the shortage of funding or being an alien in a novel sociocultural
context. However, with persistent effort invested from both sides, and with mutual understanding, recognition, and respect between the students and their supervisors, this group of students could attain smooth transitions across different worlds that enabled them to achieve personal growth and academic achievement.

As ST26 indicated, a PhD was a goal that “was impossible to give up halfway, however challenging it might be.” For ST3, a positive attitude on loneliness enhanced his transformed understanding of loneliness itself to be peace of mind and accepting the situation:

*Following my supervisor’s advice, I just do three things each day, eating, sleeping and reading. I gained a lot from that. If there’s any problem, I will come back to more reading. I don’t ask people around, as I am working alone on the project and I am the only PhD with this supervisor. (ST3, Year 1)*

*On looking back, working alone also has its advantages. I have the chance to use all kinds of facilities, doing all kinds of things in the lab, as I am the only one working there. I think this might be a blessing in disguise. (ST3, Year 2)*

**Summary**

The critical differences across these students’ multi-worlds were remarkably individual-based. They could live with the existence of differences mainly because of mutual empathy and respect for the differences, which facilitated their comparatively smooth transitions across differences. This smooth transition was also achieved through students’ agency to achieve and supervisors’ support, though it was accompanied with pressure at the initial stage and over time. With positive facilitation for the transitions across the differences, students *persisted, achieved, and transformed* with calmness and dedication.
Lei’s experience

Lei’s story represents the pattern of *Different worlds & Smooth transitions*. Though some factors in motivations, expectations, values, and beliefs were different across Lei’s multi-worlds, it was bilateral understanding and respect to differences between the individual and the small cultural research context that enabled Lei’s positive and successful PhD abroad experiences (Table 6.1). The key points of congruence or difference are shown in italics in the table.

*Pre-PhD: Expecting differences*

Lei grew up in a poor rural family, and his parents were almost illiterate. Whereas Lei started to work in farmlands early in his childhood, just as other mates did, his academic talent distinguished him from others. Lei’s parents were apparently pleased with his academic achievement and hoped he could leave the farmland to pursue a better life, so they supported his high school studies even if they had to borrow to pay for tuitions and expenses.

Without disappointing his parents, Lei was enrolled in the best university of the state. Four years later, he was accepted by the best research institute of China to do a 3-year postgraduate study. The study mobility brought on the change of geographical environment from a rural area to a state capital and then to the national capital. Accompanying these changes, Lei’s study experiences exposed him to the concept of socio-economic-cultural differences and academic cultural differences. As Lei reflected,

> After living away from home so many years, I am so used to different kinds of lives. Nothing looks really dramatic.

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2 *Data sources*: Two interviews in his second and third year of PhD (IV1, IV2); informal social contacts and chats; media reports during his PhD (media); information updated after his graduation. *Quotes in the text were drawn from the interview transcripts.*
Table 6.1 *Lei’s multi-worlds*

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<th>Motivations</th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
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<td>- choosing talented candidates</td>
<td>- the selected one to do PhD</td>
<td>- enriching life experiences</td>
<td>- high respect for PhD at home</td>
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<td>- cutting-edge research</td>
<td>- self-cultivation</td>
<td>- broadening perspectives in research</td>
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<th>Expectations</th>
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<td>- completion of the PhD</td>
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<td>- high-quality research</td>
<td>- families supportive of personal</td>
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<td>- collaboration</td>
<td>- quality output</td>
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<td>- quality research</td>
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<th>Values/beliefs</th>
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<td>- innovation</td>
<td>- diligence, focus &amp; persistence</td>
<td>- positivity</td>
<td>- families supportive</td>
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<td>- rigorous research</td>
<td>- innovation &amp; collaboration</td>
<td>- proactivity &amp; initiative</td>
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<td>- balance in life</td>
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<th>Actions</th>
<th>Research world</th>
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<td>- “free-range” style supervision</td>
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<td>- engagement in academic activities in the</td>
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Through the years of living away from the family, Lei gradually learned to make his own decisions in life, one of which was that he transferred to a different discipline of interest for the postgraduate study. Another major decision was coming to Australia to do a PhD.

Lei used an expression “out of coincidence” to describe how he landed in Australia for his PhD. When he was about to complete the postgraduate study, a presentation given by an Australian guest professor, Hudson, attracted his attention. As their research fields were closely related, Lei approached the professor after the presentation for an in-depth inquiry on a couple of questions. From this initial contact, Lei thought the professor had a nice personality, though he understood that this initial impression could be only superficial through one communication.

Combining factors in personality and academic achievement, I thought of doing a PhD with him. So I sent him an email with my research proposal, a following-up of my postgraduate research. After four months, I received a scholarship from the university. Then here I came. It’s quite simple (smile). (IV1)

Hitherto, Lei had had experiences of crossing social, economic, and cultural differences in different areas of China. He also had the opportunity of a person-to-person interaction with his potential supervisor before his application for the PhD. Research-wise, Lei’s proposal was in an area he had interest and experiences in. Financially, Lei was supported with a fully-funded scholarship. Even though Lei had never been outside of China, those factors appeared to have prepared him for the transitions across differences in the unknown territory of his PhD.

**The PhD: The positively-perceived differences**

After the commencement of PhD, Lei identified many similarities in the basic norms of conducting research between China and Australia, regardless of a fact that all the academics in his faculty were non-Chinese. Lei had been used to working with foreign-trained researchers in his postgraduate research centre, so he did not find it too difficult to fit in the “foreign” research culture in his transitioning into a PhD in Australia.
Lei did, however, identify two key differences in the core centre of his PhD study, one being the supervision style, another being the research context. How Lei positively perceived the differences and positively adjusted himself in the process of transitions were identified as critical for his successful completion of PhD within 3.5 years. In recognition of Lei’s outstanding academic achievement, he was awarded a prestigious Australian prize for young scientists (university media).

**A different style of supervision**

“Free-range style” (IV1 & IV2) was how Lei described Professor Hudson’s supervision style. From the first day, Lei was explicitly instructed to work independently, and this instruction was a consistent practice throughout his PhD.

My supervisor told me it’s my own project, so I should be responsible for the project on my own. This is a free-range style (散养的). Of course, he discusses with me if there’s any problem, but after discussion, it’s still me to make the decision. (IV1)

As far as I could see, the supervisors here mostly use a free-range style, just like mine. (IV2)

This autonomous work style apparently slowed down Lei’s progress in research, which evoked nostalgia for his previous experience in his postgraduate study, where his supervisor worked with him closely and put the brain power in sync,

While in China, we (my supervisor and me) worked with high efficiency. We plan for the next few weeks, implement the plan, conduct the experiments, test the results, and then plan for the following stage. (IV1)

However, Lei was not emotionally attached to that mood of nostalgia or that work style. Rather, he positively interpreted the differences. Lei perceived the “free-range style” supervision for the PhD was an appropriate approach for the PhD study, though it took him a while to fit with the culture. In both interviews, Lei indicated the benefit of working as an independent researcher. Lei had expected that his PhD would be a training process on an overall project where he could initiate and experiment with his own ideas, so it appeared that the norms in his current research world fell within his expectation. Lei considered it was a rational practice that the supervisor stood aside but would provide timely and essential support.
We have regular weekly meetings so that supervisors understand students’ progress and help solve some problems if in need. However, to a great extent, you are on your own because what you have been doing is something no one else has done before. The main role of a supervisor is for paper revision and to help with problems, which is very good. (IV2)

Vitally, this free-range style exposed Lei to the broadest possibilities outside of his laboratory and office. In their meetings, Lei had observed how his supervisor solved problems by extending the inquiry to his academic networks in Australia, or elsewhere global wise. Nurtured with such an understanding to the importance of networks and collaboration without geographical border, Lei travelled to attend conferences in Europe, Asia, Oceania, and America during his PhD candidature to expand his own perspectives and the linkage to the world. He expressed that he took the chances to see the world, to communicate with people, and most importantly, to extend his vision by gaining the first-hand contact with the cutting-edge knowledge within his field or cross-disciplinary.

Therefore, as a research student from a postgraduate study to a PhD programme, Lei experienced different styles of supervisor-student relationships. Upon reflecting his experiences, Lei indicated that even though the traditional concept of “father-son” relationship between a supervisor and a student was no longer prominent in contemporary China, supervisors still customarily cared about students’ overall wellness. In contrast, Lei described his relationship in Australia as “pure colleagues-at-work,” and “hardly ever relate to personal lives” (IV2). Lei expressed he had no personal preference to which one was superior. Without much difficulty and without taking long, Lei adjusted himself to the “free-range style” concept during his PhD because he viewed his study abroad experience as an opportunity for self-cultivation, so “the taste might be changed” if he could not have the independence.

In spite of that, it seemed that Lei still longed for the care from the supervisor. He revealed that initially upon landing in Australia, it was a real challenge not having one single acquaintance around. Lei thought Professor Hudson “was nice” because the professor would occasionally ask about things in his life, such as the housing. “With one ask, you will feel he is amiable. For me, that will do. How well I live here is not that important anyway” (IV2). Seemingly, what was important for Lei was the
progress of his research, but the care from the supervisor, be it more or less, enhanced the harmony in their relationship, which in turn, better facilitated Lei’s transitions with his research world and further generated productive outcomes.

**A different research context**

Besides the supervision style, another key difference between Lei’s personal and research worlds was the norms, expectations, values, and beliefs of the research context. Again, Lei’s positive interpretation of the differences availed himself of the smooth transitions across the differences.

The first difference with the research context was time factor at work. Having been used to work with a busy schedule and efficient technical support at the home institute, Lei described a difference at his research context while doing the PhD abroad. Besides self-adjustment, Lei maintained his work schedule and contemplated the benefit of this slowing-down:

*It might be another form of waste of time if we just keep doing without deep thinking. Instead, if we think, plan and implement, it might generate a better outcome. Maybe that is another kind of high-efficiency. (IV1)*

The second difference Lei did not expect to encounter was that he needed to be multi-functioning in progressing his research. Besides as a researcher, he also needed to work as a laboratory manager, a technician, a designer, and a worker. Except for some products that could be processed at workshops, he was basically by himself to set up his experimental equipment in his laboratory. Again, Lei positively interpreted the benefit of being versatile in his doctoral study period:

*In this process, I’ve learned lots of side-knowledge in technical design and mechanics. It’s time-consuming, testing patience. But if we do not have hands-on experience on this, we would not know how to do it after graduation, and it will be embarrassing in the future when we supervise our own students. Experiences in practical engineering are important for nurturing PhD students. (IV1)*

In the second interview (at the beginning of his third year), Lei revealed that they had moved into a new laboratory, equipped with new facilities and instruments, which alleviated many of his issues with experimentation.
The third difference that Lei felt was difficult was lack of a team as co-researchers. From Lei’s experience, he could see the research funding in his field was shrinking in Australia, but as his research was not costly, financially there was not much influence on his PhD. Nevertheless, a consequence of this reduction in research funding was lack of teammates. When Lei first arrived, he had several postdocs around to facilitate his progress. Gradually with no budget for hiring postdocs, all of them had gone. Lei found himself left all alone to explore everything from scratch, with no one around to discuss problems that emerged. He expressed frankly that it was a “事倍功半” (double effort but half efficiency) situation when he could not build his research upon senior researchers’ foundation:

*Though there was some research foundation in the centre, as the postdocs were gone, they took that away. Other senior doctoral students graduated and left as well. Then there was this void. The hardware is still there, but you have to explore all the soft information from zero.* (IV2)

In this situation, Lei perceived the importance of taking the initiative and making decisions independently. He sought suggestions from his supervisors, postdocs in other teams, and fellow doctoral students, but he would depend on himself in making the final decision in his project. Lei was satisfied with his supervisor’s directional and strategic suggestions, and expressed that “*if he tells you everything, it will be his research, not yours.*”

On reflection, Lei attributed his independence to his accrued life experiences before and during the PhD:

*I have been getting used to being independent since my undergraduate years, then postgraduate years, and then here in Australia. The capacity to adjust to a new environment is something you will have only through your life experiences, instead of something you are born with.* (IV2)

The following quote may further represent how Lei maintained his positive and optimistic values and beliefs towards hardships in life and academic research. These values and beliefs appeared to have helped him with the transitions across the differences of the worlds and enabled him to grow with intelligence, wisdom, and the peace of mind in the face of challenges.
I don’t have any setbacks in my life. I am so young (laughing). Just stay positive and don’t complain. Complaining is meaningless, and it is contagious, evoking your listener’s negative emotions. We’ve all learned to think with a dialectic philosophy. Just identify the problem and then look for solutions. Surely there are moments feeling upset, such as when a paper is rejected. Just revise with reviewers’ comments and submit to another journal. That’s it. There will always be a way out with an identified challenge. (IV2)

Growing with these positive values and beliefs, Lei was able to complete his PhD in 3.5 years. With his high achievement and an expanded academic network, he received several offers from Australia, China, and third countries. But for the first year after his PhD (when this dissertation was written), he stayed in the same place to enable his research to go further in the same line. One distraction for this, however, was that his girlfriend, whom he met in his last year of PhD, had her visa extension rejected upon completion of her studies in Australia. Lei revealed it was a big shock to him, which meant he had to rethink his destination after his first contract.

**A congruent social world**

With positive understanding to challenges and consistent personal effort, Lei achieved a reasonably smooth transition between his personal world and his research world. Likewise, with his sense of social commitment, which seemed to be naturally rooted in his value systems, Lei also achieved congruence with his social world while doing a PhD abroad.

Throughout over two years of contact and interviews for this project, Lei consistently presented his sense of social commitment in a natural manner. For instance, Lei was one of the first CIDS who replied to my interview invitation via emails. These two participants revealed similarly that they were willing to participate in this project simply because they considered this project might help other international doctoral students. Upon Lei’s invitation and to my schedule, our first interview was conducted in a convention centre in the evening after his presentation at an international conference. Though Lei seemed a bit tired after a busy day, he replied to all my questions with great patience, calmness, and a smile. Afterwards, he committed himself to respond to my requests for further interviews, clarification of information, and the member checking. Even more, he introduced me to other potential participants
so that I was able to establish a network in his city and his university. Out of this process, I could observe he had established a sound social network even though it was his first year in Australia at the time.

Family-wise, Lei revealed a natural sense of responsibility to his parents. He viewed a Chinese student’s success in studying abroad was closely connected with parents’ honour, face, and well-being.

*News will spread if someone’s child is studying outside. If dropping out without completion, in Chinese’s perspective, it doesn’t make any sense, and the person might be considered flaky. It’s not only about the student’s face, but it’s also about the parents’ face. Besides, a child cannot stay detached from his parents. If the child does not do well, the parents could not possibly live well. (IV2)*

Lei had been studying and living with financial independence since his undergraduate years, which seemed to explain why he associated the commitment of a Chinese international student to the parents only at a spiritual level. Though he did not mention his obligation in financial terms, he took it as a natural commitment that a child should take care of the parents by doing well during study abroad.

Socially, Lei accepted the concept of integration with the local community but did not engage much in the social activities except for academic purposes. Throughout the PhD, he had ample opportunities to attend conferences around the world, which helped him to expand his academic networks.

Noteworthily, Lei had a dynamic academic social life with a co-national network in the city where his host university was located. Since the second year, Lei became an active board member of a dynamic association for Chinese doctoral students and academics in Australia. Amidst his busy schedule in research, Lei was heavily involved in organizing symposiums, enhancing communications between top scholars and students, and Lei authored a large number of media reports for the association’s scholastic events. As the president of the association revealed in an interview (SP7), the committee members “built up a long-lasting friendship through working closely together with a meaningful purpose.” Lei was pleased that the position offered him an opportunity to meet and learn from other outstanding students, early career academics, and well-established high-profile researchers.
Summary

With a positive and empathetic understanding of challenges in research, Lei achieved smooth transitions across the differences in his research world and personal world, which led to a highly successful completion of his PhD. Lei’s previous life and research experiences enabled him to work and make decisions independently, which helped his transitions with the “free-range style” but facilitative supervision with respect and understanding. Socially, multiple opportunities to attend conferences and travel around the world expanded Lei’s academic networks and international perspectives. Besides, Lei’s sense of social commitment benefited himself with his congruence with his social world.
Chapter 7 Congruent worlds & Border crossings managed

Introduction

This chapter provides the findings in the third pattern, congruent worlds and border crossings managed, and a corresponding narrative. In this category, students successfully managed their transitions across their multi-worlds while doing a PhD abroad. The motivations, expectations, values, beliefs, and actions appeared mostly congruent in the research, personal, and social worlds, but this congruence was created with strong evidence of the performance of personal agency, skills, and initiatives in navigating transitions that enabled students’ growth and achievement.

The cross-case analysis

Nine out of 38 participants were classified into this category, respectively ST1, ST4, ST9, ST11, ST18, ST23, ST25, ST33, and ST36. Impressively, five out of nine female participants in this study were classified into this group (ST1, ST9, ST11, ST25, and ST36). By the time data collection concluded, four (ST1, ST9, ST11, ST18) had completed their PhD, and all remained in academia, one in Australia and three in China.

Pre-PhD: Motivations and influences

For this group of students, the motivations and external influences to do a PhD abroad commonly involved enriching life experiences, self-improvement, and career development. ST25 had an extra motive which was to be together with her boyfriend, who was doing a PhD in the same university. They got married right after ST25 commenced the PhD.

Both ST9 and ST36 had been to Australia on exchange programmes in undergraduate years. Besides the enrichment in the academic study, they were also attracted by the very different cultures, which brought them back to the country for PhD.
When I attended their Honor's programme (in Australia), I met many researchers that appeared to be different from what I had expected. They have a distinct personality, enjoy the freedom, and don’t care about what others would think about them. They are very independent in the choice of careers or partners. I was fascinated to see some researchers had tattoos on the face, full of holes on the ears, which was absolutely out of my imagination to the image of researchers... Afterward, I told my parents that Australia was cool, and they supported me to apply for a PhD here. (ST36, Year 1)

The PhD: The co-constructed congruence

Doing PhD abroad was not an easy task to accomplish for any participant in this study, and students in this group were not an exception. The main factor that distinguished this group was the bilateral effort in co-constructing the congruence and managing the transitions in the duration of PhD.

This study identified four key points underpinning positive experiences for those who experienced major difficulties in the PhD but still could achieve congruence between their multi-worlds. These points included students’ agency and initiative, explicit and timely supervisory facilitation, strong supervisory support to successfully navigate a crisis, and creating a shared time and space in the social world. Besides, due to the large proportion of female students in this group, this section also put a specific focus on how female international students in STEM fields experienced their PhD abroad.

Agency and initiative

Remarkably, students in this group commonly exhibited strong agency to create congruence despite difficulties in the PhD. Factors that frustrated their mind could involve repeated experimental failures, lack of hope, lack of access to research resources, getting lost in direction, or a change of supervisor. However, they exhibited a sense of transcendence, or “it’s normal” attitude to the difficulties. ST4’s conversation and narrative are used to illustrate this point.

Life is like an electrocardiogram, full of ups and downs. Sometimes I feel frustrated, but... we need to adjust ourselves. Like last night, the result was not good, though I have experimented twice. It’s stressful. But I will consult with my supervisors or look
for more ways by myself. I think it’s normal to experience happiness, peacefulness, and frustration in the PhD. (ST4, Year 1)

Soon after the commencement of PhD, ST4 had realized the necessity to be active in seeking advice and resources, and the situation persisted into his later years. He was sharp in observation and active in taking actions:

*What impressed me here is the emphasis on independence, initiative, and cooperation. My supervisor has been busy, so I have to be proactive in communicating with him for his advice. And as I am working in a cross-disciplinary field, I always communicate with academics in other schools.* (ST4, Year 1)

ST4 revealed his research topic was highly challenging, and three aspects further constrained his progress. First, his supervisor, a busy dean of the school, could not spare much time in supervising him. Next, his supervisor, a new arrival at the school, could not provide any resources in the laboratory and had not established a team to support. And third, ST4 had a gap in the foundational knowledge with his research project, which was an “upstream” inquiry (fundamental science), whereas ST4 had mostly been researching at the practical level or “downstream” inquiries (technological application) before his PhD.

In coping with the constraints, ST4 took a critical initiative to propose a co-supervisor from another school. His principal supervisor immediately agreed to his proposal. With this co-supervisor and his established laboratory and team, ST4 had key support in bridging the gap in his knowledge foundation and sourcing research facilities to progress his research. Later, introduced by his supervisors, ST4 started interstate cooperation with another research team. They maintained fortnightly Skype meetings to negotiate different results and offer bilateral feedback. Besides, ST4 mentioned another successful experience in actively seeking external help:

*Once I needed a special type of bacteria for research, so I contacted many institutes around the world. Many of them were quite nice and willing to provide me with the bacteria. Finally, I got a sample from Sweden. These scientists are quite enthusiastic to help each other out.* (ST4, Year 2)

This is consistent with other research which shows collaboration brings “secure mutual positive-sum benefits and in a common manner” (Marginson, 2018, p.8). With
positive experiences, ST4 understood external resources and cooperation meant limitless possibilities. Thus, in the third year, ST4 had started to look for potential collaborators worldwide and to establish a network to advance his future research. By then he had enhanced his confidence and competence, believing the world of science “is not a lonely island”. In Year 3, ST4 had grown to think like a chief investigator in leading his project.

*These days I have been thinking if I could give a branch of this project to someone else. I have no expertise in that area, so that will be good. It’s also an opportunity to practice my managing skills and cooperation competence. I am going to talk to X who have been very nice in helping us out. Many external resources are available out there if you go and explore.* (ST4, Year 3)

Overall, similar to ST4, these students generally valued doing a PhD abroad as a privilege in life. With this positive attitude, they were willing to take initiatives to solve problems and make a change.

*I am experiencing another kind of life here... Studying in Australia with a scholarship, with such good supervisors, such a good environment, I think it is really a privilege.* (ST4, Year 2)

**Explicit and timely supervisory facilitation**

The second point in co-constructing congruence was supervisors’ explicit instructions and timely facilitation at critical moments to enable students to grow into independent researchers. A narrative of ST11’s experiences is used to illustrate the importance of this point.

Tracing back, ST11 was not a particularly outstanding student in her undergraduate and postgraduate studies. She indicated that she had failed several courses, which was rare compared with other participants in this study. The major motive for ST11’s PhD abroad was that she did not feel ready for stepping into a working career when completing her master’s study, and she “just wanted to have some more fun” by going overseas. Nevertheless, with support from both the research and social worlds, she successfully managed her transitions and transformed into an independent and confident researcher. Upon completion, she reflected, “I think my experiences of doing PhD here is invaluable for my life. It’s definitely an experience worthwhile to have.”
ST11 completed her PhD in four and half years, but even in the final half year when the scholarship had stopped, and the deadline was overdue, she still appeared to be confident, composed, and strongly believed it was the right decision to postpone her graduation so that she could work on an unexplained phenomenon. Evidence shows her self-assurance at this stage, which would be stressful and anxious in many other cases, was related to her positive experiences throughout her PhD, particularly with the instructions she received from the beginning.

*I think both of my supervisors are very good... giving me lots of guidance in the experiments and the initial literature review. But the most impressive was that at the beginning stage, in one meeting, my supervisor told me that doing a PhD is to prepare yourself to be an independent researcher, so I contemplated how I could be “an independent researcher.”* (ST11, Year 5)

This contemplation out of the conversation with her supervisors set the tone for ST11’s PhD. She started to depend on herself for finding solutions to problems in research and would consult her supervisors only if problems become unsolvable. She also recounted an interesting anecdote,

*I once told my supervisors here that in China we called our supervisor “boss”, and they were amused. My co-supervisor, the head of the school, said that you were the boss of your project. That’s interesting.* (ST11, Year 5)

This “you are the boss of your project” notion further strengthened ST11’s autonomy in research and decision-making. It appeared this perspective had transformed ST11’s values and beliefs which helped her manage well in the transitions cross her multi-worlds. However, this transformation did not mean she had turned out to be an independent researcher overnight; rather, her supervisors’ guidance had been multidimensional and persistent over time. One key support was for ST11’s first paper at a conference, her supervisors revised 12 times before submission. A positive outcome of this rigorous training was when ST11 drafted her thesis, her supervisors replied, “Congratulations on the distinct improvement in your scholarly writing.” “Receiving such feedback was really fantastic,” ST11 appeared to be satisfied with her enhanced ability in academic writing.
Another key support was the *philosophical inspiration* to embrace scientific challenges at certain critical points. ST11 recounted for quite a while she was in a desperate mood because of an unidentified bug in a model she established. Then she was impressed when her main supervisor encouraged her, “*You are so close to the truth. No one else in this world is closer than you.*” ST11 expressed that with those stimulating words she applied herself to work again with zeal and perseverance and finally solved the problem, which generated her first publication.

With accrued confidence, when ST11 identified another strange phenomenon while writing up her thesis in the fourth year, she decided to work on it even though it meant she had to postpone her graduation. Her co-supervisor advised to give it up for now, “*Never mind, it’s another PhD.*” ST11 thought of giving it up because the phenomenon was truly complicated, but when again and again her result was diverted by the phenomenon, she decided to take it up. She told herself, “*No one else in this world is closer than me to the disclosure of the truth for this phenomenon.*” With this self-determination, she did not listen to her co-supervisor’s advice, “*though that was rather comforting.*”

> Because I decided to work on this extra experiment, I had to postpone my graduation.  
> My scholarship has stopped, but I am still here because I wish to solve that problem...  
> However, in making the decision, I suffered a lot psychologically, and I needed support from others. (ST11, Year 5)

Luckily, when ST11 needed this psychological support, she received that not only from her supervisors but also from her co-national fellow PhDs around. These Chinese students studied in the same faculty and lived together in a rental house. They shared similar topics in life and shared each other’s concerns and joys along the PhD. Living within this small social world, ST11 was not alone both emotionally and physically when she had the struggle of making the decision. With a few more months, she solved the problem, and before long, this significant breakthrough generated her second successful publication. With these two publications, she received an offer from a Chinese research institute upon graduation.
**Strong supervisory support to navigate a crisis**

Students in the situation of changing supervisor midway through their PhD may experience a difficult time either before or after the change. However, ST33 was an exceptional case in that he successfully managed the transition and achieved congruence with all supervisors. Evidence showed this could be attributed to his incoming supervisor’s extension of strong support for him.

Tracing back, ST33 had experienced a successful transition from his postgraduate study to his PhD. He did his postgraduate study in a research-intensive university in China, where he had to work under high pressure and consequently generated a high output. This resulted in a successful application to a PhD programme in a top research centre in his field in Australia. Originally, he applied to Professor Smith, but due to retirement, the professor only took a minor role in ST33’s supervisory panel. The other two were both high achieving researchers in the field. As recognition of ST33’s previous academic achievement, Professor Smith gave ST33 two scholarships, an institutional one and an industrial top-up from his own company. Hence with sufficient financial support, and working with top researchers close by, ST33 was highly positive with his first-year PhD experiences.

*All of my supervisors are super good. I am very happy studying with them. Professor Smith is very busy, so I have just met him a couple of times, but he shows me the right directions with his insight and visions. The other two supervisors maintain regular meetings with me and are always available if I need extra support. I am very happy.*

(ST33, Year 1)

However, in the second year, right after his annual leave and all of a sudden, he was informed that his two main supervisors would soon leave the university. Our second interview occurred when ST33 was unsure what would happen to him with this situation, but he showed his understanding of these two supervisors’ leaving. With this forthcoming dramatic change, ST33 hoped he could complete the construction of the main research framework by investing more time before the two supervisors’ departure.

*This situation should be normal, and I am not the only one to be influenced. This change for sure will have a huge impact on me, as this is my second year, a year that...*
should be expecting both output and advance. But I could do nothing with this situation. (ST33, Year 2)

As this was a situation out of ST33’s control, ST33 later realized that these two supervisors had become too busy to supervise him in their last few months. However, the chaotic situation had a sharp turn when Professor Smith changed the role to be his principal supervisor. ST33 had indicated in the first two interviews that the professor, as the founder of the world-class research centre and president of an international company that commercialized research findings, had an extremely busy schedule and most of the time was on business trips. However, in the first few months of taking over, the professor started intensive supervision of ST33’s PhD. Working closely together, they reviewed the overall project and improved defective points in the previous research design. Finally, they worked out a feasible plan which put time cost into consideration so that ST33 could reach the target of the project and complete his PhD on time. Upon reflection, ST33 took a deep breath, “真是不幸中的万幸 (It turned out to be the best out of all the worst).”

In the first few months, Smith and I had extremely frequent meetings. Basically, whenever I made progress, even just a tiny little one, I could go and meet him. After a while, when it’s getting better, our meetings set to be fortnightly. Then we found a real breakthrough. That meeting was, last October, I remember very well, the meeting was very long, and Smith was very happy. He finally felt a bit relieved. During that critical period, I knew many staff members could not have a chance to make an appointment with him at all, but he made himself available to me all the time. Now our meetings are much less frequent, but everything is on track. (ST33, Year 3)

As ST33 perceived, though he “wasted” several months due to the chaos, Smith’s crucial support at the critical stage facilitated him to pass through the challenging transitions and to reach a higher level of research. With the new congruence with his supervisor, ST33 appeared in his third year as dedicated, motivated, and confident as ever before.

Creating a shared time and space in the social world

Socialisation in another language in another sociocultural context was a border CIDS had to deal with over time, but students in this group were impressively proactive in
integrating with the local community. On one side, they availed themselves of the opportunities to join social occasions; on the other, they took the initiative to create a shared time and space with their colleagues and the local community, be it within or outside their comfort zones. This echoes Elliot, Baumfield, and Reid’s (2016) findings that international doctoral students are proactive in creating the third space for relaxation, recreation, and acculturation.

Within faculty events: Most students in this group valued the opportunity to socialise with academics, researchers, and fellow PhDs school-wide at faculty events, such as Friday morning/afternoon tea. Running such a weekly/fortnightly event was a tradition in most faculties in Australian universities. "It offers us a chance to get acquainted with everyone around," ST1 expressed, enabling her to integrate fast within the faculty.

However, ST4 brought up a point that Chinese students tended to stick together on such occasions. He explained, “Chinese are normally shy and not good at communicating with others.” Being aware of this issue, ST4 revealed he always reminded himself of going the extra mile to communicate with different people around, and he did do so. For example, after several talks with a professor from another school in the faculty, ST4 was pleased to see his network expanded into another but related field. As he was the HDR representative of this school, ST4 later invited the professor to give a cross-discipline seminar to his PhD fellows to generate inspirations and broaden their scope.

The campus: Though with an intensive focus on research, a few students engaged themselves in campus events and associations. ST23 purposefully pushed himself out of his comfort zone to “improve the linguistic proficiency, mingle with other researchers, and improve leadership capabilities.” His effort to be engaged was consistent and persistent in the first two years of his PhD.

There are many Chinese around, so the comfort zone is just there. I don’t want to stay within this zone. I wish to step out, though it’s really difficult. (ST23, Year 1)

I joined a research facilitation group on campus, where I was mentored, and now, as a research assistant, I am mentoring others. (ST23, Year 2)

Pubs: The pub culture in Australia is different from that in China, which might be a reason few participants in this study mentioned their experiences in pubs, but ST9 and
ST33 were exceptions. ST9 often joined her colleagues in pubs and also invited them to join her on special occasions. As she indicated, she was the only Asian student in the centre who would do so with local colleagues. Through relaxed conversation, ST9 realized that was an ideal opportunity to mingle and to understand another culture from a different lens. For example, she was amused to find that “academics here like gossiping as well.”

ST33 also frequently visited pubs, which was what his football teammates would do after Friday or weekend games. He admitted he did not truly enjoy the local way of drinking but was willing to do as Romans do. Rather than just taking it as leisure, ST33 found it opened a window to a world outside of his research centre. For example, he could get practical information from his engineer mates, such as the genuine situation in the job market.

Coffee shops: A few female students enjoyed the experiences in coffee shops. ST1 often travelled on weekends and met different people at local coffee shops. For a sojourner living alone overseas, sitting in a coffee shop also brought on the nostalgia for the time spent in the teahouse in her countryside hometown in China.

Sometimes I take a bus to some small towns around, and stop somewhere I like, sit in a coffee shop, and chat with some locals. They are very nice people. It’s good for my English as well (laugh)... It’s similar to the life in my home village... (ST1)

The metropolis: Students in this group found the life in the host city was not boring. With the multi-cultural lifestyle in Australia, they found it was easy to satisfy their taste buds with home-style food close to campus. With the beautiful environment, they enjoyed sightseeing, fishing, crabbing, or a BBQ on the beach. ST36 did not feel she was an alien in the host city even upon immediate arrival.

I think this city is very much like China, life, food... It’s the mixture of the eastern culture and the western culture. It’s so interesting. (ST36, Year 1)

In other cases, ST23 attended multiple social associations which kept him busy on weekends. ST4 regularly visited a church to interact with people from all walks of life. ST9 and ST11 were volunteers for an aged-care centre.
Personal effort and agency to integrate with the local environment were evident across this group, and the enjoyment they gained from their effort was also evident. Hence this became the fourth point underpinning their congruence across the multi-worlds.

**International female students in STEM fields**

As over half (five out of nine) female participants in this study were classified into this group (ST1, ST9 (case study), ST11, ST25, and ST36), which makes it essential in this section to scrutinise how these Chinese international female students in STEM fields managed transitions to achieve congruence between their multi-worlds.

Previous research has been concerned about the identity formation of international female doctoral students in STEM fields, where they need to construct inclusion, challenge invisibility, and re-engineer professional efficacy (Dutta, 2015). Even so, evidence in this study shows the female students in this group were generally positive about their transformational experiences. Most impressively, they commonly touched lightly about their pressure and challenges. In essence, gender boundaries were not identified to be obvious in constraining them crossing the multi-worlds; rather, these students appeared to have enjoyed the PhD abroad journey and presented strong inner strength, self-determination, and confidence in managing the difficulties that emerged over time.

ST25 decided to do a PhD abroad so that she could stay with her husband, who was doing a PhD in the same school but started one year earlier. “I wanted to be with him but did not want to stay at home as a housewife, feeling that as irresponsible to myself. So I applied for my own PhD.” After commencement, she realized the PhD was much more difficult than what she had expected. A focus group conversation revealed how ST25 encountered novel challenges in her research world and how she transformed with both inner and physical strength.

*Yang: Have you ever perceived any difference for women in the engineering fields?*

*ST24 (male), ST25 (female), ST26 (male): (Simultaneously) No.*

*ST26: Not much difference if there’s no labour work involved. If in China, you may feel the difference because we would not let girls do those labour-involved or risky jobs, but here we are all the same.*
ST25: When we do experiments, we have to prepare all the facilities by ourselves. We set up frames, do the painting, etc. Once I yelled at my supervisor, “Oh my goodness, I am drilling a drill.”

ST26: Sometimes she works as a man.

ST25: Yes. I remember one evening I burst out crying after work. I did not expect a PhD student had to do all this tough technical work. Then my supervisor talked to me and asked what’s special about being a female. He suggested as a PhD, I had to manage this. Now we use coal powder in experiments, which is quite dirty, but I feel it’s okay. Now I feel nothing really special as a woman in engineering... Here (in Australia) I don’t feel women are anywhere more fragile than men... Now it’s like I can manage everything at work.

Besides ST25’s agency in self-improvement and acculturation, she recognized her supervisor’s patience in leading her on her journey as important in establishing the rapport and trust. It seemed this rapport was critical in establishing ST25’s professional identity, transformation, and the sense of inclusion in the research world.

I was not close to the supervisor at the beginning, there was no trust, but now I do trust him, believing we can surely complete with his supervision... At the beginning when we had different opinions, we would argue, and very often I became grumpy and unhappy. He would come to me again the following day to analyse the problem. He would also ask if I felt better. He cared about how we felt; it’s us sometimes being quite childish. Now everything is getting much better. He is a respectful supervisor.
(ST25, Year 2)

Other female students in this group shared ST25’s experiences to achieve growth and independence by taking up the suggestions of the supervisors. More importantly, they were able to articulate their problems to the supervisors who appeared to be understanding and care about their problems. For example, when ST36 realized her research interest was closer to another scientist in the laboratory after about one month of commencing her PhD, her first supervisor supported her decision to change the main supervisor. In the previously mentioned ST11’s case, when she struggled with the notion of power relations in the research world, her supervisors explicitly suggested “you are the boss of your project”, which cleared her path in understanding
she was the one to control and advance her research rather than wait and rely on someone else.

This group of female students also managed the transitions between their personal and social worlds. Familywise, ST1 and ST9 came from low economic status families, but their parents had been supporting their education and their decisions to pursue a PhD abroad. ST1’s mother was diagnosed with cancer not long after ST1 arrived in Australia. With a busy schedule in the PhD, ST1 could not return home, but she checked related information online and arranged all the details for the treatment. She chatted with her parents and her sister each day online until after her mother’s successful operation and recovery, which was quite a relief for her, and allowed her to invest herself back into the PhD.

ST11, ST25, and ST36 came from urban middle-class families, but they valued the possibilities to achieve financial independence with their doctoral scholarship. ST36 was pleased with her scholarship as she could also support her boyfriend to achieve his master’s degree. ST11 had some savings in the first four years so that she could manage to survive the extra half year when the scholarship stopped. Interestingly, ST25 was happy to live far away from home “so my parents now cannot push me to have a baby.”

Despite the visible or invisible challenges, the female students in this group appeared to be strong, confident, and positive in managing transitions to achieve congruence across the multi-worlds. As ST25 put it, “The experience of doing the PhD abroad itself is just so good. I am turning into an intelligent woman (jokingly).”

**Summary**

With their dedicated effort to facilitate transitions to achieve congruence across the multi-worlds, this group of students presented some of the most interesting experiences with their exercise of agency. Importantly, most of them received strong supervisory support that facilitated them to go through diverse transitions and challenges to achieve timely completion of the PhD. These students were also the most active group in this study that endeavoured to integrate with local communities, on and off the campuses, so that most of them enjoyed the benefit of integration. Both
female and male students in this pattern, in particular, exhibited their dedication, confidence, and competence through their positive PhD abroad experiences.
Jie’s experience

Jie’s experience represents the pattern of *Congruent worlds & Transitions managed*. Jie experienced a positive congruence across her multi-worlds, but this congruence was achieved through both her personal agency and the contextual facilitation in transitioning across the worlds to achieve high academic success (Table 7.1). The key points of congruence or difference are shown in italics in the table.

**Pre-PhD: The dedicated transitions**

Growing up in a remote low socio-economic rural family, Jie was the first child in her village to have the opportunity to study at a university and then to study abroad. In the third year of her undergraduate study, she was awarded a one-year exchange programme at an Australian university. It was not surprising that this was an eye-opening experience for this country girl. Towards the end of the year, she was selected to be a guest in two TV programmes on the experiences of international students in Australia (media). In these programmes, she presented an image of a young, energetic, bright-eyed Chinese girl, curious about different cultures and lifestyles, open to various cultural experiences.

Viewing the programme, her use of English in the TV programmes appeared smooth and natural when she communicated with local Australians, tour guides and fishermen. However, in the focus group, she revealed that when she first arrived in Australia, she had “enormous difficulty” with the language (FG). For example, in one course, for the whole semester, the only words she could understand in the class were “See you next week”! This is understandable because the English education in the Chinese countryside usually lagged far behind, with a focus on reading and writing only.

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3 *Data sources:* A focus group (FG) and an individual interview (IV) respectively in her second and third year of PhD; email exchanges for supplementary information (email); two TV programmes (media); information updated after her graduation.
Table 7.1 *Jie’s multi-worlds*

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<td>- completion of the PhD</td>
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<td></td>
<td>- collaboration</td>
<td>- cutting-edge research</td>
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<td></td>
<td>- quality research</td>
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<td></td>
<td>- independence</td>
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<td></td>
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<td>- being recognised</td>
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<tr>
<td><strong>Values/beliefs</strong></td>
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<td>- diligence, focus &amp; persistence</td>
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<tr>
<td></td>
<td>- innovation</td>
<td>- positivity</td>
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<td></td>
<td>- rigorous research</td>
<td>- innovation &amp; collaboration</td>
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<td></td>
<td>- balance in life</td>
<td>- proactivity &amp; initiative</td>
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<td></td>
<td>- collaboration</td>
<td>- social commitment</td>
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<td>- care &amp; respect</td>
<td>- harmonious relationship</td>
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<td>- support &amp; recognition</td>
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<td><strong>Actions</strong></td>
<td>- independence facilitation</td>
<td>- strategic self-improvement</td>
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<td>- <em>positive and constructive feedbacks</em></td>
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<td></td>
<td>- <em>timely feedbacks</em></td>
<td>- proactive, independent and</td>
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<td>- funding support</td>
<td><em>communicative in research</em></td>
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<td>- expanding international networks</td>
<td>- sociable and friendly</td>
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<td></td>
<td>- from tolerance to trust</td>
<td>- engaging and leading social activities</td>
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</table>
To bridge the gap, Jie grasped every opportunity to improve her English. On realizing that the host nationals had little motivation to approach international students, Jie pushed herself to approach them instead. She even forced herself to chat with other passengers on the bus she took to and from the university. Much to her ease, she found that when she made a step forward, most Australians were friendly and accepting. Besides crossing linguistic boundaries, her experience in the language learning appeared to have enabled her an awareness of sociocultural differences in different living and studying contexts.

Meanwhile, her effort in her academic study was just as high. Even with that “see-you-next-week” course, her final score was over 60. In the end, her outstanding academic achievement qualified her for a PhD in the same university in Australia upon the completion of her undergraduate study at the age of 21. Jie’s family could not afford her studies, but she received a 4-year full PhD scholarship from the Chinese Scholarship Council (CSC). Hence Jie was relieved from financial concerns for the duration of her PhD abroad.

The PhD: The dedicated congruence

The motivations, the pressure, and the philosophy

Jie expressed the PhD abroad had been extremely challenging for her, but she was motivated and persistent to achieve her degree successfully on time. She expressed,

I consider doing a PhD as a 人生修炼 (self-cultivation), so I am willing to take the challenges along the way. (FG)

In both interviews, Jie naturally connected Chinese students’ persistence in the PhD abroad to sociocultural factors. The first was the high respect for a PhD degree in the Chinese society, and the second was the issue of losing face or dishonouring the individuals and their families. Jie considered the latter as more serious. “They simply could not face their families at home if giving up. This is an enormous pressure” (FG). However, Jie revealed she did the PhD abroad purely out of her personal choice, nothing related to her parents, so she did not have much of this familial pressure.
Jie’s pressure to complete her PhD mainly came from the CSC scholarship. This was related to a term in the contract that would require her to refund the scholarship if she dropped out or downgraded from a PhD programme. CSC also required recipients to return to China after graduation unless they received an overseas postdoc contract. Based on these two items, Jie expressed her determination to achieve the doctoral degree on time (FG), and also wished to do a postdoc to enrich her research experiences “while young” (FG & IV).

On chatting about the experiences of growing up as a country girl and now doing a PhD in one of the most prestigious universities in Australia with the support of a full scholarship, Jie expressed,

_Since I commenced this PhD, I have always been telling myself that from now on, every day is a win._ (FG)

This “every day is a win” philosophy proved to have helped her create congruence between her multi-worlds and successfully manage the transitions across and over time during her PhD. All these were achieved in the face of continuous challenges and stresses as an international female doctoral student in STEM fields, which will be elaborated below.

**Crossing boundaries in research**

From an undergraduate to a PhD student, Jie experienced a sharp transition from coursework study to independent research. Unlike most of her peers in the laboratory, Jie did not have any research experience before the PhD. “I was under great pressure when I looked at you,” she admitted to a colleague in her second year (FG).

Her two supervisors, both white male Australians, played critical roles in her successful transitions. They consistently inspired her to be independent and offered positive feedback and constructive suggestions. Jie described them as quite tolerant with her. “Sometimes they would say I am too proactive... I might have asked for their opinions before I tried,” Jie could not help giggling (FG). But by the third year, “now they trust me to be in charge of my own research” (IV) by only holding monthly meetings for most important issues, such as a final design or funding input. Jie thought it was fine to have the reduced frequency of meetings for two reasons: one the
supervisors were always approachable via emails, and another her growing confidence in leading the research.

Jie’s main supervisor was an authoritative figure, guiding the general research directions in her PhD. Critically, he took Jie to a top research centre in Germany to expand her vision and networks in her first year of PhD. This experience laid the foundation for the later in-depth collaboration on highly challenging experimentation, which advanced Jie’s original doctoral project design to a more cutting-edge frontier. Jie acknowledged that,

*The resources gained through the multi-national cooperation are invaluable. These opportunities allowed me to expand my academic network, familiarize myself with different techniques, and more importantly, different ways of being and doing as a rigorous researcher. These are extremely important for my growth.* (IV)

Jie’s second supervisor helped with technical details. He facilitated Jie with her first experimentation and added another student in Germany into the team for the second. The work generated two high-impact publications, a third one in draft, and a fourth one in plan in her third year (IV).

By the beginning of the third year, Jie’s output, both in quantity and quality, was sufficient to complete the degree. But on thinking it over, she initiated the challenging experimentation mentioned earlier, “which has been hypothesized for more than a decade, but still left undone because it’s difficult” (IV). Her interest was due to the closeness of this hypothesis to what she has been researching. The project involved three-party collaborators from another Australian laboratory and the German laboratory she visited, comprised of several renowned professors and their students.

As the initiator, Jie became the leading investigator in the project. She described her supervisors and other collaborators as reliable and trusting. However, as a PhD student, she felt there were many things beyond her control, such as funding and the need of a postdoc to be in the team. She also felt stressed when the progress did not meet the milestones, and in particular, when she had to work alone in her laboratory most of the time.

*I am mostly working on my own. I wish I could have more experiences. I know I’ve improved a lot, but I could have been better.* (IV)
Jie was used to working ten hours a day, five days a week, but with the newly initiated project, she invested the ten hours without a break, at least six days a week. “I used to invest 80% of my energy, but now it’s 120%, and I will invest more when the experiments start” (IV).

The mutually valued passion, dedication, motivations, and expectations underpinned Jie’s congruence and managed transitions to cross boundaries in research.

**Crossing boundaries in academic writing**

As a novice researcher who had never published before, scholarly writing was another boundary Jie had to manage. She exhibited strategic skills in autonomous learning and getting the most out of the supervisory feedback. Jie started with analysing the structures and the syntax of high-quality publications in the field. Upon realizing while Chinese preferred to write in a modest way, westerners would go directly for the logic, she modified her own writing following the structures identified through analysis. Then with supervisory comments, she noted down frequently made errors to be avoided next time. “The errors have patterns. Keeping away from those patterns helped me improve my writing” (FG).

Though Jie identified differences in writing between Chinese and western norms, she attributed her quickly improved academic writing proficiency to her strong foundation in Chinese writing. When she applied her Chinese writing skills to English, she found it was successful in many aspects, such as how to present and describe.

Furthermore, her supervisors’ positive feedback enhanced her confidence. Jie revealed that when she submitted her first draft of proposal in the sixth month of PhD, the supervisors told her she was better than most of the international students; then when she sent them the first paper draft in the 12th month, their comment was the writing was already “very good” (FG). These positive experiences, in aggregate, helped her cross the boundaries of academic writing for publication, which is a crucial component in the growth and the establishment of a competent researcher.
Crossing sociocultural boundaries

As an east-Asian student in Australia, Jie was also successful in managing her transitions across sociocultural boundaries to create congruence between her multi-worlds. Jie considered communication with different people(s) was important for the success of her PhD. Her philosophy was 求同存异 (seeking similarities while maintaining individual differences) in dealing with cultures and human relationships. As an international doctoral student in STEM fields, the cultures and human relationships were multi-dimensional, not necessarily limited to the host cultures.

Jie mentioned that she had to communicate with various others in her research. Jie well recognized that supervisors’ guidance could speed up the research. Similarly important were her fellow doctoral students and postdocs in the team. In Jie’s school, there were about 80 PhD students, roughly about ¼ Chinese, ¼ Iranian, ¼ Australian, and ¼ from other countries and states. She was aware that some Chinese students only hang about with Chinese fellows only. “That’s okay.” In practice, she approached those that could best facilitate her to progress the research regardless of ethnic background. Jie stressed the importance of communicating and negotiating with other students and postdocs to work with her on her experimentation, which normally requested several persons in close collaboration for operation.

They all have their own expertise. Even though I could rely on myself for solving problems, if there is someone to help, the research might progress much faster. (FG)

Besides, the others included peripheral but critical personnel in supporting Jie’s experimental needs, such as technicians, accountants, and external suppliers. Jie realized the importance of maintaining a sound relationship with these people. For example, technicians in workshops were supposed to be supporting researchers by processing materials for experiments, but Jie found that “if you communicate with them well, they will process your design super-fast; otherwise it is common to delay a couple of months” (IV).

To create a harmonious relationship with people around, Jie had been active in organizing activities, such as sports or fun games. For example, she organized a game at the “Escaper’s Room” between technicians and PhD students.
Technicians often say PhDs are dumb, which was why I organized this game. They lost the game, but everyone enjoyed it. After the game, we went to a pub to have a drink. (IV)

Jie revealed that she was the only Asian student in her school who would go to pubs with Australian and European peers after sports or games. When she attended conferences, she also went to pubs with her supervisors and peers in the evenings. Jie sensed the Australian’s easy-going characteristics through this special form of socialisation.

For Australians, when I drink with them, they were very surprised because there have been few other Asian students who would join them for a drink. In fact, even if we do a little bit in their culture, they would feel “Wow, you are so Australian!” (IV)

When Jie mixed well with others in the school, she found herself being amused. For example, she realized that the staff members and students all enjoyed gossiping. “That’s human nature. It’s the same everywhere in the world,” Jie smiled. She was amused to find that these technicians had endless interest in cars. Jie enjoyed chatting and laughing with them. She considered this as a relaxation to her intensive research work. Jie agreed with her supervisors’ philosophy, “work hard and play hard” (IV).

In addition, Jie had been consistently involved with volunteer work and community services. Besides helping with tutoring Chinese-Australian students in the Chinese community, Jie also visited local aged care villages every two weeks, where she enjoyed communicating with old people with different cultural backgrounds. She was surprised to find “that lady from east Europe still struggles with her English after living in Australia for over 60 years” (FG). Jie took it as a beneficial experience for herself where she could “learn about different life stories” (FG). These experiences to be in contact with the multi-cultural society and life experiences seemed to have better facilitated Jie to cross sociocultural boundaries in the novel context.

**Crossing gender boundaries**

Jie was the only female among 10 PhD students in her office. As this was a typical situation with engineering disciplines, Jie expressed that she had been used to it since high school in a science class and the undergraduate years in the engineering field,
Nothing's really special. Probably because I am a girl, they are nicer to me. When I organize games, all the attendees are boys. We all like playing games.

Jie considered male students were like never-grown-up kids, excited with games, airplanes, science, and metals. She enjoyed the time with them.

**Crossing socio-emotional/psychosocial boundaries**

So far, it appeared that Jie was at ease in managing transitions across her research and social worlds, but her reflection on her PhD process revealed it had not been easy,

> A PhD candidate always swings between feeling confident and feeling not confident; likewise is your self-evaluation. The emotions change from day to day, from hour to hour, just like taking a roller-coaster, with its ups and downs. (IV)

Jie’s congruence with her PhD peers as well as her supervisors appeared to have facilitated her transitions across socio-emotional and psychosocial boundaries. She was sure that “the motivation had always been there in existence” (IV), but in the duration of the PhD, very often she had moments of feeling stressed and frustrated. When she turned to other peers in those moments, she realized everyone in reality experienced similar emotions and similar situations. Such moments kept repeating, but each time after talking with her peers, she felt relieved and comforted. This point was important because if she had not have done this, she might have felt more stressed, and the stress might have continued to accumulate.

Occasionally, Jie talked with her supervisors about her slow progress and frustrations. She described that her supervisors dealt with such situations by reminding her of her performance and achievement. “*They gave me positive and specific examples such as ‘your writing is of high quality’, ‘you just had another publication’, or ‘your research competence has improved’* (IV)”. The supervisors’ positive comments appeared to have effectively facilitated Jie to renew her confidence when encountering setbacks or low periods (field notes).

Over the years of PhD, Jie had gradually become independent in solving problems in her research. With accumulated confidence and trust with her supervisory support, she had learned to face the setbacks and challenges with calmness, investing her time and energy on solving problems instead of staying low or being grumpy.
A congruent family that crossed socio-financial boundaries

Familywise, Jie’s parents seemed to have a reciprocal sense of happiness and pride from her achievement, since they were the only family in the village that had a child who had gone so far to a PhD abroad, the highest possible degree in all study levels, and the best opportunity their fellow villagers could imagine. Jie’s scholarship and promising future also relieved her family from financial concerns. In the interview, Jie happily and proudly talked about her parents contributing financially to upgrading their home village. Her parents voluntarily led fellow villagers to pave roads, laid water pipes, and upgraded the village’s image to attract tourists. Their positive social engagement passed back a positive message to Jie, making her feel reassured while studying abroad,

Parents have a great impact on children. If they are happy, at least I do not need to worry. (IV)

When Jie completed her PhD on time with six academic publications and three conference papers, she became an Endeavour Research Fellow which allowed her an opportunity to work with a high-profile figure in her field in another top university in Australia.

Summary

Though experienced various borders across her multi-worlds, Jie managed to create congruence with her small cultural research and social contexts over time. As the first child in the village to go to a university, Jie considered each day in her PhD abroad as a win in life. While dedicatedly investing herself in the PhD, she took the initiative to communicate with different people in the novel sociocultural and research contexts, which effectively improved her competence and advanced her research to a high level. Jie’s effort in integration was well recognized in return, generating her successful on-time completion of the PhD and an academic career.
Chapter 8 Different worlds & Border crossings managed

Introduction

This chapter examines the fourth pattern of students’ multi-worlds and transitions, with a narrative in the second section to illustrate. In this category, motivations, values, beliefs, and actions between students’ research, personal, and social worlds had some critical differences, which led to conflicting ideas, attitudes, and behaviours that constrained students’ PhD progress. However, in general, the conflicts were able to be put under control, and the transitions were managed to achieve the PhD and personal growth. This is a complicated group to elaborate because of the diversity of differences and transitions with individual approaches in different situations over time.

The cross-case analysis

Nine out of 38 (ST2, ST8, ST10, ST14, ST16, ST21, ST22, ST27, and ST29) participants were classified into this category. By the time data collection concluded, five (ST2, ST8, ST10, ST21, and ST22) had completed their PhD and remained in academia, one in Australia, two in China, and the other two in other countries. Rather than separating motivations and influences before the PhD as an individual part, this section will combine them with the PhD abroad experiences to pinpoint motivations and their effect across and over time.

Differences across the worlds

For this group of students, the study identified manifold key differences across their multi-worlds. These differences were identified to have a profound impact on students’ experiences of doing a PhD abroad. Table 8.1 is a summary of differences in expectations, motivations, values, and beliefs across students’ multi-worlds, which is also used to structure this section.
Table 8.1 *Differences across the worlds in Different worlds/ Border crossings managed*

<table>
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<tr>
<th></th>
<th>ST2</th>
<th>ST8</th>
<th>ST10</th>
<th>ST14</th>
<th>ST16</th>
<th>ST21</th>
<th>ST22</th>
<th>ST27</th>
<th>ST29</th>
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<tr>
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<tr>
<td>Lack of team support</td>
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<tr>
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<tr>
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<td>✓</td>
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<tr>
<td>Lack of intrinsic motivation</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Miscommunication</td>
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</table>
Expectations and realities

To begin with, unmatched expectations were paramount. Among the nine students, 2/3 students had not expected their PhD projects were outside of the supervisors’ professional expertise (ST2, ST10, ST14, ST21, ST27, ST29), and over 1/3 students found their research interest was different with that of their supervisors (ST8, ST10, ST21, ST29). Also, some students in this group did not expect there would be a lack of senior peer support or team support in research (ST2, ST8, ST10, ST14, ST21, ST27, ST29), a shortage of research resources and funding (ST2, ST8, ST10, ST14, ST29), or a lack of supervisory support (ST2, ST10 ST14, ST21, ST29).

When applying for a PhD, ST14 was attracted by this particular supervisor because the latter had two national grants in a cutting-edge area in which ST14 had been interested. Unexpectedly, after commencement, he realized this supervisor did not have the theoretical foundation, methodological knowledge, or hands-on experience that would support supervision on the research. Those PhD students and postdocs who had been undertaking the projects in practice had all left the research centre before ST14’s PhD. Hence ST14 indicated that he was the only researcher to undertake both projects during his PhD, and was without a supervisor or senior peers who could pass on accumulated knowledge to him.

*My supervisor’s job is mainly to get funding, but he does not have much groundwork in this area. Basically, I have been on my own.* (ST14, Year 2)

Likewise, ST27’s supervisor used to have a grant which enabled the recruitment of one postdoc, one PhD, and one master’s. With the output of these three researchers, the supervisor received a second grant which was used to recruit ST27. However, when ST27 started his PhD, he became the only researcher for the project because the other three had left, which left him in the situation where he had to work alone.

*My supervisor, in fact, did not have much experience with the project. She applied for the grant but was not the person who did it. Those three researchers used to form a team, but now I am the only one working in the lab.* (ST27, Year 2)

In another case, ST10 ended up with a topic out of his supervisor’s research expertise and interest. When ST10 commenced his PhD immediately after undergraduate study,
he was not so interested in the first topic his supervisor suggested. They attempted a second topic, but the proposal failed to pass the confirmation of candidature. ST10 was given three months to resubmit. The third topic that he chose by himself did get him through, but then his PhD became overly difficult because his supervisor was not familiar with the topic:

After I changed the project topic, it was really a low period. Nothing was there in the lab. My supervisor knew nothing more than me... He kept telling me things like this were risky and it might get worse. I totally got lost. (ST10, Year 2)

ST10 indicated that for about a year after the confirmation of candidature, he had to struggle all by himself and from scratch. It appeared this was a situation he had not expected before the PhD, but it made him feel confused and baffled throughout the PhD.

Intrinsic motivations and the demand of a PhD

Second, the lack of intrinsic motivations made a difference. This study found for several students (ST8, ST16, ST22, and ST27), intrinsic motivation for research was not the major drive for doing a PhD abroad, which created problems at least at the initial stage of their PhD.

In one case, ST16 expressed that he perceived PhD study as a job because his motivation was mostly out of financial and career considerations. Initially, ST16 came to Australia in the third year of undergraduate study on a joint international programme, for which his parents had paid a substantial amount of money for his two years as an international student. Caring about his parents, ST16 did casual jobs, but it was a difficult struggle for him to maintain high achievement. Very often he was full time on campus during the day and then worked overnight in a fast-food restaurant. “It was not a life. I just committed myself to something I had to do. I did not want to fail my parents’ investment.”

Then when ST16 qualified for a PhD and a scholarship for tuition to do a PhD in the same Australian university, he applied without hesitation. “Now I need not rely on my parents’ financial support. I could be financially independent. That’s awesome.” He also recounted that after gaining a bachelor’s degree he had wanted to find an
appropriate position but couldn’t. Therefore, ST16 took doing a PhD as the best option for him in achieving both financial independence and career development.

However, ST16 did not prepare himself well for the high demand of the PhD. After commencement, he took doing a PhD as a job during the day. He maintained his casual jobs outside the campus to make his living because his scholarship only covered the tuition fees. Very soon, ST16 found it was difficult to satisfy the supervisor with his PhD progress. He had chosen his doctoral supervisor out of the lecturers in his undergraduate study because he perceived this teacher’s personality as “nice”. Now that as a PhD student, he felt this supervisor was too strict and “like a different person”. He also realized it was highly challenging to meet the demands of research to achieve his PhD degree.

In another case, before the PhD, ST8 had an impression that a PhD certificate could help him realize the dream to be a teacher. He discovered later in his PhD it could be over-qualification because his dream was to teach in a high school rather than in a university. Since then he was demotivated towards achieving his PhD.

When I was young, I wished to become a teacher. I thought I could become a teacher after a PhD. But after a few years in PhD I found teaching in a university was not the type of teacher I wished to be. I just wanted to teach in a high school, and it does not really matter if I have or have not a PhD. If I had known this before, I might not have done my PhD. (ST8, Year 4)

In a third case, in the second year of postgraduate study, ST22 decided upon pursuing a PhD in Australia just to be with his girlfriend who was doing a PhD there. He was sad that their relationship was broken right before ST22’s arrival. As ST22 was not particularly motivated to do his PhD out of his own interest, he found himself emotionally lost for quite a long period after the commencement of the PhD abroad.

Values, beliefs, and communication

Last but not least, differences in values and beliefs led to different behaviours and understandings about communication. Consequently, these differences resulted in under-communication (ST2, ST14, ST16, ST27, ST29) and miscommunication (ST10).
ST2, ST14, ST16, and ST27 shared some similarities in under-communication with their supervisors. Taking ST2 as an example, he expressed that he could not argue with his supervisor when differences emerged. ST2 started his PhD with a topic that the supervisor had approved. However, the supervisor asked him to change the topic after several months without giving him an explicit reason. “Probably it’s funding or some other reasons. Maybe he just wanted to expand a branch,” ST2 seemed still not sure about the reason to change a project even in his third year of PhD. “I tried to argue, but it’s useless, so just let it be.” ST2 reflected that after several failed attempts to argue, gradually he would not do that again.

This “let-it-be” phenomenon, or becoming silent after a few trials of failed argument, was also salient in several other cases. In conducting the experimentation, ST16 gradually stopped trying out his own ideas but passively followed his supervisor’s instructions. He attributed that to “the difference between us.” The difference appeared to be that ST16 did not sufficiently express his own ideas, so the supervisor had to tightly follow up to push the experiment forward. In turn, this brought on ST16’s frustration and dissatisfaction, but it appeared he did not communicate how he felt with the supervisor.

Our communication is not too bad, but not too good as well. Sometimes I wanted to do something else, but he asked me to try out his ideas. I know it won’t work, but he won’t stop pushing me until I show him the failed result. That’s the difference between us. Now I understand that’s something I have to do anyway even though I am quite sure it won’t work, and even though it’s just a waste of time. (ST16, Year 2)

Worse than under-communication was miscommunication. This caused serious trouble for ST10 and his supervisor. In ST10’s situation, when the second topic failed the confirmation of candidature, his supervisor’s intention was to pick up the first topic, but somehow ST10 mistakenly thought his supervisor’s intention was to rely on himself to find a new topic that could pass the committee’s assessment. ST10 indicated that due to lack of communication, he was never aware of the supervisor’s real intention until a casual conversation in his fourth year of the PhD. ST10 attributed this miscommunication to his supervisor’s belief that providing negative feedback was the appropriate way of supervision, but with the constant unfavourable input from the supervisor, ST10 did not catch what he had intended.
The new topic did pass, but ST10 and his supervisor found themselves “*in a situation that neither of us understood anything about it.*” It seemed that his supervisor, an early career academic who was born and grew up in a suburban area of the city, attributed this to the student’s cultural differences.

*Sometimes my supervisor complains that he could not understand Chinese students’ way of thinking, saying they tend to keep things to themselves rather than express directly.* (ST10, Year 2)

Although this “*keeping-things-to-themselves*” phenomenon was described by some participants in their observations of some other Chinese students, there was not much evidence to show that students in this group were encouraged to articulate or to communicate. As ST10 indicated, his supervisor only provided negative feedback to whatever he proposed. Presumably, after several such attempts, ST10 felt timid or awkward to initiate further communication.

However, not every student believed in or behaved with this “*keeping-things-to-themselves*”. Rather than just listening to supervisors, some students defended their own ideas well. ST21 had a unique experience that he changed his principal supervisor twice in the PhD, and the second time was to defend his own beliefs. His overall experience showed some congruence and some difference with different supervisors.

For ST21, the communication was more related to his values, beliefs, and research competence rather than linguistic skills. ST21 started his PhD in Australia with a topic which extended his postgraduate research in China. His initial doctoral supervisor, a high-profile professor, perceived this topic as highly interesting but did not have specific expertise in this cutting-edge research project. Soon this professor changed himself to be the committee chair and recommended ST21 to be under another supervisor so as to get better supervision. ST21 expressed he highly valued the professor’s proposal and respected the altruism.

Somewhat to ST21’s surprise, the second supervisor did not give him the expected support in research. Till the third year, ST21 had been working on his own.

*This supervisor’s research is a bit related to mine, but she is irresponsible to students, all of her students, not only me. She hardly ever edits students’ writings and does not provide much feedback in research.* (ST21, Year 3)
Despite the unfavorable situation, ST21 strongly believed in the value of his research. Through his dedication to communicating, he successfully convinced his supervisory panel to allow him to proceed independently, particularly when his publications came out one after another. In the interviews, ST21 repeatedly indicated his lack of English proficiency due to his rural background, but he had been persistently learning the language so that it would not become a border to hinder communication with others. In comparison, he was more confident with his academic writing than his oral skills. Overall, when the communication had been smooth, ST21 appeared to be positive with the supervisor and his experiences.

_She did not supervise me in the actual research, but she bought a smartphone for me to do experiments. Now I have all the freedom, and I do enjoy this freedom. (ST21, Year 2)_

However, this freedom did not last to the end of the PhD. In a meeting in the third year, the supervisor asked ST21 to work for a joint research programme with industry. ST21 responded that was not possible because he had already been fully occupied with his PhD project. Afterwards, ST21 recounted this supervisor said to him if he rejected, “she was not sure whether I could get my PhD.” ST21 understood this situation was out of his control, so he went to meet the chair of his supervisory committee. The chair, ST21’s first supervisor, thought this was “unbelievable”. Before long, with ST21’s consent, the chair arranged a change of supervisor, for the second time in his PhD. The third supervisor successfully facilitated his achievement of his PhD.

A different case was ST22, whose supervisor had been encouraging him to articulate his ideas. ST22 indicated his supervisor had seriously examined his proposal upon application. Once started, the supervisor encouraged ST22 to follow the proposal and to follow his personal research interest. The supervisor then guided ST22 to proceed step by step so that the student could gradually build up his research.

_My supervisor first asked me what I wanted to do, putting me at the centre. He said I could communicate with him about anything. He was quite open-minded and was always available... He encouraged me to think independently and to explore the unknown. If I needed his guidance, he would give me that accordingly. If it’s out of his expertise, he will expand his knowledge, or to recommend me to some other researchers. (ST22, Year 3)_
In our first interview, ST22 (Year 2) indicated sometimes he would not speak for days. “I come to the office, sit in front of the computer, and a day just passes like that.” He expressed it was particularly difficult in winter. When the days were short, he had to always walk in the darkness between his accommodation and the office in the early mornings and late nights, “that was when you really felt low.”

However, with the encouragement of his supervisor to be articulate, ST22 seemed to have enhanced self-efficacy in communicating with others. His confidence in articulating his ideas was evident in our later interviews when he talked eloquently for hours. It was also evident in the process of member-checking that he sent me a letter articulating item by item about his concerns about confidentiality. His confidence was also evident when he mentioned how he reviewed journal articles in a robust way to communicate with authors. This confidence in communication seemed to have helped him establish his professional identity.

Noteworthily, a phenomenon of “they would not tell” indicated by ST22 deserves attention. With active involvement with co-national events, ST22 became the president of a local Chinese doctoral students’ association. He perceived that many Chinese students tended to keep the difficulties to themselves while doing a PhD overseas, in particular, they were unwilling to tell their parents back at home.

(A Chinese student) once had a leg injury which confined him to sit on a wheelchair for a few months. She did not tell this to the families back in China. It’s a common situation here. We have another girl in the office, whose boyfriend had promised to come out with her, but then changed his mind. She was very sad and cried a lot, but she would not tell. She just posted in her WeChat Moment that everything would be fine after wiping the tear away, and we even teased that a girl could use tears to de-stress. We were just silly as we did not know what had occurred to her. Yesterday, XX and I just visited a Chinese student in the hospital. He was hurt while playing basketball and was heavily bleeding. We felt terrible, but you know, that’s something he would not tell his families at home. These are the things we would not tell. (ST22, Year 3)

ST22 also referred to some other situations that his Chinese colleagues experienced, which involved burnout or breaking down at work, or feeling scared when being punched for no reason by a stranger on the bus, or when the house had been broken.
into. However, he repeated, “it’s something we would not tell, particularly not to our parents at home.”

Thus far, this part has mainly focused on the differences between students’ personal world and research worlds since the differences, or the borders, had become significantly vital. The differences further prompted different reactions, interactions, and in a few cases, conflicts, which might constrain students’ successful and timely completion of PhD if not appropriately managed.

**Growing out of the differences**

How students in this group managed the differences between the worlds to achieve the PhD and the growth is the focus under examination in this part. Four key aspects that had played a role in their managed transitions were identified as agency, persistence, resilience, and expansion.

**Agency: Make a change**

The agency to make a change was a significant factor that enabled some students in this group to grow and achieve out of their PhD. The changes involved bringing in co-supervisors, a change of supervisors, or seeking resources and opportunities from external laboratories global-wise.

In a situation of a serious lack of supervision because the supervisor was away in another position, ST29 developed his own research interest and research method to apply to his project. While working alone, he dedicatedly explored cutting-edge technologies to use in his research with possibilities of discoveries, rather than just passively following the supervisor’s initial ideas or waiting in vain. Most importantly, he suspended his PhD in the third year to work for a world-class laboratory where he tested his newly developed research method. With high recognition and success, six months later he returned to his PhD with enhanced confidence and competence to complete his PhD.

In another situation of struggling alone, ST14 sought agreement from his supervisor to bring in a co-supervisor from a British university. This co-supervisor was a leading figure in the field and had a well-established team and laboratory to support ST14’s
work. When ST14 got the opportunity to work in the U.K. late in the second year of his PhD, the first thing this professor suggested to him was a drastic amendment to the research design.

*It was a sharp turn from experimentation to simulation. Apparently, it’s getting more difficult. I contemplated the revised design and realized it’s a critical point. If I could make the transition, then there was a promising future awaiting.* (ST14, Year 2)

With the improved research design and adequate support and guidance, ST14 returned to Australia six months later, feeling inspired, motivated and confident to complete the rest of the research.

In a previously mentioned case, when ST21 had the clash with his supervisor, he decided upon a change of supervisor. Although it was already ST21’s third year, he was pleased to have made the change.

*My current supervisor is really nice. He supports what I have been doing and gives me suggestions. This is a new field for him as well, but he keeps learning. I really respect him for this. It’s respectful when a supervisor keeps updating his knowledge.* (ST21, Year 3)

Noticeably when asked in the interview how he appeared so confident after the change of supervisor, he replied that his confidence was out of his independent work, his belief in the value of the research, and the rich outcomes from his work. Besides, ST21 got himself an opportunity to work in a laboratory in Canada for eight months, where he met a team highly experienced in his research project. With enriched knowledge and enhanced competence, ST21 completed his PhD on time, and with several offers in hand he was able to continue pursuing his aspiration in the research.

**Persistence: “I’ll prove he is wrong”**

This study found the determination to be persistent, even with passive interactions in a few cases, sustained the students to get through and achieve. This part will focus on how two students persevered with passive interactions but also with self-determination.

In the previously mentioned ST16’s case, initially, he was not fully dedicated to his PhD. However, with a “pushy” supervisor who was not satisfied with his progress,
ST16 was determined to persist, “Sometimes I didn’t think his ideas were right, but he kept asking how it worked. So I just kept doing, and I proved he was wrong.” The approach he adopted may have appeared somewhat passive, but with small achievements over time, ST16 gradually accumulated confidence and interest. When his supervisor provided small grants for his living stipend, ST16 felt quite proud of himself. “Now things have been getting better, and I’m investing more of myself into research.” (Year 2)

In another case, in the fourth year of PhD, ST27 admitted that he was still not good at seeking help; rather, he would rely on himself in solving problems. He took this as consideration in not wishing to bother others, be it supervisors or his PhD fellows. For example, ST27 had a co-supervisor in China, who was the postdoc conducting the project and then left when the contract terminated. However, except for travelling to China to the co-supervisor’s laboratory, ST27 did not maintain regular contact with him while in Australia. Though ST27 understood the co-supervisor was enthusiastic to help, he had his own consideration, “As a young academic in China, he is already under much pressure, like working six and half days a week... I don’t feel good to bother him too much.” (Year 2)

Not seeking much help from others, ST27 just dedicatedly kept doing, repeating, testing, and repeating the cycle. Still, he did not wish to confront his supervisors even if he thought some of his supervisors’ ideas could not work. What he would do was to provide experimental evidence. Gradually he realized he had experienced growth through this persistence.

I have fortnightly meetings with my two supervisors here. As they did not have much experience, so we would normally have a brainstorm, they threw me lots of ideas and asked me to try them out. I will try those that make sense to me...but this principal supervisor asked me to prove it could not work by rigorous research. This is interesting but it causes much trouble, and there’s time cost. But anyway, he was not wrong in saying that... I grew up along with proving some ideas do not work. Now I’ve turned out to be an expert in this field. (ST27, Year 3)

Both ST16 and ST27 were towards the end of their PhD, though neither of their transitions were smooth. ST27 revealed, “Now I have to redo the experiment in the first chapter. My goodness! But my supervisor kept encouraging me. He might have
worried that I would have broken down before completion." (Year 4). ST27 appeared to have become more resilient from this journey than what his supervisor would have expected. The next part is about this important factor, resilience.

Resilience: “It’s building me up”

The study found in the face of serious differences between students’ personal and research worlds, they commonly exhibited enhanced resilience characteristics to enable their transitions, which further allowed them to grow through the PhD abroad experiences.

With ST10’s situation, he had to cope with an unpleasant relationship with his supervisor, supervisor’s negative feedback, lack of research facilities, and lack of funding. However, he never lost sight of his goal, and never considered he would give up. Below I use his own voice to articulate how he took all the adversities as opportunities to build up himself.

The relationship with my supervisor has not been good, so I may have experienced more difficulties than others. Nevertheless, I might have gained more as well. The inner strength built up through this process will just benefit me in the future. As long as he has not beat me down, as long as I am still standing up, for me, it’s just building me up. Of course, if he beat me down, it would be another thing, but, pity, he hasn’t. What does not kill me just makes me stronger (ST10, Year 3)

My supervisor never encourages me. He thinks encouragement is too polite, so he prefers to stimulate with negative approaches, what he calls negative stimulation. I took a long time to get used to his style of supervision... more than a year. When I had a setback, instead of encouraging me, he would list even more negative possibilities to let me know the situation could get worse. At the beginning my research did not go well, so... Now I am much stronger than before. (ST10, Year 3)

I’ve saved over $10,000 from my living stipend to purchase research equipment. Everything has two sides. After experiencing these things, which could be extremely rare for a PhD candidate, I gained precious asset for my future life. (ST10, Year 3)

The last quote shows that with lack of funding and facilities, ST10 invested his living stipend into his research. While other participants in this study commonly expressed
that their scholarship could merely make ends meet, it is difficult to imagine how ST10 managed to invest such a sum in research. Nevertheless, he remained positive and believed these experiences would become his life asset in the future.

ST10 believed personal effort and independence was most important for his PhD. “This is my project, not my supervisor’s, so I am working for myself, not for him.” With this belief, ST10 immersed himself in the research. “Everyone in the lab works hard; I just worked harder.” A conversation between him and another student (both in the second year) in a focus group may better illustrate his point.

ST10: I normally sleep early and get up early. I come at 9 and go back at 9 or 10.

ST9: (Surprised) Go back at 10?

ST10: About that time. I tried to study when I go back, but it’s too hard. Now I just take a rest when I am home.

Y: So you spend more than 12 hours in school.

ST10: Yes, but you need to deduct the time to have meals.

ST9: But still it’s very long.

ST10: Yes. But most of my experiments are in another campus, so you also have to deduct the time for transportation. The actual working time is rather limited.

ST9: But at least you need an hour to relax when you go back home.

ST10: Basically, I directly go to bed. The quality of sleeping is good.

ST9: Don’t you think after a day’s hard work, you need to reward yourself with something? (Curiously)

ST10: When you get really tired, the only thing you wish to do is to sleep. Nothing else. Sleeping is a reward.

Though here ST10 touched lightly that sleeping was the reward to a day’s hard work, in our last interview after he submitted the thesis, he recalled that many a night he could not help weeping in bed, all alone, after the change of the research topic for the confirmation of candidature in the first year. Tracing back, he spent his high school
years in a boarding school in China, then moved to Australia where he did the last two years of high school, the undergraduate study, and the PhD in the same city. The length of time did not help him to integrate with the local community; instead, most of the time he lived alone, without established social or academic networks in the host city. Leaving the home country while young, he had no social networks at home either. He expressed that he had been used to this style of living alone, but it seemed that he did not have many other options. ST10 started his study abroad journey at the age of 16 and the PhD at 22. Except for his parents’ occasional visits, his supervisor was the only person close to him in life, but it seemed his emotional attachment with his supervisor was complicated, so he would bear the differences and keep things to himself rather than complaining to others.

The relationship with my supervisor has been unpleasant, with lots of problems, but I don’t normally talk about this with others. I feel bad if other people gossip about my supervisor. I can shoulder all of these by myself. (ST10, Year 3)

Therefore, in a situation with a problematic supervisory relationship and difficult PhD research, instead of complaining or giving it up, ST10 consciously chose to keep the challenges to himself and looked for solutions with his dedicated effort.

Expansion: International academic networks

As revealed so far, personal, social, cultural, and academic loneliness which was identified earlier in the second pattern also applied to this group of students. The expansion of academic and social networks, or worlds in the terminology of this study, was the strategy most of them adopted to conquer the loneliness.

In this study, the term external has been endowed with a broad scope. It referred to human and physical resources besides students’ supervisory support, which extended to the faculty, the university, the nation, and then the collaborative global network, featuring cross-border research exchange and people mobility (Marginson, 2018).

Besides the previously mentioned kinds of expansion, such as an international supervisory panel and students moving between different laboratories, this group of students also mentioned internet resources, conferences, cross-disciplinary networks, and co-national networks. ST21 indicated that he used www.researchgate.net where
he was linked with over one hundred researchers. “If I cannot find the solution in literature, I will post the question on the website, where I seek possibilities to cooperate with other researchers.” With an expanded international network and vision, ST21 completed his PhD with academic success and a postdoc position in a highly advanced laboratory in another country.

ST10 also used conferences as a strategy to expand his academic networks. This indeed provided him invaluable borderless support in the world of science. This also enhanced his confidence in research. He completed his PhD on time and with an extended academic network.

*Once I met a student at a conference and he introduced me to his supervisor. This professor was interested and offered me to do experiments in his lab without any charge. (ST10, Year 3)*

Noteworthily, some participants in this group appeared to believe high figures in their research fields were unapproachable. For example, ST10 approached that fellow PhD candidate before meeting that student’s supervisor. ST14 mentioned explicitly about this point.

*My supervisor encourages me to go for conferences, build up networks, and collect good ideas. There are two types of networks, though. One is those among big figures, which could not help us much. Another is peers of the same generation and at the same level, doing similar research worldwide, which is very good for us. (ST14, Year 3)*

The void between these students and high-achieving scholars and researchers was filled efficiently by co-national networks in some cases. ST2 was an active committee member of a Chinese science association, which brought him close to many highly established scholars. When ST22 felt emotionally low at the beginning of his PhD, he joined a co-national academic network, where he grew to be the president, which allowed him ample opportunities to be in contact with high profile researchers. Both of them completed their PhD in the early fourth year and completed with confidence and competence.

With broadened global visions and links to the inter-connected science world, these students’ aspirations for cutting-edge innovation and research became realizable.
expansion to external resources satisfied these students’ demand for facilitation and research infrastructure, and it also reduced institutional pressure on supervisors when students could complete their PhD on time.

**Summary**

Students in this pattern encountered diverse difficulties to achieve their PhD abroad out of differences across their multi-worlds. Some of them found their research topics were out of their supervisors’ expertise or interest, and some experienced the lack of supervisory support, team support, and research resources. A few found it was difficult to meet the intensive demand of PhD research because of their lack of intrinsic motivation in research. In addition, under-communication or miscommunication between supervisors and students made the situation worse. Nevertheless, these students exhibited strong agency, persistence, and resilience to successfully achieve their PhD abroad, and many of them expanded their academic and social networks to help them achieve the goal.
Shu’s experience

Shu’s experience represents the pattern of *Different worlds & Border crossings managed*. With differences in motivations, expectation, values, and beliefs across Shu’s multi-worlds, Shu managed to put conflicting ideas and behaviours under control so as to achieve his academic success and personal growth through three phases by experiencing two small cultures of research.

*Pre-PhD: A selected candidate*

It seemed to be a promising journey before Shu commenced his PhD. In the last year of his undergraduate study, Shu met his supervisor, Professor Ben, when he was on a summer research training programme, organised by an Australia university for selected Chinese undergraduates. As an elite student in one of the top universities in China, he already had a couple of publications and presented in several international conferences out of his involvement in research projects supported by the Department of Education and the university in China. Together with the experiences in the programme, it seemed to be natural that after an undergraduate study he would apply for a PhD.

> When I decided to do a PhD, it’s just flowing with the social trend that thinks it’s the best choice to do a PhD for the best students. It’s also like a self-confirmation that I was standing at the forefront. (IV2, Year 4)

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*Data sources: One focus group interview* (FG) in his early second year; two individual interviews in his early third** and fourth year (IV1, IV2).

*The three participants in this focus group were Shu, Song, and Han. Song was under the same supervisor with Shu, but commenced 1.5 year ahead; Han was Shu’s co-national housemate, same year PhD candidate.*

**Amidst his PhD journey, Shu suspended for six months in Year 3 for a “postdoc” position in a prestigious research centre. The first individual interview occurred a few days before he was accepted for the position.*
He sent applications to several universities in the USA and Australia with higher rankings but was declined. After four months working in an enterprise, he contacted Professor Ben from SRTP and was accepted instantly.

Noteworthily in this process, Shu modified his field from physics to a field combining science and mechanical engineering for his PhD. He admitted that he lacked understanding in the discipline upon high school completion, but had chosen undergraduate physics because he had won several physics competitions while at school. Later he was gradually aware of his personal interest in practical application rather than researching abstract concepts. This conscious realization was one of the drives for his decision to change PhD field to one matching Professor Ben’s expertise and interest.

Familywise, Shu lived in a typical Chinese harmonious urban middle-class context. Although being the only child of the family, his parents lived close to other relatives and maintained a close and pleasurable relationship. After retirement, his parents enjoyed life by travelling, and were also vigorous leaders in community services. “My dad derived great satisfaction in helping others out, so he kept on doing that” (IV1), and “they never felt lonely. I don’t need to worry about them” (IV2). Influenced by his parents, Shu accumulated his philosophical values and beliefs in optimism, positivity, persistence, and benevolence. On reflection,

*The most important lesson my dad taught me was that everything, bad or good, is an experience. What’s important is to learn from the experience. Nothing is really bad. It’s just an opportunity to make you strong. (IV1, Year 3)*

Besides, when Shu applied for his PhD with Professor Ben, he accidentally heard from his lecturers about their long-established collaboration. Hence from every aspect before Shu’s PhD, there seemed to be a promising congruence across his three worlds for the PhD.
The PhD: From incongruence to congruence

Phase I: An unexpected incongruence: From mismatched expectations to a resolute change

The initial mismatches: depreciated confidence

It was after he commenced his PhD, incongruence in Shu’s personal world and research world became unexpectedly salient (Table 8.2). The key points of congruence or difference are shown in italics in the table. Though the value of high achievement in research was the same across the worlds, the situation of incongruence derived from several mismatches between expectations and realities, with the absence of the supervisor as the key reason.

The first mismatch was the expectations for supervisory support. As an undergraduate transitioning to a PhD student, Shu expected to work closely with his supervisor. In reality, he was given a research direction, but left alone to work by himself. In the focus group, Song, another PhD student under Professor Ben, depicted themselves as “academic orphans” due to the lack of supervision. Shu perceived his supervisor as expecting him to turn into an independent researcher by leaving him alone:

My supervisor’s expectation was that you should discipline yourself as a PhD candidate, which means you need to design the project, manage to solve the problems and do the experimentation all by yourself. He thinks that since we are going to become professors in the future, it is our responsibility to develop independently. (FG, Year 2)

This “all-by-yourself” attitude was linked to the reality that Professor Ben had to be frequently away from the campus. The focus group discussion revealed that not long before Shu commenced his PhD, Professor Ben became an honorary professor in another university overseas where he established a new laboratory and a research team with generous funding. This contrasted with the situation in Australia, where his funding shrank dramatically, limiting the research facilities and student facilitation.
Table 8.2 Shu’s multi-worlds (Phase I)

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<thead>
<tr>
<th>Research world I</th>
<th>Personal world</th>
<th>Social world</th>
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<tbody>
<tr>
<td><strong>Motivations</strong></td>
<td>- enriching life experiences</td>
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<td></td>
<td>- self-cultivation</td>
<td>- high respect for PhD at home context</td>
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<td>- improving career prospects</td>
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<td>- cutting-edge research</td>
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<td>- choosing talented candidates</td>
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<tr>
<td><strong>Expectations</strong></td>
<td>- completion of the PhD</td>
<td>- families supportive of personal choice</td>
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<td></td>
<td>- quality research</td>
<td>- science &amp; technological innovation</td>
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<td>- independence</td>
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<td></td>
<td>- completion of the PhD</td>
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<tr>
<td><strong>Values/beliefs</strong></td>
<td>- diligence, focus &amp; persistence</td>
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<td></td>
<td>- innovation</td>
<td>- families optimistic, positive and engaging</td>
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<td>- independence</td>
<td>- rewarding for achievement</td>
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<td>- innovation &amp; collaboration</td>
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<td>- harmonious relationship</td>
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<td>- optimism</td>
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<td></td>
<td>- no time to waste</td>
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<tr>
<td><strong>Actions</strong></td>
<td>- taking the initiative to seek supervision</td>
<td>- fellow PhD students’ network</td>
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<td></td>
<td>- independent learning</td>
<td>- family being supportive</td>
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<td></td>
<td>- discovering personal interest</td>
<td>- administrative staff being supportive</td>
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<td>- taking lessons from peers experience</td>
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<td>- strategic in communication</td>
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<td>- holding ground in negotiations</td>
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<td></td>
<td>- expanding research possibilities</td>
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<td></td>
<td>- supervisor being in control with ideas and directions, but mostly absent in position, not responsive via emails</td>
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<td></td>
<td>- a fellow PhD candidate under the same supervisor showcased the necessity to act differently</td>
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<td></td>
<td>- another fellow PhD housemate introduced the possibility of research with big data</td>
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Consequently, the professor invested himself mostly in the overseas laboratory. For the same project, there was a strong team, structured with postgraduates, doctoral students, and postdocs, in the overseas laboratory, but Shu was the only researcher in the Australian laboratory. He had little opportunity to work with his supervisor, nor did he receive email responses while the supervisor was away. Shu talked about how he approached this situation:

> Everyone works at that side, and I am the only one here. Gradually I am used to this situation. No one could help. It is like this, what you can do is to adjust yourself. (IV1, Year 3)

This adjustment, difficult and involuntary, did not help much with his disorientation, though. For better facilitation, he flew to his supervisor’s overseas laboratory to work for a short period, only to find it was a temporary solution. Most of the time he had to rely on himself. He shared his feelings with Song that they were doing “a fake PhD” (IV1), as most of the time they were at a loss, not knowing exactly the value of what they had been doing, typical of PhD students’ imposter syndrome (Woolston, 2017).

Another mismatch in expectations was the feedback from the supervisor. As a novice researcher, Shu expected to receive positive feedback on his work, which could be a recognition of his effort, or a push to advance his achievement in research. Disappointingly, his supervisor did not offer him much feedback. Shu attributed this phenomenon to the supervisor’s lack of time and the lack of interest in Shu’s research. Shu was initially passionate about his research project, but without constructive feedback and recognition of his effort, his confidence and passion gradually declined:

> Whenever I had an idea or achieved something if it’s not fit in what the team needs, the boss will just ignore. Each time this happens, it’s like a tremendous setback. (IV1, Year 3)

Hence Shu was in a situation without the supervisor working beside him, facilitating his progress, or acknowledging his effort. Towards the end of his second year, he had witnessed his closest peer, Song, complete his PhD, and leave academia and the field on the same day. Influenced by Song’s experience, Shu shared similar disillusion at an early stage of the PhD,
I will not be a professor in the future. My brain is not that good. Something in the industry might be good to me. (FG, Year 2)

It has to be noted that in sharp contrast to the self-blame that his “brain is not that good”, strong evidence from his undergraduate research performance had shown that he was a gifted student. Nevertheless, the lack of support and his friend’s actions triggered his reduced self-efficacy and his interest in a career as an academic researcher.

Taking opportunities to make a change: Revived confidence

While encountering incongruences with the research world, Shu maintained congruence with his social world, which in turn provided opportunities for his growth in the research world.

Shu had two fellow PhD friends that influenced his growth. One was Song (mentioned above) who had worked with him in the same laboratory on a daily basis. They were under the same supervisor but focused on different projects. Song was 1.5 years further advanced in the PhD, and although feeling disappointed, had followed the direction Professor Ben insisted on “because he has a strong personal preference in research and does not like us to do things that he is not interested in” (Song, FG). Song’s situation worsened with major conflicts occurring before his graduation. Therefore, Shu witnessed events that presented the need for him to act differently early in his PhD.

Another fellow PhD friend and housemate, Han, exposed him to possibilities for acting differently. Han’s supervisor, having no expertise in big data but seeing the value of the forefront technology, invited another academic from the faculty of computer science to co-supervise him.

This year, besides the research, most importantly I found my direction. Han led me into the world of big data. I learned some skills through MOOC. This is related to my project, and also will be useful for my future career in the industry. Plenty of resources and platforms I can use via the internet, so that I gained guidance more than that from my supervisor... I can feel the happiness of immersing myself into doing this. (FG, Year 2)
Thus, Shu’s confidence in applying big data to his research was influenced by the experiences of two fellow PhDs (FG & IV1), the first being Han. The second was another fellow engineering PhD student, who applied big data to his pilot research and drafted a paper in the first three months of his PhD. His supervisor, also new to the field, showed great interest in the draft by offering to revise it for publication and encouraged him to pursue the innovative methodology. Nevertheless, Shu’s experience with his own supervisor in applying big data to his research was quite different:

_When I submitted a similar paper draft to the supervisor, the reply was like, “nothing is really novel” or “What’s your point in writing this?” And then...(silence) There are huge differences between teams._ (IV1, Year 3)

Despite the discouragement, Shu believed in this direction and stuck to the application of this transferrable skill into his research. Shu’s sturdy belief stemmed from his involvement with several side-projects. He tried his hands in big data in several projects at international events, from which he developed his critical perspectives to the field. Then he joined an IBM project in machine learning, as the only student in a team full of established academic researchers. “I was a bit embarrassed when others all talking about having this and that done by funding their students (jokingly)” (IV1). In addition, he accepted an invitation from a visiting scholar in his research centre to collaborate on a project using his skills in data mining for analysis. “*It’s a lot of fun. It’s not a big project, but we can co-author*” (IV1).

With the revived confidence in research, Shu was again passionate about his work. “*Basically I have no social activities. Just the lab and the office*” (IV1). Shu also had a clear understanding of what to achieve in his PhD and the future,

_Data mining should be my direction in the future. My PhD project and all other projects are all working towards this direction. Since I am not going to follow my PhD field in future, all that I have been doing focused on two goals: get my PhD, and develop my skills._

It was noticeable that although the PhD field was his personal choice before the commencement, he had adjusted his research direction along the journey due to a couple of reasons. One was the lack of supervisory support which did not allow him
to enjoy enlightening moments in his PhD project; another was his personal judgement and interest in a new scientific technology; and a third was the positive feedback he received from his achievement in big data, which invigorated his confidence.

_Holding my ground_

Most impressively, Shu believed that he should stand his ground ("坚持立场", IV1) when confronted by different ideas from his supervisor. On the one hand, as revealed in interviews, Professor Ben was a passionate and well-established researcher, distracted by multiple positions and heavy workload, but had a strong personal preference in how to develop research. On the other hand, the absence of Professor Ben, in reality, provided Shu with space and time to develop his research methodology combining mechanical engineering, physics, and computer sciences.

Yang: Do you believe the method is feasible?

Shu: I think so. No one has done that before, but my results have been good the past few days. I am feeling like seeing the daybreak. It’s not the method the boss liked, but I have been going too far, no way to return.

Yang: Is it difficult to insist on your own way?

Shu: It’s not that difficult, as the boss is not involved much. But at some critical points, I have to communicate with him for his approval. That’s the difficult part, to hold my ground, to hold my ideas, instead of being led by him back to the starting point. The boss would look at me with his passionate eyes, asking me, “Isn’t this method good?” That’s his original idea. It’s easy to be led away by his passionate eyes. The difficult point is how to use my passionate eyes to counter his passionate eyes, to convince him with my ideas... And he approved, without directly telling me though. (IV1)

As a young PhD student, Shu was courageous in his effort not to follow Professor Ben’s suggestions and insisted on his own methods derived from his personal interest. Shu’s uniqueness was that he not only maintained his standpoint in negotiating with his supervisor, he also maintained the sound relationship by professionally debating with evidence, or challenging his professor’s “passionate eyes” with his own “passionate eyes”. Shu was unyieldingly persistent in and defended his personal interest, which in turn sustained his inspiration, contentment, and passion for research.
even in challenging circumstances. This effort enabled his survival and revival even with the unexpected incongruence which challenged his transitions in the research world.

Phase II: A PhD candidate in a postdoc position: A cherished transition

A critical episode in the duration of Shu’s third year PhD was the opportunity to work in a postdoc position in a top-class research centre (TCRC as a pseudonym). With this position, he applied his knowledge of physics, mechanical engineering, and big data into technological innovation. He had to suspend six months from his PhD, but the successful experience enabled his thriving and enhanced his confidence and passion in research (Table 8.3).

Table 8.3 Shu’s multi-worlds (Phase II)

<table>
<thead>
<tr>
<th></th>
<th>Research world II</th>
<th>Personal world</th>
<th>Social world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivations</td>
<td>- In need of a</td>
<td>- intrinsic motivation:</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>competent researcher for a functional appliance</td>
<td>to work at TCRC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- extrinsic motivation:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a chance to develop research skills &amp; CV</td>
<td></td>
</tr>
<tr>
<td>Expectations</td>
<td>- success in the innovation</td>
<td>- self-improvement</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- a patent appliance</td>
<td>- being supported</td>
<td>high interest in the innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- being recognised as a competent researcher</td>
<td></td>
</tr>
<tr>
<td>Values/beliefs</td>
<td>- enjoy researching</td>
<td>- optimistic</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- collaborative</td>
<td>- positive</td>
<td>families optimistic, positive and engaging</td>
</tr>
<tr>
<td></td>
<td>- harmonious</td>
<td>- proactive</td>
<td>- rewarding for the achievement</td>
</tr>
<tr>
<td></td>
<td>relationship</td>
<td>- diligent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- facilitating</td>
<td>- engaging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- encouraging</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>- recognising individual input in the patent</td>
<td>- enhanced confidence</td>
<td>multi-collegiate collaboration</td>
</tr>
<tr>
<td></td>
<td>- flexibility in work schedule</td>
<td>- enhanced interest in research</td>
<td>recognition of the media</td>
</tr>
<tr>
<td></td>
<td>- value individual contribution</td>
<td>- enhanced research competence</td>
<td>- industrial investment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- accumulating transferrable knowledge and skills for the future</td>
<td></td>
</tr>
</tbody>
</table>
The opportunity came because Professor Ben forwarded a letter to Song, who was about to complete his PhD by then, inquiring if he was interested in a postdoc position in the medical research centre. Song did not meet the required skills for the position which needed knowledge in both mechanical engineering and data processing, so he forwarded the letter to Shu. On checking the job requirement list, Shu realized the transferrable skills he had been self-learning bestowed on him a cutting edge in meeting the requirements. Besides, he highly valued the opportunity to work with the principal investigator (PI as a pseudonym below) at TCRC.

*It’s an once-in-a-lifetime opportunity. Even if I leave academia in the future, I would be proud to have had the experience of working with the PI.* (IV1)

However, Professor Ben was strongly against him applying for the position. Once more Shu was determined to hold his ground (坚持立场). Shu explained to his professor that he would be forever remorseful if he did not try, which allowed the professor to think twice. At this critical stage, Song kept persuading the professor that it was a worthy chance for Shu. “*With the firing from both of us, Professor finally agreed to let me have a go*” (IV1).

With the reluctant approval from the supervisor, Shu strategically prepared his application materials. Besides standard files in the request, he submitted a proposal on how to conduct the project. “*I need to show them what I can do; otherwise I am just a small potato (jokingly)*” (IV1). He was ecstatic when he was notified of his acceptance.

The six months at TCRC further enhanced Shu’s self-efficacy in his research. The environment was friendly and supportive. The PI had a great sense of humour and curiosity, which suited Shu’s characteristics. Other colleagues were friendly and provided much positive feedback on his progress. They offered him flexibility in his schedule. Hence Shu expressed “*I liked the atmosphere in the team*” (IV2).

Consequently, towards the end of his postdoc term, the team put a patent on the innovation, which was widely reported by the media and attracted industries to commercialize. Due to his contribution, Shu was fully recognized by allocating the highest personal share in the patent. As a further gesture of recognition, he was offered a part-time contract when he transferred back to his PhD candidature.
It’s great fun, and there’s that sense of fulfilment. My colleagues recognize my achievement. I always work out something new to satisfy their needs, which in turn brings back more positive feedback. I really enjoy working there, though that makes my schedule extremely tight. (IV2, Year 4)

Shu put great emphasis on the role of feedback and recognition that he received in his postdoc position. An enhanced belief upon the completion of the postdoc was that it was essential to improve his transferrable skills for future development, whereas the knowledge he was gaining through his PhD project was not very applicable in the real world. Evidence has shown this belief being enhanced by the two very different small research cultural contexts.

**Phase III: Resuming PhD: An unexpected congruence**

When Shu resumed his PhD, he experienced a period of anxiety on how to complete his degree on time. The scholarship would sustain him for another 1.5 year, and he had no wish to extend. Unexpectedly when it came to the fourth year, Professor Ben shifted his focus onto Shu’s project, leading to congruence between their minds (Table 8.4).

This was the first time Shu felt “my PhD is like a PhD” (IV2, Year 4). Shu explained the shift was due to some practical reasons, roughly because the professor needed solid outcomes in Shu’s research for industrial application. The supervisor started to meet Shu more frequently and offered him constructive feedback. Shu acknowledged Professor Ben’s research competence and knowledge, so it was a relief for him when the professor began to invest time in his research.

*All of a sudden (about two months ago), the boss started to push me in this direction. At least now I could have some feedback because he is investing his time... Before it was my own thinking, now it’s two persons’ thinking. It was strenuous, but I feel good. As long as the research could go on well, everything is fine... Indeed there’s not much change, I am still doing what I should do. The work remains with the same efficiency, but with more feedback and discussions. The key is whether he is interested in my research... Now that he is working with me, he knows what and how much I have done. Maybe if he is satisfied, I can graduate a bit easier. (IV2, Year 4)*
Table 8.4 Shu’s multi-worlds (Phase III)

<table>
<thead>
<tr>
<th>Motivations</th>
<th>Personal world</th>
<th>Social world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research world I</td>
<td>Personal world</td>
<td>Social world</td>
</tr>
<tr>
<td>- facilitating PhD completion</td>
<td>- completing the PhD</td>
<td>-</td>
</tr>
<tr>
<td>- completing the PhD</td>
<td>- completing the PhD on time</td>
<td>-</td>
</tr>
<tr>
<td>- accumulating transferrable</td>
<td>- families</td>
<td>-</td>
</tr>
<tr>
<td>knowledge and skills</td>
<td>optimistic</td>
<td>-</td>
</tr>
<tr>
<td>Values/beliefs</td>
<td>- positive</td>
<td>-</td>
</tr>
<tr>
<td>- achievement</td>
<td>- proactive</td>
<td>-</td>
</tr>
<tr>
<td>Expectations</td>
<td>- optimistic</td>
<td>-</td>
</tr>
<tr>
<td>- solid research output</td>
<td>- positive</td>
<td>-</td>
</tr>
<tr>
<td>- completing the PhD</td>
<td>- proactive</td>
<td>-</td>
</tr>
<tr>
<td>Actions</td>
<td>- optimistic</td>
<td>-</td>
</tr>
<tr>
<td>- supervisor invested</td>
<td>- families</td>
<td>-</td>
</tr>
<tr>
<td>more time into Shu’s research</td>
<td>- positive</td>
<td>-</td>
</tr>
<tr>
<td>- confidence in completion</td>
<td>- positive</td>
<td>-</td>
</tr>
<tr>
<td>- persistent in completion</td>
<td>- proactive</td>
<td>-</td>
</tr>
<tr>
<td>- accumulating transferrable</td>
<td>- families</td>
<td>-</td>
</tr>
<tr>
<td>knowledge and skills</td>
<td>- positive</td>
<td>-</td>
</tr>
<tr>
<td>- accumulating awards and</td>
<td>- families</td>
<td>-</td>
</tr>
<tr>
<td>publications for CV</td>
<td>- positive</td>
<td>-</td>
</tr>
</tbody>
</table>
| Noticeably, Shu’s attitude at this point presented a note of passiveness, which was in sharp contrast with his personality of being proactive and positive in making decisions, initiating changes, and holding his ground. He perceived that the knowledge he gained through the PhD was unlikely to be used in his future, even though the future was yet to come. It seemed to me at this stage it was likely that he would leave his doctoral field upon graduation (field notes). Shu had prepared himself for a change in field with his transferrable skills, which could bring him broader opportunities. Most importantly, the external opportunities helped him to maintain his confidence, passion, and aspiration in technological innovation.

Yang: So you’ve experienced the most challenging situations.

Shu: The most challenging situation is the next one (smile). Forever the next one. I was anxious a while ago, as the deadline for graduation was approaching, but the outcomes were not sufficient yet. When I talked with my parents, they reminded me
欲速则不达 (haste does not bring success). Now I believe if I make each step solid, when I can graduate, I will. (IV2)

The transitions from unmatched expectations to the matched one took a long time, far beyond his locus of control, but enabled his transformation, or personal growth in the journey. As revealed in the last interview, he was still a promising candidate to complete his PhD in 3.5 years (excluding the six months suspension for the postdoc position). What distinguished him was his consistency in proactively being engaged in research opportunities, holding his ground, and strategically preparing for the future. The emotional support and psychological guidance from his parents were also important in underpinning congruent social and personal worlds.

**Further notes: “将心比心” (I can feel how he feels)**

On scrutinising our conversations across three interviews, Shu consistently presented strong values and beliefs in positivity and empathy, “将心比心” (IV2). It was impressive that he disclosed the realities and interpreted the adversities with a great sense of humour and a smile rather than a bitter complaint. Typically, he valued his experiences, setbacks, ups, and downs, for his personal growth. For example, “the two years being left alone was the time of freedom to develop my personal interest” (IV2). In comparison with many other PhD candidates who would not have given a second thought if there were opportunities to choose supervisors again (Woolston, 2017), Shu had been empathetic and sympathetic with his supervisor:

> It’s the economy here impacted his funding... He’s really passionate about scientific research, more than his love for his wife... He always tells me that one has to focus on one thing... When I am exploring data processing, I feel that contentment my supervisor feels with his research. (FG)

> The professor has full-time doctoral students in both sides, which is a huge workload on him. And he has to apply for grants from both governments, teaching at both universities, which are really exhaustive... I can see he is really busy. Though we cannot have much of his support, he is indeed under so much pressure. (IV1)
His understanding for his supervisor developed over time by applying his positive evaluation to the realities, and applying his agency and proactivity in solving problems along the journey:

Maybe it’s just me having a good pair of problem-picking eyes, identifying that the boss is not the one expected, the team is not the one expected, the project is not the one expected. But everyone has problems. It’s not good if wasting time on frustrations and worries. We need to stay active and keep learning, no time to be idle. (IV1)

PhDs have this or that adversities and setbacks. Few could go along just smoothly. People imagine PhDs are living in the ivory tower, but the reality is not like that. The best thing with this professor is that he makes sure his students can graduate, which is not the case with some other supervisors. (IV2)

By being empathetic with others’ stresses and challenges, Shu did not become disillusioned with his own challenges; rather, he built up a cheerful resilience and confident inner strength. For example, he used his “passionate eyes” to counter his professor’s “passionate eyes” when defending his research perspectives. He remained optimistic and hopeful, looking for solutions and breakthroughs in adversities, which echoed the Chinese philosophy, “Reverse is the Way”.

**Summary**

Though with an expected smooth transition due to prior contact before PhD, Shu experienced an unexpected incongruence with his research world due to the absence of supervision. Notwithstanding the challenges, Shu achieved his exceptional growth with a cheerful resilience. Taking opportunities of working with other co-national PhD students and visiting fellows in the laboratory, Shu followed his passion for exploring his research interest and other transferrable skills. Further, he received an opportunity to work at a top research centre, where his competence was fully recognized and acknowledged. Six months later, Shu returned to the PhD with renewed confidence and composure. Shu found his supervisor started to invest time in his research, so Shu was confident in the successful completion of his PhD. Overall, Shu managed his difficult transitions across worlds with strong agency, empathy, optimism, and positivity.
Chapter 9 Different worlds & Border crossings difficult or resisted

Introduction

This chapter presents the fifth and the sixth patterns and two corresponding narratives. In both categories, motivations, expectations, values, beliefs, and actions were different in some respects across students’ multi-worlds. Differences led to conflicting ideas, attitudes, and behaviours. Conflicts remained unsolved, leading to escalated complications. In the fifth category, students adapted to the differences and completed the PhD, but with negative emotions, both leaving the research world afterwards. In the sixth category, the student resisted adapting and dropped out of the PhD programme. The two categories were combined because of their many shared similarities. Students categorised in other groups may have had similar challenges to the students in these two categories, but were able to effectively manage transitions. This chapter examines the constraints that made border crossing difficult or resisted.

The cross-case analysis

Two participants, ST28 and ST31, out of 38 were classified into the Different worlds/Border crossings difficult category. Only one student, ST12, was in the Different worlds/Border crossings resisted category. These three participants encountered some major challenges that constrained their PhD, but with different facilitating and personal factors, they ended up differently. This study does not claim the representativeness of the attrition rate due to the small number of participants, though this study does find quitting the PhD is usually out of the question among CIDS population.

Pre-PhD: Motivations and influences

For motivations and influences before the PhD, these students did not distinguish themselves from the majority of participants in this study. ST28 commenced the PhD after his undergraduate study and ST31 after a postgraduate programme. Both of them
studied in top research-intensive universities in China. With prior outstanding academic achievement, they were selected for a PhD in Australia with full scholarship support, one by the Chinese Scholarship Council, another by the host institution.

In comparison, ST12’s motivation to do a PhD abroad was mostly out of family and peer influences. She had cousins studying abroad, one of whom did a PhD in a US university. She also had high school and undergraduate peers who studied abroad after graduation. Being the only child in an elite middle-class family, ST12 explained that study abroad was something definitely about to happen. The only question was when. Her parents wished her to stay at home for a longer period so that she could be more independent while abroad, so she did not start to plan for a PhD abroad until after her postgraduate study.

Between ST12’s PhD and postgraduate study, she worked in a company for a year, and then she moved to another city to get married. There she used a study abroad agency to help her with the application. However, it seemed the agency provided incorrect information, so she ended up with a package of a language course and a postgraduate study program when she landed in Australia. With the help of a student assistant she transferred to a PhD, but for some reason, she had to withdraw and restarted her PhD in another university. She was a self-funded international student in this process and her PhD.

Though the three students had different motivations and influences before their PhD, they were all high-achieving in their previous academic studies and started the journey with hope, aspiration, and determination to achieve the PhD.

**The PhD: Difficult transitions across differences**

The three participants in these two categories have three commonalities that constrained their transitions across the personal and research worlds: diminished motivations, the endangered rapport, and major confrontations that ensued. These three aspects were interwoven, situative and developmental over time.
The diminished motivations

The study found these students’ diminished motivations were related to the disregarded research interest, insufficient support, ineffective communication, and lack of positive feedback in response to their investment of dedication and effort.

ST28 experienced all these difficulties. At the commencement of the PhD, ST28’s supervisor persuaded him into a project and supposed the student should find it interesting, “but he never asked whether I thought it was interesting or not.” Very soon the supervisor left for an overseas position. Without much prior research experience and without the essential supervisory facilitation to put him on the track, ST28 described himself as “an academic orphan”.

_He gave me a very broad project and left me alone. I got totally lost in the direction... Based on his decades of experiences and knowledge in the field, the boss felt there should be a breakthrough point, so he asked me to follow this direction. But he did not show me how to reach that top research level from my undergraduate level. It was just too high for me to reach._ (ST28, Year 3)

The disillusion out of the long-term suffocating struggling with the research project seriously demotivated ST28 in the process. What made him more frustrated was that his ideas were not recognised, and his research interest was out of the supervisor’s consideration.

_He would say you can do whatever you like to, but... he is not happy if you do things not within his interest, as he just pushes you to follow his interest._ (ST28, Year 3)

ST31 also had these demotivating difficulties but in a different way. At the initial stage, ST31 had already felt his supervisor was not clear about how to implement the research design of his doctoral project and conduct the experiments. Some of their ideas were conflicting or contradictory. In such situations, his supervisor asked him to comply with her ideas without further communication and negotiation. Gradually, ST31 found that he lost trust in his supervisor, feeling frustrated and demotivated, but he was determined to be dedicated and focused in the first year of PhD. However, when it turned into the second year, ST31 indicated he was entirely demotivated when his supervisor suddenly changed the plan and requested that he write a traditional thesis to complete his PhD instead of by publications. It was a shock for ST31 because
the original plan had always been to complete by publications, and ST31 had been eager to have publications to build up his academic background for the future career.

When it turned the second year, she asked me to write a traditional thesis rather than papers. I could not understand. She explained a publication needed to wait for half a year to one year, so she could not guarantee. I was even more confused. That was only the beginning of the second year... but she insisted on that. That was when my motivations were completely wrecked. (ST31, Graduate)

What demotivated ST12 was her supervisor’s continuing actions to change her research topic. ST12 started her PhD with a project she was interested in. The application proposal had been approved by her supervisor. However, after a couple of months, this supervisor asked her to change the research topic because the first one was “meaningless”. After the confirmation of candidature, ST12 had to change to another research topic because her supervisor repeatedly indicated that the second one was “highly risky”. With the third topic, ST12 worked dedicatedly till the end of her first year. Then her motivations collapsed when her supervisor refused to sign her annual report and requested her to change to another topic because the third topic was “hopeless” and “meaningless”.

He kept saying my project was meaningless. This was a topic he approved less than half a year ago. And he refused to sign on the annual report. It was really depressing. That was the day I made the decision to change to a master’s. I just wanted to finish everything here as soon as possible. (ST12, downgraded)

The endangered rapport

The study found a lack of effective communication and a lack of support in particular endangered the rapport of the supervisor-student relationship. Students in these two categories all reported their supervisors did not listen to their voices.

For ST28, initially, he was proactive in seeking supervisory support. Several months into his PhD, ST28 found he had been left alone in the laboratory, so he followed the supervisor to the overseas university and worked there for four months. However, although ST28 took the initiative to establish the rapport, it seemed his effort was unilateral.
I wished to have regular meetings with him. I tried to make appointments with him to discuss my research... I went to him to ask for appointments, but he seemed annoyed. He immersed himself into his own research and other business, so not much time could be spared in supervising students. (ST28, Year 3)

In the third year of PhD, he still described himself as “an academic orphan” due to lack of supervisory facilitation. He felt disillusioned to make more effort in initiating communication. Even with the limited opportunities to meet the supervisor, ST28 found that he had gradually lost his passion and courage to communicate.  

Initially, I talked a lot with him about my ideas, but gradually I would stumble when thinking of doing that. I found he used all kinds of attitudes to show he did not like the way I chose. Sometimes he was just emotional and would say he was not interested. (ST28, Year 3)

In ST31’s situation, it seemed that neither the supervisor nor the student had trust in each other. From initial differences in how to design and conduct research to the sudden change of how to complete the PhD, ST31 had not much say in the decision-making, but it seemed he had not been convinced by his supervisor’s reasoning either. He was still emotional when reflecting on those situations in our interviews three months after his PhD. He appeared to be desperate in attributing these difficulties to one reason, “She has no confidence in me at all.” It appeared ST31 gradually lost confidence in his supervisor in return.

In comparison to ST28’s initiative to communicate and ST31’s unwillingness to compromise, ST12 appeared to be “obedient” and was willing to listen to her supervisor’s suggestions at the initial stage of her PhD.

When I commenced my PhD, I wanted to continue doing a research I was interested in, but he rejected my experiment results and declined my proposal in the second month. Back then I was really afraid of teachers, and Asian students are obedient to teachers, so when he asked me to change a topic, I just changed. (ST12, Year 2)

ST12 reflected that “arguing made me feel frustrated.” With repeatedly failed negotiations and negative feedback on her achievement, ST12 gradually tended to avoid and resist communicating with her supervisor, feeling “I am all fine as long as he does not come to bother me” (ST12, Year 2).
Silence or outbreak: Major confrontations that ensued

When differences with supervisors emerged in research, these participants tended to compromise, comply, or remain silent to maintain the relationship. However, when transitions across the differences became unachievable, and when problems accumulated to reach a critical level, major confrontations occurred that basically broke the relationship. This brought devastating consequences on the students, such as disillusion with the research world (ST28, ST31) and dropping out of the PhD programme (ST12). Below I let ST28 narrate why he had major friction with his supervisor at the beginning of his fourth year of PhD.

*I had lots of conflicts with my supervisor, but there was the most violent one last year. At that time, my pressure was massive. My scholarship was ending in half a year. I had to write my thesis, but he still pressed me to do some extremely difficult experiments and was persuading me to do a postdoc. I was desperate. I wanted to commit suicide. I really don’t want to do research anymore. I asked him to let me graduate. I had to complete my PhD. By then I did not want to do research anymore, but he kept persuading me I should... That really drove me crazy, to the extent I wanted to commit suicide. CSC gives me four years of living stipend, but my tuition support only lasts 3.5 years. At this final stage, instead of allowing me to work on my thesis to complete the PhD, he asked me to keep doing experiments. I really felt miserable.*

*And he did not care how I felt. In our weekly meetings, he was happy if I had tangible progress in that project, and was disappointed when I had not. How could I have outcomes on a weekly basis! He was not pleased if I talked about difficulties, but I was not pleased as well.*

*With the pressure from these aspects, I nearly broke down. (In that meeting) I told him I really did not want to do research anymore. Let me graduate quietly... when I told him I wanted to commit suicide, he started to compromise. (ST28, Year 4)*

ST28 had been one of the selected few from his top-ranking home university for a PhD programme in the top-ranking host university, but upon graduation, he was shattered. ST28 left Australia in the evening of the day he submitted the thesis and landed in a third country. There he dropped his field in engineering and started working in computer science. ST28 was the third generation of researchers in his
family. His grandfather and his parents were all highly reputable researchers in China. Presumably, it was difficult for him to return home until he could recollect his hope, aspiration, and confidence.

Whereas in ST12’s case, the outbreak of a confrontation worsened the relationship to the extent of the loss of respect. Though having experienced twice a change of research topics, consistent negative feedback, and lack of actual support in research from her principal supervisor, ST12 remained positive in her PhD research and her supervisors.

However, a crucial occurrence changed what she had valued towards the end of the first year. With the third request to change her research topic again, ST12 attempted to use literature to convince the supervisor the current project was possible to achieve her PhD. To her bewilderment, the response was “Those papers are rubbish.” ST12 was shocked and asked her supervisor to show decent respect to other researchers’ work. However, it seemed since then ST12 had changed her opinion of the supervisor. Consequently, she resisted following her supervisor’s request and she downgraded her PhD to a master’s degree.

**Key extra support to facilitate transitions**

Though these three students all had major issues with their principal supervisors that constrained transitions across the personal and research worlds, they all experienced some extra key support that enabled their academic achievement and personal growth despite adversity.

For ST31 and ST12, it was the strong support of their co-supervisors. Both of them indicated if without co-supervisors’ dedicated facilitation in research and the writing up of the thesis, they would not have completed their PhD. In particular, when ST12 was in the serious dilemma towards the end of the first year, her two co-supervisors supported her, believing her current project was highly promising. This belief sustained ST12 to complete her project and the master’s degree on time.

*My project was actually done with the support of my co-supervisors. If I only had ... (the principal supervisor), I might still be in the hell.* (ST31)
When... (the principal supervisor) kept questioning the possibility of my research project, ... (the other two supervisors) believed it could work, which really helped. (ST12)

Differently, ST28 did not have co-supervisors, but coincidentally, he met a visiting PhD fellow in his laboratory who helped him with narrowing down of the scope of his doctoral research.

It was until early this year, with the help of a visiting student, I could finally narrow down my focus and did the core research sufficient enough to complete my PhD. If I have not met that student, I might not have known it till now. (ST28, Year 3)

As to the social world, it seemed because these students had been focusing on how they dealt with the problems in their research world, their social activities were almost invisible in their talks about their PhD journey. There was not much evidence to show their integration with the local communities except for ST12’s regular attendance in church services as a Christian. Noteworthily, ST12 and ST31 lived with their partners during their PhD, which was recognized as a source of emotional support and company in life.

As a self-funded student for her PhD abroad, ST12 was grateful for the family support from her husband and her parents. They provided both financial support for her study and emotional support for her to go through the challenges. Throughout her PhD, ST12 strongly wished she could pay back her families’ investment, both financially and emotionally.

**Summary**

Thus far, this section has reported two categories where major differences existed between students’ multi-worlds and border crossings became difficult or resistant. When students perceived the difficulties as almost unsurmountable, they experienced diminished motivations, endangered rapport, and major confrontations with their supervisors. The students in the two categories experienced some extra support that facilitated them to complete the study, though the one in the last pattern downgraded to a master’s degree. The following sections are two narratives to illustrate each of the two patterns.
Ming’s experience

Ming’s experience represents the pattern of Different worlds & Border crossings difficult. When he encountered differences across his multi-worlds, there was a lack of mutual understanding, communication, or negotiation to facilitate the transitions across the differences, which gradually developed to become almost unsurmountable (Table 9.1). The key points of congruence or difference are shown in italics in the table.

Pre-PhD: A promising transition

Upon the completion of the postgraduate study in a research-intensive university in China, Ming was motivated to do a PhD abroad due to three considerations. The first was self-cultivation. He considered doing a PhD abroad as an investment in himself and for better career development. The second was a financial factor. At the time the PhD scholarship on offer was higher than the average salary he could receive with his educational background. The last was to experience a different linguistic, educational, and sociocultural environment. He was willing to “闯一闯” (be brave in trying out different opportunities in life) because he was “年轻气盛” (youthfully courageous).

The reason Ming landed in Australia was “a coincidence”. Before completing the postgraduate study, Ming sent PhD applications to universities in the United States of America, Europe, and Japan. He had an offer from Japan and had a scholarship from the Chinese Scholarship Council. However, after initial contact with visiting professors from the Japanese university, Ming was concerned about the high pressure of working in Japan. He felt he would not be a good fit with that solemn working context because he considered himself as “active and optimistic”.

5 Data sources: One three-hour interview (in two sessions) three months after his completion of PhD; several social contacts afterwards with more talks about his PhD journey. Quotes in the text were drawn from the interview transcripts.
Table 9.1 *Ming’s multi-worlds*

<table>
<thead>
<tr>
<th>Motivations</th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
</tr>
</thead>
<tbody>
<tr>
<td>- choosing talented candidates</td>
<td>- the selected one to do PhD</td>
<td>- enriching life experiences</td>
<td>- high respect for PhD at home context</td>
</tr>
<tr>
<td>- quality research</td>
<td>- self-cultivation</td>
<td>- broadening perspectives in research</td>
<td>-</td>
</tr>
<tr>
<td>- international cooperation</td>
<td>- improving career prospects</td>
<td>- contributing to life betterment</td>
<td>-</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
</tr>
</thead>
<tbody>
<tr>
<td>- completion of the PhD</td>
<td>- completion of the PhD</td>
<td>- sufficient supervision</td>
<td>- science &amp; technological innovation</td>
</tr>
<tr>
<td>- quality research</td>
<td>- quality research</td>
<td>- personal development</td>
<td>-</td>
</tr>
<tr>
<td>- <em>no publications</em></td>
<td>- <em>publications</em></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Values/beliefs</th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
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<tbody>
<tr>
<td>- rigorous research</td>
<td>- <em>diligence, focus, &amp; persistence</em></td>
<td>- <em>positivity</em></td>
<td>-</td>
</tr>
<tr>
<td>- support</td>
<td>- <em>proactivity &amp; initiative</em></td>
<td>- <em>harmonious relationship</em></td>
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<table>
<thead>
<tr>
<th>Actions</th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <em>main-supervisor detached from the supervision</em></td>
<td>- initial dedication</td>
<td>- <em>lack of familial support</em></td>
<td>-</td>
</tr>
<tr>
<td>- co-supervisors provided strong support in supervision</td>
<td>- <em>demotivated after conflicts</em></td>
<td>- supporting and facilitating his girlfriend’s life and study</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>- <em>complying with main supervisor’s requests</em></td>
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<td></td>
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<tr>
<td></td>
<td>- <em>seeking co-supervisors’ support</em></td>
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<td></td>
<td>- completing the PhD and left academia</td>
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At that time Ming noticed that an Australian university was looking for cooperation opportunities with his university and offering several scholarships for PhD applicants. Ming checked online and found that the faculty in his discipline in the Australian university had been collaborating with a national level laboratory. Ming counted it as an advantage for expanding his research.

*When I have decided upon where to go, the choice of a supervisor was comparatively much easier. I applied to a professor who was most relevant to my research field. As the professor was about to retire soon, he recommended me to another supervisor. So here I came.*

When asked about his family situation, Ming simply said, “*I am all alone by myself.*” His father passed away before he was born, and his mother remarried afterwards. Ming was brought up by his grandparents, but they had passed away. Ming recalled that he spent time in his childhood “*all with friends*”. Ming reflected that this early life experience enabled him to be independent and also to maintain sound relationships with people around.

Ming’s hometown was in a mountainous village. With the outstanding academic performance, Ming was selected into a top high school in the area, and then into a top university in a city for undergraduate study, and later a top research-intensive university in another metropolitan city for postgraduate study. Financially, Ming had scholarships, loans and part-time jobs to support his university studies. Upon completing his master’s degree, he had accumulated loans to pay back. Hence Ming had experienced the challenges of life at an early stage of his life, but also experienced transitions from different cultures before the commencement of his PhD abroad.

**The PhD: Emotionally challenging transitions**

While doing the PhD in Australia, Ming experienced unexpected incongruence with his main supervisor, but the congruence with his co-supervisors sustained his completion of the PhD.

Ming’s supervisory panel was structured with Dr. Kate as the main supervisor and Professor Ken as his co-supervisor. Based on Ming’s account, Dr. Kate was an early career researcher in the field, “*with limited experience of supervising students*”. 
Professor Ken was the one Ming originally applied for, but because the professor was about to retire, Ming was recommended to be with Dr. Kate, and the professor only took a minor role in the supervision. In addition, there was Dr. Sarah, a research scientist, who worked together with Ming on the project. Though Dr. Sarah was not officially recorded in the supervisory panel, Ming perceived her as his supervisor. On reflection, Ming acknowledged that it was Professor Ken and Dr. Sarah that invested greater time and energy than the main supervisor in facilitating his completion of the PhD, for which Ming considered “an unreasonable allocation of time and responsibility.”

**Incongruence with the main supervisor**

Ming illustrated several critical instances of “clashes” that had led to the deterioration of the relationship with the main supervisor and his demotivation in his PhD.

**Initial mutual disappointment**

Ming interpreted the clashes could have been out of mutual disappointment from the very beginning of his PhD. To begin with, Ming recounted that after he started the PhD, Dr. Kate asked him to prepare some equipment and materials for the experiment, “but I did not complete the preparation after two weeks, which must have made her disappointed.”

Then Ming also felt disappointed after the second week. Dr. Kate initially invited Ming to take positions as a tutor for two courses and a demonstrator for a third. After two weeks, Ming did all the preparation work but realised that another doctoral student had taken the position. Dr. Kate’s explanation was Professor Ken did not want him to spend too much time on tutoring, which left Ming offended by this change of mind without telling him. Ming’s sense of disappointment was amplified during the semester when the tutor came to Ming frequently for questions from students. “We worked in the same office, so I understood he was not in the field at all. It was reasonable to say I fit the position better, but she left me out.”

In about half a year into the PhD, Ming had another major clash with Dr. Kate because of the distribution of a top-up scholarship. Ming recounted that although the guideline of the application showed the scholarship was supposed to be spent on conferences,
travel, living stipend, and tuition fees, Dr. Kate insisted on him spending the scholarship mostly on purchasing a research instrument. As Ming considered that instrument was not essential for his research, and later he indeed did not use that instrument for his PhD, Ming was left unhappy. Ming revealed that as an early career researcher, Dr. Kate was short of research funding and research facilities, but still, Ming felt it was unreasonable to use his scholarship. Ming reflected that “from then on, our relationship was a bit embarrassing.”

Clashes in the research

On reflection, Ming overtly expressed his differences with Dr. Kate in their perspectives on research all the way from the design to the implementation and the report of the research. With the research design, when Ming questioned some points and proposed his ideas, Dr. Kate “did not compromise, so I had to listen to her.” Then when conducting the experimentation, Ming realised it was impossible to follow Dr. Kate’s suggestion and considered her explanations as not convincing, so “this time, I did not listen to her.” That caused a major confrontation between the supervisor and the student. Ming proved himself with his experiments, but the process had been extremely difficult without the supervisor’s support.

Understandings about the duplication of research was another major difference between them. Dr. Kate asked Ming to replicate other researchers’ published experiments, but again she could not convince Ming why the practice was necessary. Ming was resistant to the suggestion as he perceived it as copying, and “not helpful in answering my research questions.” Ming could not find justifications from Dr. Kate’s reply when “she just kept telling me that although you could not publish, you could put them into your thesis.” Ming could not understand “why I have to copy others’ experiments and put into my thesis?” Without successful communication and negotiation, Ming reflected this episode negatively impacted his confidence and motivation.

The escalated demotivation reached its peak when the second year started. They had different opinions on how to report the findings for Ming to achieve his degree. The original plan was by publications, but Dr. Kate changed her mind and told Ming to write a traditional thesis. Professor Ken thought it was fine to graduate by publications
because he could revise Ming’s manuscript one after another. Dr. Sarah was also supportive of publishing. However, Dr. Kate insisted that Ming should write a conventional thesis. Again, Ming could not understand why Dr. Kate insisted so strongly.

That was just the second year. She said it needs half to one year to publish, so we cannot guarantee for publications. Isn’t that just the second year? ... And if none of the papers could pass the peer-reviews, how can the overall thesis pass?

Apparently, the main supervisor had the final say, so Ming changed from writing papers to writing a thesis for graduation. Ming was concerned that if he did not publish, someone else would, and felt more frustrated that his concern turned out to be true one year later. These accumulated negative experiences hugely impacted Ming’s motivation in his PhD:

The experience in my first year resulted in a very bad consequence – I was extremely unmotivated in the second and third year. I no longer worked from 8 to 9; instead, I worked from 10 to 5, and did very little even if I was there.

On reflection, he felt frustrated that he had wasted his time. Ming admitted that at least half of the data in his thesis were collected in the second six months of his first year.

Negative feedback: “She had no confidence in me”

Upon reflection, Ming felt his PhD abroad experience was bitter because of the unpleasant relationship with his main supervisor. He expressed that was mainly because “she gave me too much negative feedback” due to, first, “she had no confidence in me at all” no matter how Ming had proved himself, and second, “she did not care about my PhD from tip to toe.”

In the regular weekly meeting with the supervisory panel, Ming recalled that Dr. Kate seemed to have withdrawn from his supervision and hardly gave any positive or constructive feedback. “It makes not much difference whether she was there or not.” However, Ming revealed that Dr. Kate actively held a daily meeting with another PhD who was doing Dr. Kate’s project.
Besides, Ming was upset that “she had no confidence in my English at all”. Ming gave several examples for illustration. Once as requested by the faculty, Dr. Kate asked Ming to attend a 3-minute oral presentation competition but told him not to spend too much time as he had no chance to win due to his accent. However, Ming was awarded the third prize in the faculty and then another third prize in the university when the other candidates were mostly native speakers.

Another time Ming had a poster presentation at an international conference. He described how his supervisors reacted differently in the preparation:

Professor Ken trusted me and revised the content in full detail. Dr. Sarah did not feel much hope but smiled to encourage me. However, when I looked at Dr. Kate, she returned with total contempt.

Ming was the winner of the Best Poster of the conference, followed by candidates from MIT, Oxford, etc. Ming used a Chinese expression 不负众望 (up to the expectations) to show his gratefulness to Professor Ken and Dr. Sarah for their help and inspiration but was upset when recalling Dr. Kate’s facial expression.

In the thesis writing, Ming revealed that the three supervisors acted differently. Dr. Kate did not read his thesis until he completed the full version because “she said she was used to reading a completed version”; whereas Professor Ken and Dr. Sarah helped him to structure the chapters and revised all the manuscript “line by line”. However, in a panel meeting at a late stage, Dr. Kate suddenly proposed proofreading of the thesis. Ming felt embarrassed because his other two supervisors had been dedicatedly revising the thesis:

She did not read the thesis, but she just said that after all the work Professor Ken and Dr. Sarah had done. Professor Ken has supervised over 40 PhD students and never had anyone fail; Sarah is not only a native speaker, but is the person who knows the most about my research. Her words hurt all three of us.

Ming’s disappointment lasted into the final stage of his PhD. After the return of the thesis reviewers’ feedback, Ming quickly completed the revision with his two co-supervisors and submitted to his main supervisor. At the time, Dr. Kate was on annual leave and did not respond to emails; when she was back, she provided minor feedback after two months, and when Ming submitted to her again, Ming had to wait another
month. In the process, Ming went to see Dr. Kate, but held back because Dr. Kate said to Ming that he “was pushing her.” When Professor Ken suggested Ming remind Dr. Kate, Ming felt awkward to do so, “because last time when I asked her, she was sick, so I felt guilty to push her again.” Ming’s thesis was not submitted to the postgraduate office until the due day.

Three messages upon reflection

Upon reflection after the PhD, Ming expressed briefly three points that negatively impacted his PhD. First, “My biggest problem was I listened to her too well, considering she was my main supervisor.” Ming could see the difference in Professor Ken and Dr. Kate, the former being patient, guiding, and facilitating, whereas the latter did not exhibit these qualities. Ming felt it was particularly important to have a good supervisor for a doctoral student, a novice researcher, “the importance of a good supervisor goes beyond a good university.”

The second was about communication issues. Ming admitted he had problems in communicating with Dr. Kate from the very beginning, but still he “followed blindly” in most cases. Ming understood Dr. Kate might not be satisfied with what he did, but he felt frustrated when Dr. Kate requested him to do certain things without convincing reasons or explanations. Consequently, Ming felt growing barriers that hindered their communication.

Third, with negative emotions, he did not write until the last stage of his PhD. He wished he could have spent two hours a day to summarize the literature, or to report his daily research outcomes in a scientific format, “but I never did that.” Ming spent eight months on writing up his thesis, and he attributed the prolonged length of time to his unsolidified foundation in scholarly writing.

Nevertheless, a consequence of no publications upon graduation was that Ming found it almost impossible to find a position as a postdoc or an academic in China, Australia, or elsewhere. Two years after his graduation, Ming had changed his life trajectory from a researcher to a businessman, and had less wish and potential to return to the academia where “publications are the threshold in applications.”
**Congruence with co-supervisors**

Ming felt he was lucky to have Professor Ken supporting him all through. “Without him, I might still be in the hell.” Ming mentioned two points he appreciated in Professor Ken. One was the professor’s broad perspectives and in-depth knowledge; the other was his patience and tolerance with students. Ming in particular appreciated the second point and gave several examples for illustration.

First, Professor Ken allowed students to try out their ideas and make mistakes. Ming recalled several times his colleagues finally adopted Professor Ken’s ideas after several trials on their own, sighing, “If I had listened to him, I could have saved this much of time.” Ming attributed this to Professor Ken’s personality, outlook, and experience.

Second, Professor Ken was extremely careful and patient in revising students’ manuscripts, providing many in-depth points for improvement. Ming was particularly grateful that each time after explaining in person with pencil marks on manuscripts, Professor Ken would also send students feedback in a Microsoft Word file in case of misunderstandings.

Third, Professor Ken was open and receptive to novel ideas and skills. “He always asks us to share at least three things we learned from a conference. And he is always willing to share with us new things he learned from outside for the purpose of cross-field inspiration.” Ming also learned about how to expand academic networks from Professor Ken, who had been dedicatedly expanding international networks for better opportunities and collaboration.

Besides research, Ming also enjoyed chatting with Professor Ken about various topics, such as cuisines and plantations. Ming liked the time having fun in Professor Ken’s backyard. Even after retirement, Professor Ken would visit the research centre once a week, chatting with each person in the office. Ming concluded that Professor Ken

... was someone who was willing to spend time on students ... He nurtured his students with time and patience.
Another critical support came from Dr. Sarah, a research scientist. She was not recorded officially as a supervisor for Ming, but because she worked side by side with Ming on the project, Ming treated her “with the respect to a supervisor.”

In particular, Ming valued three points in Sarah. First, Sarah was calm and peaceful in mind. She never pushed Ming for results or outputs in progressing the research; therefore, Ming worked with perceived progress but under not much pressure. Second, Sarah was willing to invest in research, considering human labour as the most expensive factor, which relieved Ming from too much financial pressure in his project. Third, Sarah invested herself in facilitating Ming’s research and his thesis. In conclusion, Ming appreciated that Sarah in reality had taken more than half of the supervisory responsibility, though not officially recorded.

**Summary**

To sum up, during Ming’s PhD, he encountered difficult transitions across his research and personal worlds because of some major differences between the worlds and the lack of effective mutual understanding, communication, and negotiation to facilitate transitions. With the support of co-supervisors, Ming completed his PhD but then stepped away from the research world, feeling not confident or competent to pursue a career in academia.
Lina’s experience\textsuperscript{6}

Lina’s story represents the pattern of Different worlds & Border crossings resisted. In resisting to cross the borders between her personal and research world, Lina dropped out of the PhD and left with a master’s degree (Table 9.2). The key points of congruence or difference are shown in italics in the table.

\textit{Pre-PhD: An unexpected complication}

\textit{Family and peer pressures}

Lina grew up in a competitive environment with her cousins. She spent her childhood with her extended families living close in a small-sized city. Most of the elders in the family were well-educated and held decent jobs, and her cousins had outstanding academic performance in schools and while studying abroad. Lina studied in the best schools in town, but her cousins’ outstanding performance put pressure on her all the way from primary school to university. For the childhood memory, Lina recalled,

\begin{quote}
Since young, I was surrounded by them. Each time at the end of a school semester when we presented our school transcripts to Grandpa, I felt it was stressful. (IV1)
\end{quote}

Probably because of this stress, she put immigration as her major motivation in doing a PhD aboard. She realized Australia was a country with comparatively friendly immigration policies, and the life in Australia was “\textit{less competitive than that in China}.” Another motivation she revealed was the “\textit{face}” issue. As several of her cousins had had their doctoral degree, wherever it was, she thought she should have one as well to bring honour to her parents and the extended family. Besides, after senior high school, she witnessed about half of her peers going overseas for higher education. All factors combined to shape her motivations to study abroad.

\textsuperscript{6} Data sources: Three interviews, respectively in her late-Year 1, mid-Year 2, and after completion (IV1, IV2, IV3).
### Table 9.2 Lina’s multi-worlds

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<tr>
<th></th>
<th>Research world</th>
<th>Personal world</th>
<th>Social world</th>
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<tbody>
<tr>
<td><strong>Motivations</strong></td>
<td>- cutting-edge research</td>
<td>- an overseas study experience</td>
<td>- high respect for PhD at home context</td>
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<tr>
<td></td>
<td></td>
<td>- a PhD degree</td>
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<td></td>
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<td>- self-cultivation</td>
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<td>- peer pressure</td>
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<td>- immigration</td>
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<tr>
<td><strong>Expectations</strong></td>
<td>- <em>low-risk project</em></td>
<td>- completion of the PhD</td>
<td>- families supportive of personal choice</td>
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<td></td>
<td>- up-to-date research</td>
<td>- sufficient supervision</td>
<td>- families expecting a settled life</td>
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<td></td>
<td>- academic achievement</td>
<td>- science &amp; technological innovation</td>
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<td></td>
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<td>- family’s wellness</td>
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<tr>
<td><strong>Values/beliefs</strong></td>
<td>- innovation</td>
<td>- diligence, focus &amp; persistence</td>
<td>- families valuing knowledge</td>
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<tr>
<td></td>
<td>- cutting edge research</td>
<td>- positivity</td>
<td>- home culture valuing harmony</td>
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<td>- harmonious relationship</td>
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<td>- self-realisation</td>
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<td>- social commitment</td>
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<td></td>
<td></td>
<td>- dutifulness to the family</td>
<td></td>
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<tr>
<td><strong>Actions</strong></td>
<td>- main-supervisor being negative</td>
<td>- self-funded for PhD</td>
<td>- familial financial support</td>
</tr>
<tr>
<td></td>
<td>- <em>requesting the change of topics three times</em></td>
<td>- diligence &amp; focus</td>
<td>- familial emotional support</td>
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<tr>
<td></td>
<td>- rejecting to sign on the annual report</td>
<td>- <em>feeling confused with a frequent change of research topic</em></td>
<td>- co-supervisors’ emotional support</td>
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<td></td>
<td>- co-supervisors being supportive</td>
<td>- feeling frustrated with negative feedback</td>
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<td></td>
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<td>- resisting main supervisor’s suggestion;</td>
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<td>- working with co-supervisors instead</td>
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<td></td>
<td></td>
<td>- downgrading to a master’s degree</td>
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Then the matter was when. Her father thought of sending her out early, but her mother thought it would be better if she could have more independence in outlooks and life skills before leaving for overseas. Therefore, she completed her postgraduate study and worked as a researcher in an institute for a year before she started PhD applications. Back then, she was in love with her postgraduate peer, Sun, so they planned to study abroad together. Both families were supportive of their decisions.

A misled application

Lina consulted a local agency for international studies. It turned out to be a nightmare because of mismatched information. As Lina was not confident with her English, the agent did all the translations and sent emails on her behalf. When Lina’s IELTS score did not meet the requirement for the two universities where she was accepted for a PhD, the agent asked her not to tell the supervisors in contact in case of rejection. The agent advised Lina to take a package of a master’s degree with a language course instead. Lina paid a big sum for the consultation, and left alone without Sun, her newly wedded husband because the agent advised her not to apply for his visa together with hers in case the visa officer considered their marriage as a false one.

_The information from the agent was absolutely wrong. They just trapped students into their plan and waved goodbye once students stepped aboard. They did not care what occurred afterwards._ (IV1)

Lina did not realize the information from the agent had complicated her situation until she talked with a student advisor in the language course in Australia. With the help of this advisor, she renewed her contact with a professor she applied to and transferred to the PhD programme. She also arranged the visa for Sun so he could come and join her. However, the wrong advice had cost time and money. More than half a year had passed for things to be sorted out, and she had missed the opportunity to apply for a scholarship that year. In order not to waste more time, she paid the tuition fees out of her savings so that she could commence the PhD, hoping she would receive a scholarship in the next round of applications. On reflection, Lina felt deeply regretful and upset to have used an agent for her application process.
A sad drop-out and reapplication

Lina did not expect that this PhD enrolment would last only a year. When she started, she was hardworking, motivated, and committed to the research. Besides her own work, she was also involved with tutoring undergraduate students for her supervisor, Professor Ken, who was pleased with her solid foundation in research from her master’s degree and work experience.

However, half a year later, Lina was shocked by a request from Professor Ken, which she considered was “absolutely unethical”. She attempted to ignore the request until a major clash occurred, which forced her to realise it was a situation she could never yield to. Lina revealed she was desperate because it involved sacrificing someone else’s interest, which was the least thing Lina wished to do.

Though Lina’s values and beliefs were in serious incongruence with her supervisor, she received strong emotional support from her husband. That evening on the way driving home, heart-broken and desperate, Lina explained everything to Sun. She did not tell him before that day because she did not want her husband to worry. Luckily, Sun understood and supported her decision to quit. Their families also supported their decisions and welcomed them back home.

Three months after, Lina was able to regain her strength and was determined to return to pursue a PhD. She reapplied to another university in Australia. This time she directly contacted Professor Mitchell, a distinguished researcher in the field, and very soon received an offer letter. Though still without a scholarship, she was financially supported by her parents and parents-in-law.

"My parents do not care if I could finish my PhD or not. My parents-in-law gave us money so that we don’t need to struggle too hard in Australia. They never had high expectations in me. They just supported whatever decisions we made and hoped we could have a good life. (IV1)"

Though Lina expressed much pain from the previous experience, she received great love and care from families, which helped Lina to courageously start her second PhD abroad.
The PhD: A distressful incongruence

Unexpectedly, Lina experienced another incongruence with her research world, though in another way. Again, it was the congruence with her social world that sustained her to go through the challenges and difficulties in the research world. Though she downgraded to a master’s degree to complete this journey, she appeared to be maintaining her self-confidence instead of feeling disillusioned and disheartened upon completion.

“He kept changing research directions”

Lina’s journey of this PhD started with a change of supervisor. Upon arrival, Lina was informed that Professor Mitchell could only be her co-supervisor due to his impending retirement; thus, she was put under Dr. Dowson’s name as her main supervisor.

Once commenced, Lina encountered two major challenges with Dr. Dowson: No research funding and the constant change of research directions. Lina was shocked to understand that her supervisor meant her to be self-funded on the research experimentation because he had no research funding to support her. As a self-funded international student for tuition fees and living costs, that was extremely stressful for Lina because “the experimentation is indeed costly” (IV1). However, with the “selfless” (IV1) financial support from her parents and husband, Lina managed to cope with this challenge so that she could push the research forward. By this time, her husband had given up his own research career and worked as a barista to increase the family’s financial income.

However, the challenge Lina found overwhelmingly difficult to cope with was the constant change of research directions. Lina started her PhD with a research proposal derived from her interest and research experience. After one month, though, Dr. Dowson felt Lina’s results were not significant, so he kept giving her negative feedback by “saying it was highly risky” (IV1) and asked her to change topic. Lina listened to her supervisor’s advice and changed topic. However, before the confirmation of candidature (COC) in the sixth month of PhD, the supervisor asked her to change the topic again by “again saying it was highly risky” (IV1). This time Lina felt she could not manage the change because of the short notice. She struggled
till after the COC and then had to change for a second time. Her emotional explanations of this time revealed her confusion and frustration,

*I tried to listen to him, but it’s so confusing. He kept changing his ideas. He changed the whole direction of research, not just one specific question in one project. It’s really difficult to negotiate with him because he does not like to listen at all.* (IV1)

With the new research topic, Lina’s two co-supervisors started to get more involved. They provided strong support in guiding Lina’s experiments and solidify her knowledge in the field. They also facilitated her to write up the research. By then Lina had realised the different level of support and different approaches of supervision from different supervisors. It was a new research area for Lina, but with co-supervisors’ support and positive feedback, Lina had remained hopeful for the future.

However, after the first year, when Lina sent her annual progress report for her supervisors’ approval, Dr. Dowson again asked her to change topic. This time Dr. Dowson expressed that he thought the project “was hopeless and meaningless” (IV2), so he refused to sign the annual report.

What made Lina feel most frustrated was, with each of the three topics in the first year, she had sought her supervisory panel’s approval before commencement. She had not expected that her main supervisor would change his mind each time after a couple of months. In particular with the third topic, though Lina’s two supervisors had been positive and supportive, thinking it was a promising topic to achieve a PhD, Dr. Dowson was strong in his stand to make a change. Lina started to be seriously concerned about her timeline to achieve the PhD with another change.

**Failed negotiations**

In an attempt to convince Dr. Dowson that this research was indeed promising so that she could go on with the same project in the second year, Lina presented some influential papers from high-impact journals in the field as evidence, but Dr. Dowson’s reference to those publications as “rubbish” absolutely shocked her and resulted in a major confrontation.

*He said those papers were rubbish. I was displeased to hear him saying that because it was rude and untrue. I said to him, “You cannot say other researchers’ papers are*
However, Lina’s evidence did not change Dr. Dowson’s opinion, nor could she convince him to sign the annual progress report, so she started to think of other options. Lina had to let her co-supervisors know that unless she had a change of the main supervisor, she could not possibly go on with her PhD. Then Professor Mitchell had a conversation with Dr. Dowson just to find Dr. Dowson was reluctant to withdraw. On learning about this, Lina felt desperate and made a decision to downgrade her PhD to a master’s degree because she “just want to finish this as soon as possible” (IV2). Dr. Dowson was also reluctant to approve the downgrade, but Lina had been determined to do so. This time Lina was strong in their negotiation:

*I had to tell him that even if he thought this project was meaningless, there’s no time for me to change to another topic. (IV2)*

To downgrade to a master’s degree by research was apparently an extremely difficult decision for Lina to make. One reason was she already had completed a master’s degree in China; another was her high expectation of completing a PhD abroad, not only for her benefit, but for the honour of her families.

On recalling those moments when she was making decisions to drop out from her PhD, Lina expressed that she was desperate because she believed she could never complete her PhD without “cohesion, consistency, and integrity” in the PhD project:

*He always changes his mind, kept talking with me about new ideas, and asking me to put up new ideas. He just focused on the up-to-date innovation but did not think about the cohesion, consistency, and integrity of my PhD project. How could I possibly complete my PhD thesis like that within the timeframe? It just made me confused and upset. (IV2)*

Feeling anxious and frustrated, but staying with the same supervisory panel, Lina resisted making further negotiations with Dr. Dowson in her second year. This emotional struggle appeared to transform Lina from an open and accepting doctoral student to become someone who was resistant to any of her supervisor’s suggestions. In the second year, she had been resisting Dr. Dowson approaching her:
I told him if he didn’t like it, I didn’t mind him not getting involved... My situation now is as long as he does not come to bother me, I will progress smoothly. When he does do so, I would decide by myself whether to take his words or not... but his appearance disturbs my mentality and emotions. (IV2)

It was noteworthy that with the Chinese value that a teacher is respectful, Lina was not used to making negotiations or arguments with her Australian supervisor even in her second year, as she recounted, “Arguing with him makes me feel frustrated, hopeless, which impact my emotions” (IV2).

**Sources of support and self-justification: Life remains purposeful**

In contrast to the incongruence with her main supervisor, Lina had strong support from other sources. The first source was from her two co-supervisors who supervised her final research project and revised her thesis. Their support not only enhanced Lina’s self-efficacy to some extent, but also functioned to sustain her at critical moments, such as when it was due for submission:

*My two co-supervisors had carefully revised the thesis chapter by chapter and had recognised it was good in quality, whereas Dr. Dowson did not do anything in that regard. When it was due to submit my thesis, Dr. Dowson still refused to sign on the form. I was nearly broken down at that stage. Professor Mitchel had to push him for that.* (IV3)

The second source of support was from her fellow PhD colleagues working in the same group. These colleagues were empathetic with Lina. When Lina shared her feelings with others, she realised she was not the only student to be left in the difficult situation with Dr. Dowson. However, there were no other co-national Chinese students in the group, and Lina did not feel she had close friends in the small research context.

The third source was emotional and financial support from her families. Her parents and parents-in-laws never pressed her for the success of PhD abroad; instead, “they just want us to live a good life” (IV2). Besides, her husband provided the never-fail emotional support. He had been beside her as she experienced this journey, working full-time as a barista to supplement their income.
In addition, Lina was a Christian, so she attended the local church regularly. There she made some friends with different cultural background and educational background, which offered Lina a social network in the host community.

Lina self-justified her considerations to downgrade with her family dutifulness. In return to her husband’s enormous sacrifice in supporting her study, Lina had always hoped that with a degree, she could be qualified for permanent residency in Australia. Once granted, her husband may pursue his PhD without the need to pay for the tuition as an international student, which may allow him to return to the track of conducting research in bioscience, which was what “he loves and is good at” (IV2).

*His character suits for research and he loves it. He has sacrificed so much for me. I don’t want him to have too long a void in his research career. I hope he can return to research soon.* (IV3)

Lina hoped to pay back the love and the sacrifice from her husband and other families who had strongly supported her when she needed that. She appeared to have transformed not to be emotionally affected after the graduation. “It’s all gone now. At least I will know how to better deal with such situations in the future” (IV3). She was expecting the birth of her first baby upon the last interview (after the completion of her master’s degree). Though still upset when recalling episodes of her frustrating journey in study abroad, with new purposes in life, she seemed to be hopeful and optimistic for the future.

Noteworthily, after two failed PhDs, Lina felt awkward to complain anymore. Even though there were contextual reasons in both PhDs, Lina was sad that “Everyone else around could complete anyway. It seems it’s always me having these problems” (IV3). In the last interview, she intentionally avoided mentioning much about her PhDs.

**Summary**

To sum up, encountering serious incongruence with critical factors in the research world, Lina experienced two failed PhDs in Australia. The first was due to her uncompromised values; the other was due to unmatched expectations and beliefs. Lina’s lack of strong motivation in the persistence of achieving the degree might also play a role. Lina was supported by her families both financially and emotionally, and
she had extended social networks. However, in Lina’s case, these were not effective in supporting her to manage transitions across her multi-worlds.
Chapter 10 Discussion and conclusion

Introduction

The last chapter of this dissertation will first reiterate and discuss major findings from this study. Then it moves on to contributions, implications, limitations, further thoughts, and the final section concludes this inquiry.

For a brief review, to enhance understandings of Chinese international doctoral students (CIDS), this study set out to investigate the nature of their experiences and major influences that facilitate or constrain their timely and positive completion of a PhD degree in STEM fields. Drawing on sociocultural perspectives, a three-dimensional (CIS space) multi-world (academic, personal, and social) conceptual framework was developed to support this narrative inquiry. Transformation and heterogeneity were distinctive features in describing the nature of CIDS’ experiences. By identifying a number of borders as potential constraining factors, the study classified six patterns to illustrate congruence or difference across students’ multi-worlds and the corresponding transitions to scrutinise what, how, and why certain factors could facilitate or constrain. Below I will first reiterate and then discuss the major findings of this inquiry.

Transformation through the PhD abroad

For the first research question, the nature of CIDS’ experiences, the commonality identified in the study is students’ academic and personal transformation, or growth out of this transnational doctorate experience. The study found Chinese doctoral students grew and transformed when they utilised research, personal, and social resources for the progress of the PhD. They exercised agency, skills, and strategies to make transitions across their multi-worlds, particularly in their small cultural research context. In general, in the process to achieve the PhD abroad, they transformed from novices to independent researchers. This resonates with Gu’s (2015) statement that Chinese students’ study abroad experiences are “both transitional and transformational”
because they have to constantly search “for who they are and whom they want to be as they move across… cultural, social, and structural boundaries” (p.68).

A plausible explanation for this growth could be drawn from Brown’s (2009) findings that when international students are free from cultural and familial expectations and are exposed to the opportunity of self-discovery in a new cultural context, they are likely to experience growth and transformation. For example, ST19 reported that following her partner was the major motivation to do a PhD abroad, but she transformed through personal growth and academic success along the journey of pursuing a doctorate. In general, the PhD journey was a source of growth for CIDS, for example, when they had the opportunity for independent living and learning, in one participant’s (ST22) words, “the free spirit” in the novel sociocultural and research contexts that allowed them to grow.

Remarkably, the study shows the heterogeneity among students’ experiences and the consequent transformation. This was mainly related to the diversity of their pre-PhD motivation and backgrounds, what formed their multi-worlds, and how these worlds interacted. It was also related to how well their small cultural research context facilitated their PhD study and how the transitions across the worlds occurred. This finding in heterogeneity supports extant literature (Beaven & Spencer-Oatey, 2016; Jones, 2017; Liang, 2004; Ryan & Vite, 2009; Ye & Edwards, 2015, 2017) that argues against the holistic labelling of “international students” versus local students in research. Regarding Chinese students, this study supports Ryan and Vite’s (2009) argument that there can be greater diversity within “Confucian-heritage cultures” than between them. Ye and Edwards (2015) argue that students should “be treated as individuals rather than using labels ascribed in accordance with social categories such as gender, class, ethnicity or nationality” (p.239). The study found an individual had his or her own familial, cultural, and educational experiences before the PhD, which shaped their motivations and influenced their PhD abroad experiences. In this study, the Chinese culture does not refer to a holistic traditional Chinese culture or the associated Confucianism, but a modernised and individualised integration of the Chinese culture and other cultures that have influenced China in the context of globalisation in recent decades. An individual Chinese international student also develops his or her “third culture” (Fail, Thompson, & Walker, 2004) while situated in other cultural contexts. While doing a PhD abroad, the nuance and subtlety in the
motivations, expectation, values, beliefs, and actions across an individual’s multi-worlds develop into complex and diversified experiences in their specific disciplinary fields.

**Borders**

With respect to the second research question, major influences that facilitate or constrain CIDS’ timely and positive completion of a PhD abroad, the study identified a number of borders to conceptualise potential constraining factors. Drawing on students’ recounted experiences, there were sociocultural, psychosocial, socio-relational, linguistic, socio-economic, institutional, and gender borders. These borders do not apply to each student; rather, they are in tune with individual cases and specific situations, which are particularly related to their small cultural research contexts. While the scope of borders is frequently interrelated or overlapped (Davidson & Phelan, 1999), each border has distinctive features that distinguish constraints to students’ positive and on-time completion of a PhD abroad. An understanding of what, how, and why some factors constrain students’ development may, in turn, help us to understand what, how, and why some factors can better facilitate and support students.

Firstly, CIDS may consistently encounter *sociocultural borders* while doing a PhD abroad. This was because of some fundamental differences in CIDS’ personal motivations, expectations, values, beliefs, and actions with those of the broader western sociocultural or smaller cultural research contexts. For example, when a Chinese student expected to invest all the time in the laboratory to achieve the PhD, this student found it was frustrating that the laboratory was not accessible on Christmas day due to safety management in the Australian institution, which was a different norm from what this student had been used to while studying in China. However, what this student had also missed out was the communication on social occasions, for instance the morning teas organised by the faculty, where he might have easily learned about the close of the laboratory on holidays. The hierarchical relationship with supervisors and other staff members, as well as the distance with students from other sociocultural background constrained the student from effectively collecting information at the host institution.
Secondly, *psychosocial borders* are connected with how successfully CIDS deal with these sociocultural borders. The study found psychosocial borders were crucial for CIDS because it was associated with their psychological distress, motivations, and expectations in their small cultural research context on a daily basis. Both sociocultural and psychosocial borders are in accord with a large body of literature that focuses on the difficulties of Chinese international students’ acculturation and adaptation in a cross-cultural context (e.g., Meng, Zhu, & Cao, 2017; Wang & Mallinckrodt, 2006; Winchester-Seeto et al., 2014; Zhang & Goodson, 2011). Though supervisors may have different perspectives on how to make successful student researchers (Gatfield & Alpert, 2002; Gu et al., 2017; Kiley & Mullins, 2005), the current study found smooth communication, in the means of recognition and timely feedback on students’ achievement along the doctoral process, was important for students maintaining psychological balance (Christie et al., 2008), persistence (Zhou, 2014), and confidence (Cotterall, 2013) to achieve their PhD degree abroad.

Thirdly, the *socio-relational borders* that may constrain CIDS’ success put the supervisor-student relationship into the foreground. This was mainly because, first, the nature of one-to-one (including one supervisory panel) doctoral supervision system that highlighted the central importance of supervision in the completion and satisfaction of a PhD. This supports previous findings in literature about doctoral students and international doctoral students (Due et al., 2015; Lee, 2008; McClure, 2005). The second reason was related to the high value attached to the harmonious supervisory relationship by Chinese students. In particular, this study found psychosocial borders could become minor when students were situated in harmonious socio-relationships in a small cultural context that well-facilitated their PhD progress, whereas the psychosocial borders could become gravely detrimental when the relationships had deteriorated. This finding reflects the influences of core Chinese philosophy, 仁 (Ren), which stresses human relatedness, interdependence, and social connectedness so that an individual is devoted to seek social harmony as a form of self-cultivation (Lai, 2006).

Fourthly, most CIDS also needed to deal with *linguistic borders* while doing a PhD abroad. This includes Chinese students’ difficulties with both oral communication and academic writing in English, both of which have been broadly addressed in literature (e.g., Brown, 2008; Brown & Holloway, 2008; Cortazzi & Jin, 2013; Lowinger, He,
Lin, & Chang, 2014; Ryan & Viete, 2009). To complement this body of literature, the current study found differences in Chinese students’ English proficiency when they commenced their PhD abroad. Again, this was connected with each individual’s sociocultural background within Chinese society. For example, those growing up in cosmopolitan areas had much better English proficiency than those who had lived in remote rural areas. These differences in oral and written English related to access to resources. However, the study also found linguistic borders may become invisible even for students with rural background if their small cultures put more importance on students’ intellectual capability rather than their English language proficiency. This was also associated with students’ agency, motivation, and determination to master the language. In other cases, linguistic borders may remain till the completion of their PhD abroad. This was mainly because some students chose to stay within their comfort zone and limited their use of oral English to meetings with supervisors. Even so, linguistic borders appeared not to have constrained their academic writing and publications. Several such students had a high number of publications despite the difficulty in oral communication in English.

Besides, CIDS may also encounter socio-economic borders. While some had to deal with limited research funding, others had to manage international tuition fees, rent, and other living costs. Examples evident in this study included a student who saved the living stipend to purchase most of the research resources essential for his doctoral project; and several self-funded students who struggled with self-esteem in seeking familial financial support and the challenge of balancing casual jobs and the high demand of doctoral research in STEM fields. While Chinese international students contributed hugely to the Australian economy, society, and culture (Australian Bureau of Statistics, 2017; Deloitte Access Economics, 2016), Chinese international doctoral students’ struggle for self-esteem in relation to financial independence remains mostly silent in previous literature. This point will be further elaborated in this chapter.

In addition, some CIDS encountered institutional borders. This may include the designation of the principal and co-supervisors. In several cases, students reported difficulties when the principal supervisors they applied for became co-supervisors due to factors such as research directions and retirement. Some students had to change supervisors in the mid-term of their PhD because their supervisors left the institution. Other students had to apply for a change of supervisor because of a clash in research
interests. For example, a student changed supervisor after refusing his supervisor’s suggestion to join an industrial project in the latter half of his second year of PhD, as the supervisor had indicated the student might not graduate if he did not join. As Tanyildiz (2015) shows, research laboratories present a closed environment among supervisors, students, and other researchers, and once the balance was disturbed or changed, students needed time to reposition themselves in a new relationship. Though these institutional borders were mostly out of students’ control, the current study found how students experienced support and facilitation after a critical change could take them on different research trajectories.

Finally, some female CIDS may come cross gender borders. Surprisingly, most female students in this study hardly considered gender difference as a constraining factor that hindered their timely completion of PhD abroad and their personal growth. Rather, they were highly positive about the experiences and valued opportunities of doing the PhD abroad. They mostly talked about their transformation and enhanced confidence through the PhD process. These findings are complementary to the literature that focuses on the unique challenges international female PhD students may encounter, such asorder invisibility and exclusion in the male-dominated STEM fields (Dutta, 2015). Despite the perceivable challenges, most female students in this study exhibited their inner-strength, strategies, and skills to integrate, grow, and achieve. The one student who downgraded was a female but there was insufficient evidence to suggest her constraints were related to gender.

Thus far, this section has discussed sociocultural, psychosocial, socio-relational, linguistic, socio-economic, institutional, and gender borders as potential constraining factors that hinder CIDS’ successful PhD abroad. The emergence, elevation, or decline of these borders are connected with individual situations over time, leading to different outcomes. While other studies have investigated particular borders or constraints, for example as mentioned in Chapter 2, sociocultural (Hopwood, 2010), psychosocial (Posselt, 2018; Poyrazli, Arbona, Nora, McPherson, & Pisecco, 2002), socio-physiological (Winchester-Seeto et al., 2014), emotional (Gu, 2015), linguistic (Flowerdew & Li, 2007), gender (Dutta, 2015), and institutional borders (McAlpine, Jazvac-Martek, & Hopwood, 2009), this present study used an approach to identify borders holistically for interpreting the experiences of international doctoral students. Future studies are highly encouraged to examine, criticise, and complement these
concepts so that we may understand better how to facilitate international doctoral students for the sustainability of international doctoral education.

**Congruence/difference and transitions**

This dissertation reported six patterns classified to represent students’ congruence or difference and corresponding transitions across CIDS’ multi-worlds over time. Although each of the six patterns encompasses diversity with respect to students’ perceptions of experiences, there are, nevertheless, some common themes (Phelan, Davidson, & Cao, 1991; Phelan, Davidson, & Yu, 1993).

The six patterns demonstrated a range of experiences, from the congruent worlds and smooth transitions that led to students’ confidence, competence, and high achievement, to the less congruent worlds and border crossings resisted that result in a student dropping out of the PhD programme. This study showed that achieving a PhD abroad in STEM fields was an extremely challenging task for each student, and the way they experienced the journey made a difference.

The study also found that the outcomes of the PhD and after-PhD career and destination decisions were connected with their experiences during the PhD. Positive PhD graduates are more likely to remain or to think about remaining in academia, whereas when students complete with negative emotions from their negative experiences, they are more likely to step away from the research world.

In the first pattern, **congruent worlds and smooth transitions**, students reported the motivations, expectations, values, beliefs, and actions were generally congruent across their multi-worlds so that they experienced comparatively smooth transitions across and over time. These students described academic success based on common motivations, expectations, and diligence. They also described harmonious relationships based on shared values and beliefs. All these assisted them through the challenges of doing a PhD abroad. Most importantly, their supervisors, team, and families offered strong support to facilitate their congruent world and smooth transitions so that they could concentrate on their doctoral research, which in turn enhanced their confidence, competence, and calmness.
Remarkably in this pattern, communication barriers were not readily perceivable between the students, their supervisors and others involved. For example, when Shao was on the verge of withdrawing from his PhD when he lost its meaningfulness, the conversations with his supervisors and his families played a crucial role in him returning to the research world. The preconditions that these conversations could function effectively at critical moments may include, firstly, the mutual care of the families and, secondly, the relationship with supervisors. Chinese students rarely make decisions without considering their families (Bodycott, 2009; Bodycott & Lai, 2012). They also care about their supervisors and are willing to listen to their advice if they have an established relationship of rapport, trust, and respect. Students in this pattern were generally intensively engaged in negotiating with their supervisors in the whole process of their doctoral research. They articulated their ideas with confidence and the supervisors’ positive recognition further enhanced their independence and self-efficacy in traversing boundaries to achieve a successful PhD abroad.

Students in the second pattern, *different worlds and smooth transitions*, reported diversified cross multi-world differences that persisted along their PhD journey. However, these differences were understood, recognised, and respected by the agents in their multi-worlds. It was the valued differences that enabled their smooth transitions across and over time. The differences between students’ multi-worlds were related to the boundaries and borders that emerged in their PhD abroad. These borders brought on pressure and stress during their PhD abroad, but with the mutual empathy and agency to recognise and value the differences, these students persisted, transformed, and grew with confidence. Lei’s narrative illustrated how he valued the different supervisory style and the research context. Lei perceived himself as doing the PhD with a “free-range style” where his supervisor encouraged his independent work but provided support and resources when necessary.

This group of students is similar to those in the first pattern in that not many communication issues are evident between them and their supervisors or others in their multi-worlds. In Lei’s case, the self-navigated but supported PhD facilitated easy transitions across the multi-worlds. This enabled him to establish his research, expand international academic networks, and complete his PhD with high output and recognition in the field. In general, when the differences are valued, these students do
not feel panic or anxiety about boundary issues; rather, they calmly focus on the pursuit of scientific research and experience success and growth.

In the third pattern, *congruent worlds and border crossings managed*, students exhibited strong agency and took initiatives in managing transitions to create congruence for their PhD abroad. This group of students is different from those in the first pattern because the congruence is created with agency and a clear locus of control. The example of Jie showed she was a novice at research at the beginning of her PhD, but she aligned the motivations, expectations, values, beliefs, and actions across her multi-worlds to facilitate her highly successful academic achievement. This group of students also distinguished themselves from the second pattern in their dedicated negotiation, communication, and adaptation to create congruence rather than let the differences remain. For example, Jie described herself as a unique Asian student in the research centre or at conferences she attended as she would join Australian and European fellows at pubs after work. Jie was aware from her initial contacts that local people lacked the motivation to establish relationships with international students. However, instead of enduring the distance as an outsider, she actively made herself be one of them.

This group of students reports their supervisors, team, and families being supportive and positive in facilitating their transitions and academic studies. Their communication with supervisors has been smooth because of supervisors’ explicit instructions, timely facilitation, and dedicated support at critical moments, sometimes in a crisis. This smooth communication in many cases has rescued students from feeling distracted, confused, or lost. It is the consistent mutual or multi-lateral effort that enables these students to find congruence between their worlds and to enhance their self-efficacy in managing transitions across potential or existing boundaries.

Students in the fourth pattern, *different worlds and border crossings managed*, presented the strongest agency in navigating their PhD abroad to achieve the goal. They may experience ideological or behavioural conflicts due to diversified differences in motivations, expectations, values, beliefs, or actions. These conflicts may negatively impact their PhD abroad experiences at certain stages, but these students exercise agency, resilience, and persistence to achieve their goals regardless of perceivable dissatisfaction or frustration.
This pattern shares some similarities with the second pattern in that differences exist from the very beginning of their PhD. Differently, in this pattern, most students experience a more severe impact of differences, such as the lack of supervisory support for knowledge continuity, team support for knowledge fluidity, and research resources for progressing research. A few of them lack the initial intrinsic motivation in the scientific research itself. Besides, the majority in this group are impacted by under-communication or miscommunication with their supervisors, which are not so obviously perceivable in the previous three patterns. The issues with communication are closely related to difficulties in border-crossings that undermine the transitions between their multi-worlds. Two different types of students with respect to the agency of communication are representative in this pattern: one “holding my ground” and another “keeping everything within”. The former is evident in Shu’s case, where he defended his ideas in a hard way. Shu’s experience had been extremely difficult because the effort to communicate seemed to be unilateral. In the latter type, the outcomes were diverse due to the differences in whether they are facilitated or encouraged to communicate or not. With supervisory facilitation, students grow to be confident in articulation and communication; without, students appear to be resilient, agentic, but less communicative and more stressed. In general, the locus of control is evident in their transitions across the borders so that this group of students could achieve their PhD with both positive and negative experiences and the corresponding emotions.

In the fifth pattern, different worlds and border crossings difficult, students experience almost insurmountable borders, and they have to struggle for sheer survival of the PhD abroad. Similar to the fourth pattern, these students experience conflicts that impact their PhD experiences, but differently, for this group, the conflicts remain largely unsolved without effective communication, thus leading to escalated complications, such as major confrontations with supervisors. Consequently, these students complete their PhD with negative emotions and turn away from the research world after graduation. More severely, they are confused with their personal, professional, and cultural identities upon graduation, which influences their career decisions and the destination after the PhD.

In pre-PhD experiences, these students are not distinguishable in motivations, educational background, and external influences from the students in the first four
patterns. However, during the PhD, perceivable and unrelieved conflicts in motivations, expectations, values, beliefs, and actions between students’ multi-worlds lead to students’ negative psycho-emotions towards their PhD and a future career in research. In Ming’s case, without being convinced why he had to follow particular instructions, Ming experienced confusion, disappointment, clashes, and demotivation throughout his PhD. Insufficient communication and never-established rapport and trust become key borders that seriously undermined Ming and another student in this group’s PhD abroad experiences. Notably, key factors that helped students to survive were co-supervisors and other external support that compensated what was missing in achieving the goal.

Then in the last pattern, different worlds and border crossings resisted, the student dropped out of the PhD as the borders between her multi-worlds escalated and were perceived as unsurmountable. This student decided to put it to an end after repeated setbacks in attempts to communicate and negotiate. When students perceive traversing psycho-social boundaries as impossible, they experience anxiety, disillusionment, anger, and depression.

Also notably, for Lina in this study, a key factor in surviving her downgrade to a master’s degree was her co-supervisors positioning themselves as her allies when she had major confrontations with her main supervisor. With co-supervisory support, Lina could compose herself and maintain the essential self-efficacy to complete her master’s degree. This essentiality to have extra support, be it major or minor, shares some similarities with the fifth pattern even though the outcomes are different. The effectiveness of co-supervising doctoral students has attracted the attention of recent research (e.g., Grossman & Crowther, 2015; Olmos-Lopez & Sunderland, 2017; Robertson, 2017), but this study extends understandings to the importance of co-supervisory support with Chinese international doctoral students in cross-cultural settings.

With fine and distinct differences between each of the six patterns, students and their supervisors’ agency in communication and the effectiveness of this communication are evident as core components in facilitating or undermining transitions across the multi-worlds over time. Drawing on previous research that identifies the importance of communication for international students (Ai, 2017; Cortazzi & Jin, 1997; Gareis,
Merkin, & Goldman, 2011; Holmes, 2005; Ngwira, Mapoma, Hong, Sariyo, & Kondowe, 2015; Williams, 2005; Yang, Dunleavy, & Phillips, 2015), this study finds communication can make or break the rapport, trust, and respect between a supervisor and an international doctoral student, the key relationship to facilitate or to constrain a successful doctorate in STEM fields (Halse & Malfroy, 2010; Lee, 2008; Robertson, 2017). Pertaining to this crucial point, the focus of the discussion below is the importance of bilateral effort in exercising agency to initiate and enhance communication, or what could be termed as *agnostic communication*.

**Agentic communication**

As revealed above, an important finding from this study is how *agnostic communication* can play a crucial role in facilitating or constraining Chinese students’ successful on-time completion of a PhD abroad. The findings have explicitly shown how congruence facilitates academic and personal growth, but the difference does not necessarily mean constraint. Rather, it is how the *transitions* occur that is important in whether students could achieve their transnational PhD on time, positively, and successfully. Although with six patterns, there were four different kinds of transitions and outcomes reported in the study: smooth, managed, difficult, and resisted. This section first examines why agentic communication functions in differentiating the patterns and outcomes of transitions, then moves on to why establishing rapport, trust, and respect through communication is important for CIDS’ PhD abroad, and discusses the complexity of the communication due to CIDS’ hybrid identities that goes beyond cultures. The section ends with some practical suggestions on facilitating agentic communications in transnational education settings.

**Communication for transitions**

Communication issues persistently exist among Chinese international students while studying abroad. In classroom contexts, prior research finds Chinese students in Australia and Canada tend to avoid potential communication with their lecturers or non-Chinese peers whether it is out of modesty or to avoid losing face when making mistakes (Ai, 2017; Fang, Clarke, & Wei, 2016). This mistake-avoiding strategy corresponds to Chinese philosophy, 言多必失 (one is prone to make mistakes with
over-talking), and often ends with “silent voices” (Ryan & Viete, 2009). In a research context, this current study has reported a phenomenon that some Chinese doctoral students in STEM fields have the tendency of “keeping-things-to-themselves” because of their cultural values and beliefs, disposition, or linguistic barriers. This could lead to the notion of “problematic Chinese learners” in transnational educational settings (Ye & Edwards, 2015; Ye, 2018), and students being misunderstood, misinterpreted, or marginalised in the research context (McClure, 2007), impacting their emotions and psychological well-being (Han et al., 2013; Wang, Wei, & Chen, 2015).

Drawing on the literature and the findings in this study, agentic communication, as a form of communication, is proposed as a strategy to facilitate transitions across the multi-worlds and to facilitate CIDS’ positive PhD study abroad experiences. The agents in this operation involve students from the personal world, supervisors and others from the research world, and families and others from the social world. The interlocked and interacted multi-worlds conceptual framework shows the importance of mutual contribution to communication when taking initiatives to traverse sociocultural, psychosocial, linguistic and other borders. The nature of a PhD programme in STEM fields requires cutting-edge innovation and advancing science and technology forward. This suggests a “co-learning experience” (Robson & Turner, 2007) through students’ doctoral research which also calls for mutual effort in initiating communication.

The mutual contribution to facilitating communication may avoid minor issues accruing into the unsolvable ones during the CIDS’ PhD abroad. Ideally, the student should initiate the conversation and use their agency to take the intercultural responsibility in mediating transnational spaces (Tran & Vu, 2017; Ye & Edwards, 2015, 2017). However, if not, any agents involved could initiate conversations and encourage the student to be articulate. The role of the supervisor is of particular importance (Wang & Li, 2011). Data have repeatedly shown smooth communication facilitates positive experiences and enhances intrinsic motivation to persist in the doctoral research. A key finding is that effective and constructive conversations are crucial during the PhD abroad so that transitions are smooth or manageable instead of being difficult or resisted. This supports previous research (Magyar & Robinson-Pant, 2011; Soong, Tran, & Hiep, 2015) that argues supervisors may develop reciprocal cross-cultural communication skills and the capacity to promote greater agency in
their international doctoral students for constructing a positive supervisory relationship and a harmonious small cultural research context.

Supervisors’ positive feedback in enhancing students’ confidence in articulation is an important facilitating factor in smoothening communication. Wang and Li’s (2011, p.101) research argues the importance of “dialogic and culturally sensitive feedback” in supervising international doctoral students. The current study supports this dialogic approach, but finds that with the multiculturalisation of higher education, it might be difficult for supervisors to be culturally sensitive to the diversity and nuances of individual cultures; instead, positive feedback may always apply for enhancing CIDS’ academic confidence, though it needs caution to find the balance between “pushing too little” and “praising too much” (Hu, van Veen, & Corda, 2016). This current study found when feeling confident, students may navigate their PhD abroad journey with self-motivation, self-determination, and self-regulation. This study has reported several cases where a harmonious relationship had compensated for the limitation of resources in research to the level that students completed their PhD successfully and on time.

This study identified a possible gap between supervisors’ perspectives and students’ experiences on this point (a summary of supervisors’ perspectives is shown in Appendix E). Several supervisors, not supervisors of student participants of the study though, showed concerns that Chinese students seemed to be too obedient and were reluctant to defend their ideas. One supervisor compared his three students (one Chinese, two Europeans) who published articles in Nature during their PhDs. He perceived the Chinese student as the most hesitant in articulation in their meetings, though as strong as the other two in research and writing. However, these supervisors did not reveal to what extent they had encouraged students to communicate and whether they provided positive feedback when students did communicate.

Different from supervisors’ perspectives, many students in this study reported their agency and confidence in articulation through their positive interaction experiences with their supervisors. When these students could articulate and were recognised for doing so, they presented trust and respect to their supervisors in return. These positive experiences have been identified as highly related to their enhanced intrinsic motivation. This motivation is further linked with their perceived and facilitated
academic competence and self-esteem as mature adult students (Bandura, 2002; Brown, 2009; Deci, Koestner, & Ryan, 2001; Ryan & Deci, 2000).

At the positive end of the spectrum of agentic communication, students presented characteristics that fit Ryan and Deci’s (2000) research on psychological needs that facilitate intrinsic motivation – competence, autonomy, and relatedness. Ryan and Deci view these three needs as essential for understanding “the what (i.e., content) and why (i.e., process) of goal pursuits” (p.228). Research on Chinese doctoral students in China suggests that self-efficacy and intrinsic motivation could “fully” mediate the influences of different supervisory styles on doctoral students’ power of innovation (Gu, He & Liu, 2017, p. 736). The current study found for students working on the goal-directed activity of completing a PhD programme on time, “the motivation has been always there” (participant), be it intrinsic or extrinsic, but for international doctoral students, the communication process may influence their self-efficacy in articulation and how they perceived their social relationships.

In contrast and towards the other end of the spectrum, some other students suffered from diminished intrinsic motivation. They experienced failed agentic attempts to articulate and did not see their ideas being valued. These students became increasingly dubious about their supervisors’ suggestions. As a consequence, they maintained a distance from their supervisors, both physically and spiritually. They would stay in their own niche rather than initiating further communications with supervisors. They may also become increasingly passive in taking initiatives in research, and this lack of autonomy could seriously undermine their motivation and self-efficacy (Bandura, 2002; Ryan & Deci, 2000).

Evidence in this longitudinal study consistently supports the notion that agentic communication, whoever initiates the communication, could be the icebreaker to address the keeping-within issue and other boundaries in CIDS’ PhD abroad. Although students may have different trajectories and differ in the nature of transitions across their personal, research, and social domains (Beaven & Spencer-Oatey, 2016), when communication is smooth, academic achievement follows.
Rapport, trust, and respect

This section elaborates the importance of establishing rapport, trust, and respect through agentic communication for the success of Chinese students’ PhD abroad. As mentioned in the introduction, a key aspect in Chinese philosophy is the concept that everyone is related. Though diversity exists between Chinese students, some of the shared values and beliefs were evident across the participants.

With the traditional philosophy that emphasises “仁” – human relatedness, interdependence, and social connectedness – the cultivation of the self is the cultivation of relationships (Lai, 2006; Wu, 1986). This concept applies to the educational setting. In this setting, students take their peers as brothers and sisters (师兄/弟, Shi Xiong/Di, 师姐/妹 Shi Jie/Mei) and their collective friendship could last life-long. The most important figure in this setting is the teacher. Several students in this study quoted a Chinese maxim to express how they viewed supervisors, “一日为师，终身为父” (He who teaches me for one day is like my father for life). With this ideology, Chinese students commonly apply an introspective way of thinking to look for problems within themselves when conflicts or problems occur. While doing a PhD abroad, these students readily bring with them these family-like educational values and beliefs.

However, as reported in the findings, these students, with an average age of 25.26 (range from 21 to 30) when commencing their PhD, were open to embracing new cultural values and beliefs. This may lead to the formative and developmental nature of their “third culture” (Useem, Donoghue, & Useem, 1963). For example, this study reported in Different worlds/smooth transitions pattern, some students perceived a PhD as a job rather than education, so they tended to work with a 朝九晚五 (nine to five) schedule, even though they worked much longer to fulfil their commitment. Nevertheless, it was evident that these students were more likely to have a transformed notion of considering their supervisors as a colleague-figure instead of a father-figure because of their transformed concepts of the nature of the PhD.

However, these data must be interpreted with caution. While some supervisors interpreted Chinese students’ respect as too obedient, students took it as essential respect to a senior person. Here by “senior”, I mean not the age, but the social status.
As novice researchers and scientists, students consider themselves as juniors in the social status so that they expect themselves to show due respect to supervisors as essential cultural values. One common action of this belief is the willingness to comply with supervisors rather than confronting and articulating their doubts, problems, and challenges. Students may consider asking their supervisors with minor problems in their PhD as bothering them too much. However, it was far too often these minor issues accrued into major ones or even became unsolvable, which caused complicated situations, disillusionment, and even the loss of respect.

Hence encouraging Chinese students to articulate and giving them positive feedback can be helpful to establish rapport, trust, and respect. As mentioned earlier, this is important for students’ transitions so that they would not keep problems within themselves and so that minor issues would not accrue. However, this study found culture was not the only important factor involved, and this will be discussed in the following section.

**Cultures and beyond**

Importantly, this study argues that culture might become the scapegoat for miscommunication or under-communication in some situations. As evidence of this point, while CIDS in this study had a Chinese cultural background, their supervisors had a wide range of ethnic-cultural origins in the Australian multi-cultural context. Remarkably, among the six patterns, there were students with supervisors of the same ethnic-cultural background but were positioned at two opposite ends of the spectrum due to their extremely diversified experiences and outcomes. At one end, students were well facilitated and appeared to be confident, competent, and calm; at the other, students were left disappointed and seemed to be confused, anxious, and frustrated.

With scrutinisation that goes beyond cultural factors, the factors that constrain or facilitate smooth communications can be complex and multi-faceted. As comprehensively unfolded in the finding chapters, it involves multifarious differences in motivations, expectations, values, beliefs, and the corresponding actions across students’ multi-worlds, making communications “a very complicated interaction”

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7 For privacy and confidentiality considerations, ethnic backgrounds of supervisors are generally not disclosed in this dissertation.
(Liang, 2004, p.iv). For example, when a student was eager to publish his research findings after the first year, and his supervisor changed his mind and did not support him for publications, the student found the barriers that hinder their communications became unsurmountable. For another example, when a self-funded Chinese student was under tremendous financial pressure and the supervisor provided him with an opportunity to lecture in a summer school, the student felt encouraged to communicate more with his supervisor. This is consistent with findings in the literature on establishing PhD candidates’ professional identity (McAlpine, Jazvac-Martek & Hopwood, 2009). The study found Chinese PhD students’ confidence in communication increased with the strengthening of his/her professional identity through opportunities and activities such as lecturing, reviewing papers, attending conferences, or being part of national or international research networks.

These influences are interactive and developmental over time, but the quality of the supervisor-student relationship may often “spell the difference between completion and non-completion” (Lovitts, 2001, p.131), which becomes the drive for the focus of this section on the communication between supervisors and international doctoral students in relation with and beyond culture, but all based on “respectful interactions” (Ryan & Viete, 2009, p.308).

Due to the significance of communication for the successful and positive completion of a transnational PhD study, this study suggests professionals in supervision at the university level integrate the importance of agentic communication in the doctoral training programmes. Besides appealing for students to initiate communication, the study also suggests supervisors that are engaged with supervision of international doctoral students exercise agency to encourage students to communicate. Supervisors need to provide positive feedback when communication is effective, and to work on constraints when communication is less effective, bearing in mind that problems might exist both within and beyond language and cultural issues.

Thus far, this dissertation has extended the discussion on the importance of operating agentic communication to facilitate transitions and successful PhD abroad experiences. Next, it will move on to discuss two important but more minor findings: loneliness and financial issues.
From loneliness to serenity

This study identified multiple types of loneliness and isolation that CIDS experienced differently due to their specific situations. Respectively, it involves personal, social, cultural, academic, and geographical loneliness. The loneliness is linked with psychosocial, sociocultural, socio-economic, linguistic, and institutional borders students have along their PhD abroad experiences. Regardless of these difficulties, how these students cope with the sense of loneliness and find spiritual serenity will be the focus of discussion. This point is focal because research in psychology, anthropology, sociology, and education fields has consistently suggested loneliness as a painful, threatening, debilitating, and exceedingly unpleasant experience (Baldassar, 2008; Brown & Holloway, 2008; Sawir et al., 2007; Weiss, 1973), whereas maintaining psychological well-being, or the peace of mind, is essential by nature for doctoral students to concentrate on their research over time and to complete on time (Barry et al., 2018; Han et al., 2013; Stubb et al., 2011).

Five modes of loneliness

独在异乡为异客，每逢佳节倍思亲。
遥知兄弟登高处，遍插茱萸少一人。

(All alone in a foreign land, I am twice as homesick on this day. When brothers carry dogwood up the mountain, each of them a branch – and my branch missing.)


This poem, from about 1,300 years ago, passed on the nostalgia that a Chinese sojourner had on the day of a traditional festival that was meant to be a family reunion. It involves personal loneliness (living alone in a foreign land), social loneliness (no brothers nearby), and cultural loneliness (missing the tradition that brothers climb mountains on the day and wear dogwood to ward off evils). While China has several such traditional festivals around the year for family get-togethers, such as the Chinese New Year and the mid-Autumn Festival, this study identified these occasions might become “emotionally fragile moments” (participant) to trigger the sense of loneliness for CIDS living far from home.
Chinese international students generally experience these three kinds of loneliness while studying abroad and for many, the loneliness occurs on a daily basis (Sawir et al., 2007), as exemplified in Chapter 6 in particular. Reasons for this loneliness mainly include lack of social connectedness or friendship (McKenzie & Baldassar, 2017; Meng, Zhu, & Cao, 2017), being away from families (Elliot, Baumfield, & Reid, 2016), and lack of social self-efficacy in the new cultural context (Tsai, Wang, & Wei, 2017). This current study found the convenience of online social media such as WeChat may soothe the loneliness, but only to a limited extent. This finding is in accord with other research indicating that social media creates bridges and boundaries in the meanwhile (Sleeman, Lang, & Lemon, 2016).

To complement this body of literature about international students’ loneliness, this study found a fourth type, academic loneliness, or in other words, working alone, applied to most Chinese international PhD students in STEM fields while doing a PhD abroad. For the first scenario, the study has reported many students unexpectedly found they were in a working alone situation. They did not have essential team support or senior peer support that was critical for research fluidity, facility, and continuity. This scenario may apply to doctoral students in a general sense if they encounter such a dilemma.

For the second, some Chinese students found their concept of father-figure of the supervisors or the brotherhood and sisterhood (师兄弟, 师姐妹) among fellow doctoral students in a research centre did not apply to the new research context; rather, the colleague relationship applied, to which they needed to adjust themselves. This adjustment, if successful, could become an advantage for students’ academic achievement; whereas if the transitions throughout this adjustment process was distorted, not encouraged, students may fall in a strange situation, without knowing how to deal with this relationship or how to articulate their perspectives in research. And for some students who lived in a rental house alone off campus, they may encounter the third scenario that they could not have someone around to discuss their research within or out of their laboratories, in addition to the limitation of their chances to integrate with the culture of the host country.

The latter two scenarios especially applied to Chinese students in that the situations are dramatically different from the crowded, sometimes over-crowded, research
laboratories and on-campus accommodation in China, where a student is naturally put in a shared me-and-others space. As one student revealed, in China, she hardly had any “me-time”, whereas in Australia she had had it in both her research and living. Another participant was annoyed “no one told me” that on Christmas day the campus was all shut. The shared inside/outside space, connectedness, and inter-dependence in China may become the causes that when these Chinese students commence their PhD abroad, they need to learn how to deal with the loneliness, how to be independent in research, but importantly, they also need to learn how to break the sociocultural and other borders to reach for outside connections and resources. This finding supports Park, Chuang, and Hald’s (2018) research that identify academic socialisation as the most crucial factor that may constrain the development of professional identity for Asian STEM doctoral students in the USA.

In addition, this study identified some CIDS might experience geographical loneliness while doing a PhD abroad. This is mainly due to the regional remoteness where their research centres are located for disciplinary needs. This issue may not just apply to CIDS; rather, it may apply to other researchers in those centres. Thus, it is not a focus to be discussed here, but for those CIDs experiencing geographical isolation, it added to the overall feeling of loneliness.

With diversified situations, an individual may experience one or a combined form of loneliness while doing a PhD abroad. Noticeably, this loneliness is often related to helplessness. As grownups, they cannot resort to parents for help when problems emerge; the exceptions are those who have partners with them, but many are still single. As international students, they may not have established social networks in the host community. And as novice scientists and researchers, they are yet to know how to establish their own professional identity and academic networks. Further on and as discussed earlier, some have the disposition to “keep things to themselves” or shoulder responsibilities on their own. These students are most likely to experience moments feeling extremely lonely and helpless during their PhD abroad, which may cause anxiety and depression (Levecque et al., 2017; Woolston, 2017) and further impacts their psychological well-being in general (Han et al., 2013). As this study finds the majority of CIDS persisted to achieve their academic goals, how they used their personal resources to sustain and transform through the loneliness will be in the discussion below.
**Philosophy leads the way**

The multi-world model in the conceptual framework allowed this study to discover CIDS’ spiritual aspect in their personal world. Building on previous research that attributes Chinese doctoral students’ persistence to manage perceived difficulties to Confucian cultural beliefs in malleability, effort, interdependence, and filial piety (Zhou, 2014), this study found an interesting philosophical or spiritual world that integrated Chinese and western, old and new, formal and informal philosophical values and beliefs. Students may hold fast to a certain motto, but they also kept absorbing and integrating new thoughts throughout their PhD abroad experiences to lead their way.

The mottos students mentioned vary and were individual and situation based. To mention a few, “*Every day is a win*” in self-inspiration; “*It’s a conversation with myself*” in dealing with loneliness in life; “*The harder I work, the more luck I will have*” in strengthening the belief in the dedication in scientific research; “*Look down while you walk, and put your head up while looking for your path*” in guiding the process and turning points in life; “*Standing on the shoulders of giants*” in aiming to make breakthroughs in research; and applying “*the Doctrine of Mean*” when dealing with trifles and choices in life.

As mentioned in the introduction, Chinese people are philosophical rather than religious due to the importance of philosophy in Chinese civilisation (Feng, 1947/2012). This study found CIDS’ philosophical values played a crucial role in sustaining them to go through the loneliness and other challenges to achieve the goal. With the philosophical self-cultivation, the CIDS constructed their personal world in a way that compensated for the loneliness and facilitated their spiritual serenity, or calmness, which further supported their academic achievement and personal growth.

Besides, this study found the tranquil campuses of most Australian universities echoed Chinese students’ philosophical being and becoming, which facilitated their transformed understandings from loneliness to serenity while doing the PhD abroad. Daoism, one of the main schools that contributes to Chinese philosophy, promotes its “admiration of the free movement of the spirit” and its “idealization of nature” (Feng, 1947/2012, p.355), which gave profound inspiration to traditional Chinese paintings. As shown in Figure 10.1, a typical Chinese landscape painting always illustrates at
the foot of a mountain, a man or two sitting or walking in tranquillity, “appreciating the beauty of nature and contemplating the Tao (Dao) or Way that transcends both nature and man” (Feng, 1947/2012, p.355).

In the current study, this deep level of contemplation in the tranquil environment was found to have facilitated students’ advancement in cutting-edge scientific research and technological innovation. The development of the philosophical perspectives is a gradual becoming process, situated differently in individual cases, but this study found those who had this serenity in the lonely journey of doing a PhD in STEM fields and doing it abroad were likely to have smooth or managed transitions cross borders and achieve their best out of the process.

Regardless of the importance of philosophy for interpreting the experiences of Chinese international students, research that has used this perspective has been scarce; thus, this study appeals for future research that integrates Chinese philosophy in understanding Chinese students.

Figure 10.1 A Chinese landscape painting that illustrates the relationship between nature and man (By Zhang Daqian)
Social networks count

The multi-world model in the conceptual framework also allowed this study to identify important factors that facilitated or constrained CIDS’ achievement from the constructs in their social world. The study found co-national networks played an important role in CIDS’s PhD abroad experiences, and because of its importance, the influences of co-national students were salient. They learn from each other’s knowledge, experiences, and perspectives while doing a PhD abroad. For example, when a participant witnessed the challenges of his co-national mate experienced after a change of a supervisor, this student was determined not to change a supervisor no matter how incompatible the supervision relationship had been in his PhD. The study found those who had stable and established co-national networks around were more at ease when traversing across borders between their multi-worlds. Their minds were settled when they had the connections with peers of the same cultural background. As Gu (2009) suggests, co-national networks may bring a sense of security and academic and life support for international students.

These findings show CIDS have unique characteristics that are different from those international undergraduates or postgraduates by coursework (Rosenthal, Russell & Thomson, 2006), whose sense of connectedness was identified to have a positive relationship with their social engagement with local students, but unrelated to that with their co-nationals.

This study found the unique characteristics of “Chineseness” in Chinese doctoral students differentiated them from their fellow students from other cultural backgrounds. This uniqueness positioned them as distinctive Chinese in their “intercultural personhood” (Kim, 2008, p.359). This salient difference often constrained their integration with others in the host community (Ward & Kennedy, 1993). An illustration of this point is participants in this study often referred “we” to themselves and their Chinese co-nationals, and “they” to anyone that was not Chinese. With narrow success visible or tangible in the search to integrate with the local community, the majority of CIDS revealed that co-national networks, especially established co-national associations on campus or in town, filled up the void in their social world. Co-national support was multi-dimensional, from research, daily life to
social events, and multi-functional, from sharing insights, sustaining emotional balance, to offering advice for the PhD study and the future.

This study found a gap of understandings in this respect between students and supervisors. In contrast to students’ perceptions and practices, some supervisors in this study perceived it as a missed point if Chinese students only stick to each other in the laboratories, offices, common rooms, or the living space (see details in Appendix E). The supervisors generally attribute this phenomenon to students’ lack of language proficiency and cultural adaptation.

This current study perceives students’ use of co-national networks as an exercise of collective agency. In Bandura’s (2000) work on human agency, he stresses the importance of exercising collective agency due to the interdependence of human functioning. Bandura states that human beings “do not live their lives in individual autonomy”; rather, “many of the outcomes they seek are achievable only through interdependent efforts” (p.75). This perspective may apply to the supervisor-student relationship that co-constructs students’ academic success, and it may also apply to an individual student’s social networks with co-nationals, where “people’s shared beliefs in their collective power to produce desired results are a key ingredient of collective agency” (p.75). In the case of the current study, Chinese students shared their philosophical perspectives, values and beliefs, motivations and expectations, and most importantly, they shared similar experiences of doing a PhD abroad. Hence these co-nationals reengineered their collective power, in the form of collective agency, to achieve their success in doing a PhD abroad.

In addition, this current study also found those who did not have co-nationals around may become more active in exercising agency to integrate within the host institution. This is resonant with Korobova’s (2015) finding that critical mass, or the ratio of international students in an educational environment, may affect international students’ engagement on campus.

Another unique phenomenon identified in this study is those doctoral students who started their study abroad journey in high school years had difficulty in establishing social networks with both their co-nationals and non-co-nationals. These students appeared to be particularly lonely in their PhD abroad journey because they could not mingle with their co-nationals, nor with other international or local fellow students.
They seemed to be stuck in-between home and host cultures. As they left home at teenage, their understandings of China mostly came from their fragmental memories, imaginations, or second-hand information from the media or others around. They were curious about what China was like, but they found themselves being left out of the fast-changing Chinese society, which led to their sense of being rootless.

**Scholarships make a difference**

The evidence from this study also suggests the criticality of a scholarship in support of an international doctoral student. The financial issues of international doctoral students have been a less researched area (Harman, 2003). Besides funding in research, being self-funded for a PhD as an international student is another issue some students have to deal with.

As reported in this study, adding to the pressure of completing the PhD within three to four years, the self-funded students struggled extremely hard to balance high-demanding research work and earning a basic income for living. The burnout situation due to overwork and the frustration due to unsatisfactory research performance was more salient among these self-funded students than those scholarship supported ones.

Besides, this study did not find any individual who was able to work to pay for the high tuition fees set for international PhD students in the current social context. In that sense, the self in the term self-funded did not mean students themselves; rather, they had to seek support from their parents or partners.

The study found it was a huge pressure for these adult PhD students to have this support from their families who had to sacrifice enormously to pay for the studies. Therefore, these students were more likely to suffer economically, psychologically, emotionally, and physically than those who were financially independent and self-sufficient with a scholarship.

The financial issue is also likely to influence these self-funded CIDS’ after-PhD decision-making. Rather than pursuing further research development, it is common to find “I’ll work to pay back my parents” as the priority in their choice of careers and destinations. That means they may prioritise the income of a job, for which they may have to compromise personal interest and the enormous effort having invested in the
training of the PhD. In general, this study found those with financial independence are more likely to extend their life trajectories in the research world, whereas those without may have more complicated factors to put into consideration. This is a point that deserves further studies.

To sum up, the sections in this chapter thus far have reiterated and discussed major findings regarding the two research questions. Heterogeneity and growth were two major concepts in examining the nature of CIDS’ experiences. Sociocultural, psychosocial, socio-relational, linguistic, socio-economic, institutional, and gender borders were examined as potential constraining factors to CIDS’ PhD abroad. Congruence of an individual’s research, personal, and social worlds facilitates academic achievement and personal growth, but difference does not necessarily mean constraints. Rather, transitions across their multi-worlds are crucial to make or break their successful on-time PhD abroad completion.

This study argues agentic communication is extremely important in facilitating CIDS’ successful transitions. Initiating communication involves various agents in the multi-worlds, but in particular, the student and the supervisor(s) because a supervisor-student relationship that is based on rapport, trust, and respect can best facilitate CIDS’ study. This is related to culture but also goes beyond cultural factors due to the nature of PhD research in STEM fields. While doing a PhD abroad, most CIDS have to endure personal, social, cultural, academic, and geographical loneliness, but their personal philosophy leads their way to be persistent in achieving their goals. For a few self-funded CIDS, this study reveals their struggles with self-esteem, over-work load, and future decision making.

**Contributions and implications**

With the purpose to enhance mutual understandings in the context of internationalised higher education, this research makes its empirical, conceptual, and methodological contributions to the reservoir of human knowledge. It also has its significant practical implications for international doctoral education.
Empirical and conceptual contributions

Empirically, this study is the first narrative educational research on the experiences of the current generation of Chinese international doctoral students (CIDS) in STEM fields in Australia, which has been elaborated in detail in the above sections.

Conceptually, this study contributes to the literature with its development of the three-dimensional (CIS space) multi-world conceptual framework. This framework has effectively enabled this study to holistically examine and interpret the complex and multi-faceted cross-cultural doctoral study abroad phenomenon with multiple theoretical perspectives. In this framework, the three-dimensional axials of continuity, interaction, and situation (Dewey, 1938) forms a space to incorporate sociocultural perspectives. Within this space are students’ multi-worlds (Phelan, Davidson, & Cao, 1991; Phelan, Davidson, & Yu, 1993) that includes CIDS’ personal, research, and social spheres, which are inter-connected and interplay to co-construct CIDS’ doctoral study abroad experiences, the core of this study’s investigation. Noteworthily, the three-dimensional CIS framework is established to provide a conceptual space for the holistic understanding of PhD abroad experiences. It is not meant to be used to structure the thesis; instead, this concept is interweaved all through the findings and the discussion to underpin the multi-world framework and to unfold the students’ experiences as situated, interacted, and developmental over time. This framework is generic by nature and organically open to theoretical perspectives so that it may apply to a broad range of future research in similar fields.

This conceptual framework highlights the role of agency in Chinese international doctoral students’ personal world. The students exercise personal agency, relational agency (Hopwood, 2010) and collective agency (Bandura, 2000) for transitions between their personal world and social/research worlds. By doing so, they navigate, construct, and exploit their doctorate abroad experiences. A main finding in this study is that this agency is exercised differently by students when navigating the transitions between their specific multi-worlds. This is consistent with Chen, McAlpine, and Amundsen (2015) and McAlpine and Amundsen’s (2016) studies, where they conceptualise agency as individual’s motivations, intentions, and efforts to “plan and to construct a way forward in light of constraints over time, whether expected or unexpected” (McAlpine & Amundsen, 2016, p.20). The study reported here shows
how agency plays a critical role in almost all the patterns and students, whether the exercise of agency may or may not lead to successful outcomes (McAlpine & Amundsen, 2016).

With the conceptualisation of the personal world, this study identified CIDS to be a group of bright and pleasant young people, full of energy, aspirations, and dreams. While doing a PhD abroad, these students persistently devote themselves to the goal of completing the PhD on time, but the exterior facade may hide their personal world to the outsiders so that their activities have been simplified as exclusively focusing on research (Borg et al., 2010). McAlpine and Amundsen’s (2016) vivid sketch of PhD students who “worked 60+ hours a week for multiple years, living in a small apartment or residence with little income, and not having much life” (p.20), also appears to represent most CIDS in the current study.

However, the present study also found other sides to international Chinese PhD students’ lives which complements McAlpine and Amundsen’s sketch. The conceptualisation of the transitions across research, personal, and social worlds played a key role in revealing the other facets. This study found that love, care, and support from the social world may not only be the source of emotional comfort and physical relief but the psychological driving force that encouraged these students to persist and to be inspired in research. Many cases in this study revealed that students fell in love and were loved by partners, cared about and were cared for by parents, enjoyed hanging out with friends or peers for fun or a tour. In general, their personal world is closely inter-linked with their social and research worlds in reaching the goal of achieving a PhD abroad on time.

A distinctive aspect here is that these students’ social world is typically interweaved with their research world. This allows them to make the most of their social time to achieve academic goals and success. For example, they enjoy travelling around the world to experience different cultures by taking the privilege of moving between research laboratories and reporting at conferences. Very often their fellow travelers are highly focused researchers as well. For example, supervisors, peers, and other researchers in the research world may become important agents in their social world where a student’s doctoral experiences can be expanded beyond small research contexts.
The shared space in the conceptualised multi-worlds presents CIDS in this study with a hybrid identity that comprises personal, professional, and sociocultural identities. With this hybrid identity, communication for and with CIDS may involve three layers: personal, professional, and cross-cultural. Empathy in understanding the challenges an international doctoral student may encounter could be a good starting point for a supervisor to initiate a conversation and to establish rapport. It is not an easy task to accomplish, though, because it involves skills and competence in cross-cultural communication besides knowledge in supervising cutting-edge scientific research.

Also, this conceptual viewpoint underscores the role of the research context and extends the context from a specific research lab to a global science world. This study supports McAlpine and Amundsen’s (2016, p.8) “nested contexts perspective” that an individual researcher is situated within institutional, national, and global contexts. Many cases in this study revealed how a small research context and wider contexts facilitated or constrained students’ doctoral experiences. This study also extends this perspective to cross-border research collaboration and researcher mobility (Marginson, 2018) that supplement or compensate local research limitations. For example, Shao and Jie highly valued their small research contexts and the international extensions as resources for their learning. Additionally, ST10, ST14, and ST21 received strong facilitation and solid research resources from laboratories cross-states and cross-nations, which enabled their enhanced competence, confidence, and on-time PhD completion. Notwithstanding the global reach of these contexts, the contexts themselves are mostly quite narrow for PhD students and hence situate CIDS mostly in their “small research contexts”, which has been the focused context of this study.

**Methodological contributions**

The methodological contributions of this study involved two aspects. The first is a research design that combined a cross-sectional study, focus groups, and a longitudinal study. This combination allows my four-year doctoral research to complete on time, with sufficient data collected in breadth, depth, over time, and with some time left for data analysis and writing the dissertation. This method could be of use for future research that has a time limit but still wishes to maximise the scope and the diversity of data to be collected.
The second contribution is the researcher’s positionality as both an insider and an outsider. I was one of the CIDS as an insider and an academic as an outsider. This positionality empowered me with a capability to approach the cohort being researched, empathy to understand their revelation, and reflexivity in interpreting and narrating the findings (Elliott, 2005). Over time, this empowerment helped to enhance the researcher’s objectivity and reduce subjectivity in the qualitative research.

The complexity of my positionality enabled me to interview a wide range of doctoral students and different levels of supervisors. Very often I reflected if without this double-sided positionality, I might not have been able to have such in-depth conversations with these highly intelligent groups of people. In turn, this reflection enhanced my self-efficacy in accomplishing this doctoral project on researching other doctoral students. A researcher’s life experience is not replicable, but this research could contribute to our understandings to the methodology in qualitative research.

Practical implications

With the surge of Chinese doctoral students in STEM fields studying in Australian institutions, a fundamental question would be how to better facilitate these students for the long-term sustainability in the doctoral education sector. This current study contributes to broadening understandings of the experiences of these students through the eyes of a Chinese researcher in Australia.

The empirical evidence of this research may have practical implications for policy-making organisations, higher education institutions, supervisors, and future CIDS. Together it aims for the sustainable growth of international doctoral education in the context of globalisation and student mobility.

First, this study provides in-depth interpretation of how CIDS have been doing in Australia for Australian policy-making organisations. With this deep understanding of their experiences, the study suggests a consistent policy for international doctoral students. The foremost is the visa. In this study, there were students who had to wait an extended period for their visas, which endangered their PhD enrolment and the scholarship. While undertaking interviews, I witnessed how a student suffered emotionally in his first year of PhD because his wife could not have her visa for entry. The couple were accepted by the same Australian university, received the same
scholarships from the Australian government, and submitted visa applications on the
same day. The husband received his visa in a couple of weeks to commence his PhD
on time, but the wife waited 11 months to get hers. On the official website, the normal
visa processing time was announced to be 21-28 days (https://www.homeaffairs.
gov.au/trav/visa-1/500-), but it seemed the couple did not receive any explanation for
the prolonged extension.

This student was extremely anxious because that year of waiting for the visa could
have totally changed his wife’s life and career trajectory. The scholarship, according
to the policy, was about to be cancelled in the sixth month. The wife started to work
in a company in the waiting period because of the uncertainty. It was likely she might
have abandoned her pursuit of doing a PhD abroad if not for the hope of joining her
husband. Anecdotally, I learned that with the extended length of time in granting visas,
many students in China had to change their applications, reluctantly disappoint their
Australian supervisors who had accepted them, and land in another country. Therefore,
for maintaining the sustainable growth in international doctoral education, the visa
policy for international students needs to be consistent. This policy may have a huge
impact on an individual, a family, as well as universities in both Australia and China.

This study can also have implications for Chinese policy-making organisations and in
particular, the Chinese Scholarship Council. As a major source country of
international PhD students in STEM fields, China needs to know the nature of
experiences of these students so as to make policies and provide support accordingly.

Second, this study may help universities and supervisors in western institutions better
understand their Chinese doctoral students. In any sense, doctoral supervision is not
an individual but a collective institutional responsibility (McAlpine, 2013). The
understandings of both students’ strengths (e.g., diligence and positivity) and
weaknesses (e.g., reluctance to speak out about problems) may result in better
communication, facilitation, and academic achievement. The narratives reported in
the findings of this dissertation may help supervisors to be aware of different situations
and interactions that lead to different outcomes. If these students’ experiences of study
abroad have been generally positive, which is mostly true as revealed in this study, the
CIDS can turn into grateful alumni, willing to contribute back to the host university
and the host country. Chinese international students are often underestimated because
of their language proficiency and cultural background which may cause inefficient communication or even miscommunication. This issue may overshadow their intellectual and social capacity in their own cultural context. If a student and a supervisor could make a joint effort to cross this border, long-lasting collaboration is most likely to sprout and grow within and after the PhD.

This study may also have implications for Chinese universities and supervisors. There are important good practices in the established Australian doctoral educational system that deserve to be learned from. What CIDS have highly valued in this system could be what has yet to be improved in the Chinese system. For example, laboratory management, safety management, technical and administrative support to PhD students. More importantly, what students value in their Australian supervisors that facilitate high success are also important. For example, weekly meetings, international networks and collaboration, a smaller number of PhD students under each supervisor, less pressure with publications, and the sole-focus on research.

Third, this study wishes to contribute to future Chinese international doctoral students in STEM fields. In general, CIDS, or seeds in the analogical meaning in this study, can become invaluable resources for the future of the science and technological world. This is because they have the opportunity to be nurtured with the most valuable nutrition from a combination of Chinese and the western educational and research systems. After a robust doctoral training, they may become competent researchers standing at the forefront of science and technology. After navigating the challenges as sojourning international students, they achieve personal transformation and international perspectives. However, as this study revealed, the process to achieve these outcomes could be extremely challenging.

This study may first help future CIDS understand more of what they can encounter while doing a PhD abroad. Then they may learn important lessons from the cases. It is important for them to know some problems that occurred to them could be in fact universal. Being aware of potential challenges, they may better focus on research instead of being distracted too heavily. Also, by learning how their senior students have dealt with specific situations and the corresponding outcomes, they may better cope with their own situations. CIDS’ success, joy, setbacks, and frustrations unfolded in this dissertation may help future students to understand what may facilitate (e.g.,
dedication, agentic communication, and taking the initiative) and what may undermine their achievement (e.g., lack of communication, lack of networks, and passiveness).

Therefore, this study is significant in making a conceptual contribution to literature and providing empirical evidence to policy-making and educational practices for both host and home countries, universities, and individuals.

**Limitations and thoughts for future research**

This study has several limitations that need to be addressed, but it also lays the groundwork for future research into Chinese international doctoral students’ experiences.

For limitations, first, the findings in this study cannot be extrapolated to all Chinese international doctoral students studying abroad due to the heterogeneity of individual experiences and the contextualised situations.

Second, it is most important to address the possible bias in the data collected in this study. Though the data in this study have been rich, students’ recount must be approached with some caution because their reflection and interpretation were from their own perspectives. This study collected data from supervisors, but for privacy considerations, supervisors and students were intentionally not recruited in pairs. A consequence of this is the lack of triangulated understanding of a specific event or situation. A reasonable future research to tackle this issue could be to follow paired supervisors and students during a PhD, but privacy and confidentiality need to be thoughtfully considered.

Third, the nature of qualitative research allowed this study to go deep, but also limited the scope of the sample size and the availability of diverse experiences. In this study, the numbers of participants classified in the last two patterns were extremely small, but it could not be claimed the small probability would apply to the overall CIDS population. Upon reflection, the reason for this limitation was not only in the small number of participants in the qualitative study but in the limitation of approachability of those students who had real problems. Throughout the investigation, it was found time and time again that Chinese students did not articulate their problems to outsiders unless there was established rapport and trust. The use of multiple approaches to
recruiting participants in this study did help to bring in students with different experiences. However, when the study went deep at the later stage and with more opportunities to get close to large numbers of CIDS, for example through state-wide or nation-wide doctoral forums, a deeply felt need was patience, care, and time to approach those who had problematic experiences in the transitions across their multi-worlds but did not have effective networks that could identify and help with their problems.

For future research, besides what has been mentioned alongside the discussion, three more points deserve to be contemplated for the future research. First, this study proposes a mixed method design, drawing on the findings from this study, but starting with a quantitative investigation to test general issues with a broader population and then identify specific cases to follow up with qualitative methods over time.

Second, Chinese students’ study abroad experiences and influences from high schools to after PhD career trajectories is an important area for future longitudinal research. This study spotted, but did not expand on, a phenomenon that those who started their study abroad journey from high school years may experience more of isolation than other CIDS who left China after undergraduate or postgraduate studies. It seemed some of these students could not establish a functional social network in the host community, nor could they maintain an alumni network with 师兄/弟 or 师姐/妹 (brotherhood or sisterhood with study mates) as other Chinese students may have.

These students were stuck in-between the home and host cultures. They struggled with their value systems and identities because they were not guided or facilitated to form those of their own when they were in late teenage years. There would, therefore, be a definite need for future longitudinal research on the experiences of these “men in the middle of the third culture” (Useem, Useem & Donoghue, 1963, 1964) or “adult third culture kids” (Fail et al., 2004) who stem from both a western and an eastern society by international study mobility. A possible area of research is to examine what occurred to them in Vygotsky’s conceptualisation of the age of puberty and “crisis at age seventeen” in his classic work Problem of Age. Other possible areas would be to investigate their emotional and relational aspects, such as a sense of belonging, the nature of relationships formed in the host community, and how they enculturate and back-enculturate in the host and home contexts.
Third, another interesting area for further research is international PhD students’ sense of belongingness in the context of globalisation and internationalisation. Sojourners’ belongingness has been a fascinating topic in research (e.g., Glass & Westmont, 2014), but there is still a gap for this special population. In this current study, some students have moved several places in their life inside and outside of China in pursuit of their studies. Along with their growth, these post-80 and post-90 generations experienced enormous socio-economic changes along with China and the world. After all these moves and changes, some of these students, future scientists and technological researchers, extended a question in contemplation, “Where is my home?” Chinese people have the tradition of returning home at the old age, as the old saying goes, a falling leaf returns to the root. However, it seemed that with the social changes and study mobility, they might get confused about where they belonged after an extended period of study abroad. This is a question that deserves social science researchers to explore in depth and over time.

**Coda**

The study investigated the nature of experiences of Chinese international doctoral students (CIDS) in STEM fields. It also examined the influences that facilitated or constrained CIDS’ positive and on-time completion of a PhD abroad. Situated in social and cultural contexts, this study developed a *three-dimensional* (continuity, interaction, and situation) *multi-world* (research, personal, and social) conceptual framework to support the narrative inquiry. Evidence shows congruence facilitates academic and personal growth, but difference does not necessarily mean constraints. Rather, it is how the transitions occur that is important in whether students could achieve their transnational PhD on time, positively, and successfully. When transitions are smooth or manageable, students grow into competent, confident, and calm researchers; when transitions are difficult or resisted, students experience problematic relationships that constrain their academic achievement. In the worst scenario, they may drop out the PhD programme.

This study also found when doing a PhD in an Anglophone country, Chinese students had to cross sociocultural, psychosocial, socio-relational, linguistic, socio-economic, institutional borders, and gender borders for female students in STEM fields. To cross
the borders and cope with the loneliness, the study argues agentic communication between agents in students’ multi-worlds can always help to avoid minor issues accrue into the unsolvable. The study also found these students had to endure social, cultural, personal, academic, and for some, geographic loneliness while doing a PhD abroad. To facilitate their own persistence in achieving the goal, these students developed their specific philosophical values and beliefs that encompass different sociocultural fundamentals, be it Chinese and western, old and new. This study contributes to the literature on international doctoral students’ experiences with conceptual, empirical, methodological, and practical implications.

Four years ago, I embarked on this journey of inquiry with a question, “How our students have been doing out there?” Now I wind this scrutiny up with relief. Joy and tear, ups and downs, everything out there for Chinese international doctoral students to experience contributes to their academic achievement or personal growth, or both in most cases.

故天将降大任于斯人也，必先苦其心志，劳其筋骨，饿其体肤，空乏其身，行拂乱其所为，所以动心忍性，曾益其所不能。

(When Heaven is about to confer a great responsibility on a man, it will first fill his heart with suffering, toil his sinews and bones, expose his body to hunger, subject him to poverty, confound his journey with setbacks and troubles, so as to stimulate his alertness, toughen his nature, eventually bridge his incompetence gap and prepare him for his mission.)

— Mencius (372-289 B.C., Zou Dynasty.)

Thanks to Mencius, now I may conclude this doctoral dissertation.
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Appendix A: Demographic information of individual participants

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<td>Yes</td>
<td>BE</td>
<td>China</td>
<td>2y industry</td>
</tr>
</tbody>
</table>

*Note. IV1 = the first interview; M = male; F = female; S = single; M = married; Grad = graduate; BE = Bachelor of Engineering; ME = Master of Engineering; BS = Bachelor of Science; Aust. = Australia.*
Appendix B: Information letters

Letter I: An information letter to students (English version)

Invitation to participate in a research project related to experiences of Chinese international doctoral students in STEM fields in Australia

Hi, I am… from… I wish to invite you to participate in my research which is investigating the experiences of Chinese STEM doctoral students in Australian higher education institutions.

Aim of the project: Though there have been a large number of Chinese doctoral students studying in STEM fields in Australia, so far there is little research on their experiences. My project aims to explore the journeys of Chinese doctoral students to develop understandings about how students can be supported to achieve success. Your participation will help generate knowledge that may help other Chinese doctoral students in Australia in the future. It may also increase reciprocal understandings for Australian research institutions.

Participation: Chinese doctoral students in STEM fields in Australia will be invited to participate in the research. Participation will involve a small group or an individual interview (depending on availability), lasting approximately 45-60 minutes. Interview questions will be related to the doctoral study experiences in Australia, such as motivations, expectations and real-life experiences. Interviews can be conducted in English or Chinese, depending on your preference. The interview will be audio recorded so that I can keep my concentration on the conversation instead of busily taking notes. Following the initial interview, you will be invited to participate in a follow-up interview to allow me to enrich my understandings of your experiences. There is no obligation to participate in the follow-up interviews.

Confidentiality: Should you agree to participate, you are under no obligation to answer all interview questions and can withdraw from interviews at any time without needing to provide an explanation. All participants will be given pseudonyms in any publication arising from the study, and every effort will be made to maintain
anonymity. All participants will receive a summary of the findings before the conclusion of the study.

This project will be carried out in accordance with the National Statement on Ethical Conduct in Human Research. No risks or likelihood of harm is to be expected in participation, but I am always ready to answer any questions that you may have about the research or about your rights as a participant. Alternatively, you may contact my supervisor by email… or contact the Human Research Ethics Committee…

This information letter is for you to keep. Your participation will prove to be significantly meaningful for better understandings in the doctoral education for international students in STEM fields. Should you wish to participate, please contact me by email or telephone… Thank you again for considering participation in this research.

Kind regards,

…
参与中国理工科博士留学生在澳留学经历研究课题的采访邀请函

亲爱的同学：

你好！我是……来自……现诚挚邀请你参加一项关于中国理工科博士留学生在澳洲留学经历的研究课题。目前在澳洲就读的中国理工科博士生为数众多，但教育学界对他们真实经历的了解仍然是空白状态。我的课题将致力于对同学们在澳学习历程和生活点滴进行解读，探索如何能够帮助博士生们或将来的博士生们获得更好的学习经历和学业成就。

如果你是来自中国大陆的理工科博士留学生并有兴趣参与我们的研究，我会对你进行小组访谈或者单独采访，每次采访时间大约在45-60分钟，采访内容主要涉及来澳留学的动机、对留学经历的期望以及在澳洲学习生活中的现实经历，采访过程中使用中英文皆可。我会用录音笔记录采访过程，以便能够专注于交流，而不是笔记。同时还希望你接受今后的跟踪采访，以便于我更好地了解中国留学生的的真实经历，当然你的意愿会得到完全的尊重。

采访过程中，你可以跳过不愿回答的问题，也有权随时退出采访。所有被采访者的个人隐私会得到妥善保护，个人信息将不会被透露给任何第三方。在本课题即将结束之时，我会给所有被采访者寄去相关研究结果的情况介绍。

本项课题将严格遵守政府对人类研究道德准则规范的相关规定，我们保证受访者的个人及隐私安全，但如果你对参与课题存有任何疑虑，我愿意详细解答。你还可以通过电邮联系我的博士导师……或者直接联系人类研究道德规范委员会（联系方式……）。敬请保留此函以方便联系我们。

万分感谢你对促进澳洲高等研究机构对中国博士留学生研究的贡献和帮助，这对将来的澳洲博士生教育具有重要的意义，对将来在澳洲留学的学弟学妹们也定然有所助益。

祝 万事如意，学业有成！

......
Letter III: An information letter to supervisors

Invitation to participate in a research project related to experiences of Chinese international doctoral students in STEM fields in Australia

Hi, my name is ... and I came from... I wish to invite you to participate in my research which is investigating the experiences of Chinese doctoral students in STEM fields in Australian higher education institutions.

Aim of the project: Though there have been a large number of Chinese doctoral students studying in Australia, so far there is little research on their experiences. My project aims to explore the journeys of Chinese doctoral students to develop understandings about how students can be supported to achieve success. Your participation will help generate knowledge that may help Chinese doctoral students in Australia in the future. It may also increase reciprocal understandings for Australian research institutions.

Participation: Supervisors with experiences of supervising Chinese doctoral students in STEM fields in Australia will be invited to participate in the research. Participation will involve an individual interview, lasting approximately 45-60 minutes. Interview questions will be related to your supervision experiences with Chinese doctoral students. Interviews can be conducted in English or Chinese, depending on your preference. The interview will be audio recorded so that I can keep my concentration on the conversation instead of busily taking notes. If you are willing to share further reflections after the interview, please send me an email so that I could enrich my understandings of your experiences.

Confidentiality: Should you agree to participate, you are under no obligation to answer all interview questions and can withdraw from the interviews at any time without needing to provide an explanation. All participants will be given pseudonyms in any publication arising from the study, and every effort will be made to maintain anonymity. All participants will receive a summary of the findings before the conclusion of the study.

This project will be carried out in accordance with the National Statement on Ethical Conduct in Human Research. No risks or likelihood of harm is to be expected in participation, but I am always ready to answer any questions that you may have about
the research or about your rights as a participant. Alternatively, you may contact my supervisor… or contact the Human Research Ethics Committee...

This information letter is for you to keep. Your participation will prove to be significantly meaningful for better understandings in the doctoral education for international students in STEM fields. Should you wish to participate, please contact me by email or phone (…). Thank you again for considering participation in this research.

Kind regards,

…
Appendix C: Consent forms

Form I: An interview consent form for students

Interview consent form

I am/was a Chinese international doctoral student from mainland China working in STEM fields.

I have read the participant information letter, which explains the nature of the research and the possible risks. The information has been explained to me, and all my questions have been satisfactorily answered. I have been given a copy of the information letter to keep.

I agree to be interviewed and the interview can be audio recorded as part of this research. I understand that I do not have to answer particular questions if I do not wish to and that I can withdraw at any time without needing to give any reason.

I agree that research data gathered from the results of the study may be published provided my name or any identifiable data is not used. I have also been informed that I may not receive any direct benefits from participating in this study.

I understand that I will not be identified in any publication arising out of this study. I understand that all information provided by me is treated as confidential and will not be released by the researcher to a third party unless required to do so by law.

Name: __________________________ (Please print)

Signature: ______________________

Date: __________________________

Contact: _________________________

Note: If this consent form is completed online, please email the completed consent form to...
Investigator’s acknowledgment

I have fully explained to __________ the nature and the purpose of the research, the procedures to be employed, and the possible risks involved. I have provided the participant with a copy of the Information Letter.

Name: _____________________
Signature: _________________
Date: _____________________
Contact: ____________________
Form II: An interview consent form for supervisors

Interview consent form

I am a supervisor in STEM fields and I have experiences in supervising Chinese doctoral students from mainland China.

I have read the participant information letter, which explains the nature of the research and the possible risks. The information has been explained to me and all my questions have been satisfactorily answered. I have been given a copy of the information letter to keep.

I agree to be in the focus group and for the interview to be audio recorded as part of this research. I understand that I do not have to answer particular questions if I do not want to and that I can withdraw at any time without needing to give any reason.

I agree that research data gathered from the results of the study may be published provided my name or any identifying data is not used. I have also been informed that I may not receive any direct benefits from participating in this study.

I understand that I will not be identified in any publication arising out of this study. I understand that all information provided by me is treated as confidential and will not be released by the researcher to a third party unless required to do so by law.

Name: ______________________ (Please print)
Signature: ______________________
Date: ______________________
Contact: ______________________

Note: If this consent form is completed online, please email the completed consent form to...
**Investigator’s acknowledgment**

I have fully explained to ___________ the nature and the purpose of the research, the procedures to be employed, and the possible risks involved. I have provided the participant with a copy of the Information Letter.

Name: ______________________

Signature:  ________________

Date: ______________________

Contact: ______________________
Appendix D: Interview questions

I. Interview questions for students in Phase I

1. Greetings: Hi, thanks so much for participating this interview. I am very appreciative of this.
2. How long have you been here?
3. What motivated you to undertake your doctoral study abroad?
   Prompts:
   - Why did you want to pursue a doctoral degree?
   - Why did you choose to study at this institution?
   - How did you find your potential supervisor(s)?
   - How did you communicate with your potential supervisor(s)?
   - What aspects have you considered as important in the decision of choosing the present supervisor(s)?
   - Did anyone help you in making the decision?
   - What challenges have you had in making the decision?
   - How did you handle those challenges?
4. How have you been experiencing your academic study so far?
   Prompts:
   - How do you think of your PhD study experiences so far?
   - How do you get the funding for research?
   - How many hours do you work on average per week?
   - How about your academic writing?
   - How is your work environment?
   - How do you think of your supervisor(s)?
   - How is your academic community?
   - How do you think of the department?
   - How well can you negotiate with people around if there are conflicts?
   - Who do you seek support from?
   - How do you think of the academic norms for your doctoral research?
5. How have you been experiencing your life of living in Australia?

Prompts:
- What about your lifestyle here?
- What about your social network?
- What support have you had?
- How do you manage the transition, or “fit-in”?
- How do you interact with or engage in the host culture?
- Do you have stressful experiences?
- How do you think of your identity as a Chinese?
- How do you think of your identity as a researcher?
- How’s the general satisfaction with your study so far?

6. How have you been navigating through the journey? And what do you think sustains you to navigate through?

Prompts:
- How do you cope with challenges in the study?
- How do you cope with challenges in daily life?
- Who do you depend on emotionally, yourself or someone else?
- What sustains you if you have any challenges?
- If there’s something bad happens, how long does it take to recover? How serious will it impact you?
- What about your social support?
- What is the most difficult challenge to obtain your doctoral degree?

7. What do you expect to achieve personally and academically through this journey?

Prompts:
- How do you define your academic achievement?
- And what factors do you think will help or impede your achievement?
- How do you navigate through the challenges?

8. Ending: Thank you very much for sharing your experiences and insights. If you have any other things you would like to share with me, please do contact me via email. And it will be really helpful if we may have a follow-up interview in the future. Best wishes with the rest of your doctoral study!
II. Interview questions for students in Phase II

1. Greetings.

2. Would you please classify (✓) the level of importance for your current study?

<table>
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<th>Important</th>
<th>Less important</th>
<th>Please briefly indicate the reasons</th>
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<td>Attending local workshops</td>
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<td>Co-nationals</td>
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<td>Social opportunities</td>
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<tr>
<td>Interaction with non-Chinese</td>
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<td>Involvement in the local community</td>
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<tr>
<td>Communication skills</td>
<td></td>
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</tbody>
</table>

3. It is interesting that you listed… as the most important factors for the success of your PhD. Could you please tell me more about that?

4. Is there anything particular in the column you put as important you want to talk about?

5. Are there any particular reasons that some factors are less important?

6. Are there any other factors not listed but you take as extremely important?

7. Would you like to list the top three factors you think crucial to the success of your PhD abroad?
8. Could you please identify how much you are satisfied with your doctoral study at the present stage? (1 = not satisfied ……10 = very satisfied)

9. What are the major challenges for the successful completion of your PhD abroad? How are you managing those challenges? And what sustains you to go through when encountering challenges? (For example, relationships, motivation, a sense of purpose, positive emotions…)

10. What do you value most through your personal study experiences in Australia? It could be anything you have learned here, taking as valuable for your academic study and personal growth.

11. What improvement could be made to have better study experiences in Australia? This is about your suggestions and expectations to Australian institutions and supervisors for reciprocal understandings.

12. Ending: Thank you very much for sharing your experiences and insights. If you have any other things you would like to share with me, please do contact me via email. And it will be helpful if we may have a follow-up interview in the future. Best wishes with the rest of your doctoral study!

III. Interview questions for students in follow-up interviews

1. Greetings.

2. How have you been experiencing your academic study so far?

3. Are there any dramatic changes, like the change of supervisors, since we last met?

4. What are the major challenges at the moment for the successful completion of your PhD? How you’re managing that challenge?

5. What sustains you to go through when encountering challenges? (relationship, motivation, a sense of purpose, little success, positive emotions…)

6. At the moment what do you expect to achieve personally and academically through this journey?

7. How are you hoping to meet your expectations?

8. What do you value most in your PhD abroad?
9. How do you think your study experiences impact your personal growth?
10. What institutional improvement could be done for better study experiences?
11. Ending: Thank you very much again for sharing your experiences and insights. The discussion has been very inspiring for me and has given me lots to think about. Best wishes with the rest of your doctoral study.

**IV. Interview questions for supervisors**

1. Greetings: Professor/Dr ____, nice to meet you. I appreciate so much that you accepted my interview invitation. Here is an information letter for you to keep. And this is an interview consent form for me to keep. Thank you. Basically, my questions will be about three points: your experience with doctoral students from China, your perspectives about their study in Australia and your suggestions for future students and supervisors.
2. Before we start the interview, may I ask if you have been to China? How familiar do you think you are with Chinese culture?
3. How would you describe your experiences of supervising Chinese doctoral students in Australia?
   - Do you think there are any common features among them?
   - Do you think there is anything unique about students from China?
   - Do you think this is anything different from local students or students from other countries?
4. How do you think of your relationship with your Chinese doctoral students?
5. Have you ever experienced difficult situations related to the supervision of students from China?
6. Can you think of any challenges that Chinese doctoral students typically experience? Why do you think that is the case?
7. As a final question, what will be your suggestions for Chinese doctoral students in Australia?
8. Ending: Thank you so much again for sharing your experiences and perspectives. The talk has been very inspiring for me and has given me lots to think about. Wish you all the best.
Appendix E: A summary of interviews with supervisors

I. Positive perspectives

My Chinese students are diligent, and they have sound work ethics and a solid academic foundation. (SP1, SP2, SP4, SP5, SP9, SP12)

Chinese students respect their teachers, always maintaining a good relationship, even after their graduation. (SP1, SP5)

They are motivated, organized, planned for themselves very well. (SP4)

By doing a PhD abroad, there are challenges, but I think they enjoyed in a professional way. They appreciated the opportunity to do this. (SP4)

II. Neutral perspectives

When Chinese students choose disciplines, they think more of future career opportunities rather than their personal interest. (SP1, SP3)

Because they are so motivated, so clear on the future plans and ambitions, we could not persuade them it would be so helpful to improve their English. (SP4)

The attrition rate of Chinese doctoral students is very low. They invest their time in study and they are young, which really helps. (SP1)

Chinese students tend to view their supervisors as a father figure, a more hierarchical relationship. (SP2)

III. Aspects to be improved and recommendations:

A thing that really holds them back is the writing. (SP1, SP2, SP5, SP7, SP9)

Chinese students need to take the initiative to present themselves and to communicate. (SP1, SP2, SP3, SP4, SP5, SP6, SP7, SP8, SP9, SP10, SP11, SP12)
Chinese students need this opportunity to push themselves out of the comfort zone. It would be a missing point if they just stick to co-national networks. (SP3, SP10)

In a hierarchical supervisory-student relationship, Chinese students are hesitant to challenge their supervisors or authorities. (SP2, SP3, SP6)

Chinese students are less capable of critical thinking than their local counterparts. (SP6, SP8)

Chinese students do not understand the local culture, so they may do something that is not appropriate in a western context. (SP1, SP5)

Chinese students have problems in the intrinsic motivation in research. (SP6, SP11)

The current generation of Chinese students is less diligent and less independent than the previous generations. (SP8, SP9)

Chinese students tend to stick with co-nationals, hardly ever communicate with non-Chinese. Language is one problem, another is they don’t know how to deal with people from other cultural backgrounds. (SP1, SP3, SP10, SP11)

Chinese students need to be more creative. (SP1, SP2, SP5)

Chinese students need to have critical thinking. (SP6)

They need to know how to expand their social and academic networks. (SP6, SP7, SP9, SP12)

Students should be very careful in selecting the supervisor. (SP1, SP2, SP9)
Appendix F: A publication on CIDS’ motivations


Motivations and Influences in Chinese International Doctoral Students’ Decision for STEM Study Abroad

Despite China’s recent remarkable performance in high-quality research, the number of students going abroad to pursue doctoral degrees in STEM fields has been rising rapidly. This study investigates the motivations of Chinese international doctoral students (CIDS) in STEM fields for undertaking a PhD abroad, and the external factors influencing this major life decision. Based on in-depth interviews with 35 CIDS from seven universities in four Australian states, the findings show that for the current generation, enriching life experiences and self-cultivation emerged as most prominent personal motivations. The choice to study abroad, though ultimately a personal decision, was influenced by a range of factors and particularly long-term cooperation between host and home institutions. Both academic and personal reputation of supervisors played important roles in the selection of host institutions. This study may be of value to supervisors and higher education policymakers, at institutional and government levels in all countries, whether ‘home’ or ‘host’, invested in sustainable international doctoral education.

Keywords: internationalization of higher education; Chinese doctoral students in STEM fields; international doctoral education; motivation; decision-making in study abroad
Introduction

In recent years in China there has been a remarkable investment and output in scientific research, yet in the meantime, the number of PhD candidates in the fields of science, technology, engineering and mathematics (STEM) going abroad to study has risen at an unprecedented rate. Chinese investment in Research and Development (R&D) was 1,331 billion RMB in 2014 alone, approximately US$200 billion (National Bureau of Statistics of China, 2014). This substantial investment in R&D has generated abundant output. The Nature Index 2016 Rising Stars, which identifies the countries and institutions showing the most significant growth in high-quality research publications from 2012-2015, indicates that 40 Chinese institutions were among the top 100 institutions worldwide, and most prominently, the nine sitting at the top of the chart were all from China (Nature, 2016). Furthermore, major expansion of higher education has boosted PhD output in China, which resulted in an average 40% annual growth of doctoral degrees across all disciplines from 1998-2006 with an ongoing trend, and China has overtaken the US to become the world’s biggest producer of PhDs since 2008 (Cyranoski et al., 2011).

Given this context, it could be speculated that most Chinese research students in STEM fields might wish to stay in one of the Chinese institutions for a PhD degree, and hence, the number choosing to study abroad would decline. Interestingly, however, a different trend has emerged. In Australia, for example, the overall annual enrolments of Chinese doctoral students increased from 1,438 to 3,374 between 2009 and 2014, and the most significant upsurge occurred in the doctoral students studying in STEM fields, growing from 471 in 2009 to 819 in 2011 and 1,360 in 2014. The increase in engineering enrolment was an extraordinary 288.7% from 2009 to 2014 (Australian Department of Education, 2015).

Therefore, the sharp contrast raises questions as to why Chinese students in STEM research fields still desire to embark on doctoral journeys abroad, and what external influences may contribute to their decision. It is critical to investigate these questions because the flow of these brightest students links to the power of an innovative economy and global competitiveness of any country (Han, Stocking, Gebbie & Appelbaum, 2015). In the wider context of previous research on ‘push-pull’ factors for international students’ motivation to study abroad (e.g., Bodycott, 2009; Chen,
and the research on the motivation of pursuing a doctoral degree (e.g., Brailsford, 2010; Guerin, Jayatilaka & Ranasinghe, 2015), this empirical study, taking Australia as the context, focuses solely on Chinese International Doctoral Students (CIDS) in STEM fields in order to incorporate in-depth interpretation of cultural insight within the larger cultural-educational context (Volet, 1999).

A Unique Cohort: New generations of PhD students in STEM fields from China

Some understanding of the contemporary social context of the cohort is essential to this study, as the present generation of CIDS is distinct from previous generations of CIDS, as well as other international students at least in three aspects. First, the majority of these students are the only child of their parents due to China’s one-child policy implemented from early 1980’s until 2015. This post-80’s/90’s generation has become a unique phenomenon in Chinese society and its unpredictable impact on China’s future has been examined by researchers in various fields such as anthropology, sociology, economics and education (e.g., Fong, 2004).

Second, this generation matured amidst the transition to a sustainable knowledge-based economy alongside the rapid economic boom in China. The Chinese government has realised the criticality of having innovators in STEM fields that are equipped for the knowledge economy with broad world visions. This reality has created enormous demand for top level scientists and researchers nationwide.

Last but not least, this generation has also experienced significant cultural reformations while growing up. Confucianism, communism and various western cultural elements have all impacted on the formation of their characters, life aspirations, values, and expectations. Family responsibility, financial improvement, social reforms, and social mobility have generated constant cultural collisions that worked together or against each other to shape this unique Chinese generation.

However, there is a paucity of front-end empirical research aimed at understanding how and why this generation of Chinese students arrive at the decision to study abroad for a doctoral degree (Bodycott, 2009). Numerous studies have identified key factors influencing international students’ motivation to study abroad, such as knowledge about host country (Mazzarol & Soutar, 2002), quality and variety of education
(Shanka, Quintal & Taylor, 2006), rankings or the reputation of the university (Wilkins, Balakrishnan & Huisman, 2011), family recommendations (Gatfield & Chen, 2006), employment during and after study (Binsardi & Ekwulugo, 2003), social and cultural experience (Li & Bray, 2007), recognition of gained qualification or the degree value in home country (Chen, 2008), English-speaking environment (Bodycott, 2009) and in particular, the financial outlay (Padlee, Kamaruddin & Baharun, 2010). These studies are however dominantly focused on international undergraduates or postgraduates in general.

Meanwhile, empirical literature on doctoral students’ motivations and aspirations for a higher degree has mostly concentrated on local students embarking on a doctoral study in their familiar home environment (e.g., Gill & Hoppe, 2009; Wilks, 2006), thus generating findings that may apply only partially to international students. Furthermore, the literature about the motivations and aspirations of students for doctoral study is mainly based on research in the social sciences disciplines (e.g., Clark, 2007) or research students in general (Guerin, Jayatilaka, & Ranasinghe, 2015), while the STEM fields at the doctoral stage remain largely unexplored. Due to the specialised nature of PhD study and the exclusive focus on research in laboratories in STEM fields, some of the previously identified factors may not apply, and it is highly likely that there are influential factors unique to this group. These factors may also vary depending on the country of origin and background of students.

Given the changing context of the research environment and the unique features of the present Chinese doctoral students, it is highly worthwhile for both home and host institutions to understand why these Chinese doctoral students are motivated to study abroad and what are the external influential factors in this major decision. This understanding is critical because it is expected to be highly related to students’ academic success, how they value and perceive their study experiences abroad, and hence, influence future decisions upon completion, which may have a further impact on the ‘brain circulation’ in creativity and innovation areas at national and global levels.
**Conceptual Framework**

To understand the motivations and aspirations of CIDS to undertake a PhD abroad, this study conceptualises motivation from a social cognitive perspective whereby student motivation was found to be the strongest predictor of their academic performance (Ning & Downing, 2010). Motivation is the product of the individual’s expectation of reaching a goal, and the value of that goal to the individual (Woolfolk & Margetts, 2013). Specifically, the expectancy-value theory posits that an individual’s expectations for success and the subjective (perceived) value of the task have a strong influence on motivation in the immediate or longer-term future. Eccles and Wigfield (2002) identified four components of subjective task-value: intrinsic value, attainment value, utility value, and relative cost. In relation to the participants in this study, intrinsic value would capture students’ interest in pursuing a higher degree for its own sake, while attainment value would refer to the importance of doing well. Study abroad could be perceived as important if individuals viewed this activity as central to their sense of self, or allowed them to express or confirm important aspects of their self-fulfilment. Utility value or usefulness would be captured in how the completion of a PhD is aligned with future plans and also ties to personal goals such as attaining a particular career the student values. Finally, the relative cost may be a consideration when study abroad requires additional personal resources and may take time away from other pursuits. The cost of postgraduate study abroad for adult students may involve but is not limited to tuition and fees, living expenses, travel costs and social costs, such as safety and racial discrimination (Mazzarol & Soutar, 2002). These components of the expectancy-value theory were used in this study as a lens through which to interpret the findings.

Two research questions were generated for this in-depth study of CIDS’ profiles regarding the decision to embark on a doctoral degree abroad:

- *Research question 1*: Why are CIDS motivated to pursue a PhD abroad?
- *Research question 2*: What external influences play a role in CIDS’ decision to pursue a PhD abroad?
**Method**

**Participants**

As shown in Table 1, participants were 35 doctoral students from mainland China, in various STEM fields in seven universities from four Australian states. The gender ratio reflects the disciplinary characteristics of STEM fields. Participants were recruited through a snowballing approach, starting with the personal network of the first author who had previous experiences of working in a research-intensive university in China. Through this personal network, participants were also recruited via Chinese doctoral student associations in several Australian capital cities.

Due to the small number of participants, the findings are not expected to be representative of all Chinese doctoral students studying abroad in STEM fields, but this cohort did display the specific features of the present CIDS generation.

**Data Collection**

In light of the paucity of research on CIDS to date, in-depth conversational-style interviews were perceived as the most suitable method of data collection (Creswell, 2013). Based on their availability, 25 students were interviewed individually, and ten were in three focus groups, generating approximately 38 hours of audio data. A semi-structured interview schedule and prompts were used to explore themes spontaneously raised by participants. All interviews were conducted in Chinese by the first author, who used her relevant experiences to position herself as an empathetic “insider” (Lee, 2015) among CIDS, which generated resonant and rich data. A guiding principle of the interviewer was to maintain genuine respect to individuals’ lived experiences without judgement.

**Data Analysis**

Interviews were audio-recorded, transcribed and translated by the Chinese researcher before importing to NVivo11 (QSR, http://www.qsrinternational.com/product), and were coded using a combination of inductive and deductive methods. Emergent categories were identified by continuous comparison and deduction (Corbin & Strauss, 2008) based on conceptual constructs of the framework of the expectancy-value theory.
The co-authors extensively discussed coding and categorising of the data so as to maintain transparency and consistency. In order to ensure that the data remained true to its source, the member-checking method was also applied by offering some participants the opportunity to review the themes and agree on the translation of quotes into English.

Findings

Research Question 1: Why are CIDS motivated to pursue a PhD abroad?

As a unique cohort, the participants appeared to be motivated to seek study abroad opportunities by a range of factors related to a combination of expectancy for success and perceived value of PhD studies. Five major motivations were identified, in order of importance: enriching life experiences, self-cultivation, broadening perspectives in research, improving career prospects, and contributing to life betterment. These themes appeared to be intertwined, and their combined influence motivated students to strive to meet high aspirations.

Enriching Life Experiences

Given that in the context of economic growth in Chinese society, the majority of people’s essential material needs are being met, it was not then surprising that enriching life experiences emerged as a dominant motivation of pursuing a STEM PhD abroad among informants. Observations similar to the following were typical: “Not everyone has the opportunity to do a PhD abroad. I wanted to experience it to enrich my life” (Feng-2-male).

Self-cultivation

Although their apparent burning curiosity to experience the world and other cultures may have been age-related, participants emphasised terms such as “change”, “challenge” and “self-cultivation”. For example, “I think doing a PhD is like a self-cultivation.” (Wei-2-female)

“Self-cultivation” (Rensheng Xiulian: 人生修炼), which is a literal translation from Chinese, emerged as most important to academic study and personal growth:
By doing a PhD abroad, we could learn much more than English and academic knowledge. Even if we will not be working in academia in the future, we would know how to behave and communicate with others, with confidence and elegance. (Feng-2-male)

As participants were at various stages of their PhD journey, it is important to acknowledge the possibility that some motivations and aspirations may have been reconstructed over time and with experience. Indeed, some mentioned how motivations had evolved towards the sense of self-cultivation:

When I first started, I thought I would surely stay in this field upon graduation; otherwise, it would be a waste of 4 years of my life. After one or two years, however, this idea gradually changed. Knowledge might not be the most important part of this process; instead, we learn a lot for our personal growth, and for our disposition. These are important aspects for everything we will do in future. (Wei-2-female)

The consistent, high value placed by most participants on self-cultivation over and above the academic study itself was unexpected. However, it reflects Chinese philosophy mentioned by some participants (e.g., Peng-1-male), “Prior to doing any business, first learn how to be a proper man; Prior to learning how to be a proper man, first set up the moral standard” (Zuoshi Xian Zuoren, Zuoren Xian Lide: 做事先做人，做人先立德)

Broadening Perspectives in Research

In the context of the advancing research capability in China, the second significant theme emerging was that CIDS wanted to follow the world renowned top-level academics and researchers, which they thought would substantially broaden their research perspectives and vision of the field. By intending to absorb the best of what the host academic context could offer, these PhD candidates were looking for valued opportunities to stand out from their peers and “experience different ways of doing research so as to enhance my competency” (Chen-2-male):

When I completed my Master’s, most of my peers found jobs in research centres, but I didn’t think I was ready to start my career in research. When my Master’s supervisor suggested to me to go out and gain a variety of perspectives, I reckoned that suited me best. (Kong-4-female)
The fact that most participants had successfully achieved prior degrees in top universities in China before embarking on their PhD abroad is noteworthy, and needs to be kept in mind when interpreting the findings of this study. Although home institutions generally had a strong reputation in scientific research and international publications, students nevertheless sensed some gaps. In particular, they appeared eager to familiarise themselves about the overall international standards for applying and managing projects, for solving problems emergent from experiments, and for reporting project outcomes. Thus, this elite group appeared to have turned to the outside world to further enhance their research proficiency in their chosen field of study, because “research capabilities are much more important than publishing papers itself” (Wang-2-male).

Some participants noted that although research investment from the Chinese government had meant upgrades in research infrastructure, there were weaknesses in the conceptualisation of academic research, and significant pressure for doctoral students to publish to graduate. Overall, participants were quite optimistic about the future and were confident that, together with other talented graduates returning to China, their enhanced proficiency and perspectives in scientific research could make a change.

*Improving Career Prospects*

Another emerging motivation was future career aspirations, which would be expected of most PhD candidates. Most valued the experiences of study abroad as they envisaged benefits for seeking positions in research: “I thought I would like to polish my skills in research so as to seek a better position in university” (Zhao-1-male).

For these CIDS, undertaking a PhD abroad was important also because of the high value placed on academic research and teaching positions in Chinese society:

*Doing research and having a career in teaching are the two most self-fulfilling jobs in (Chinese) society. There are many jobs from which you can earn money, but these two realize one’s value the most. The satisfaction cannot be matched by other jobs. Though our workload now is pretty heavy and we do not have salaries for that, I think I am quite lucky that I have the competence of doing something very interesting and being trained abroad.* (Wei-2-female)
Contributing to Life Betterment

The last broadly reported motivation was the wish to create a better life for themselves and their families. The family reason was particularly salient for over a third of participants who came from a low-income rural background. For example, Han’s parents were both chronically ill due to years of hard farm work, so her motivation was unique and unilateral:

_The only purpose is to let my parents have a better life. That’s the ultimate purpose of my life (tears in eyes). (Han-Vis-female)_

However, due to the economic gap between classes in China, the motivation of life betterment may be closely linked to socio-economic background. In comparison with students from poor rural families, those from middle or upper-class urban families did not express much concern about financial issues; instead, they valued the respect and stability that an academic life could bring. For more socially advantaged students, doctoral study abroad was almost part of their life journey and sure to happen: “Since I was young I have known I would go abroad to study, just as several of my cousins did” (Wu-1-female).

Four participants, two male and two female, revealed that they chose to do a PhD abroad because they were inspired by their partner doing a PhD abroad. They wanted to follow their beloved’s steps and create a better future together, as Gu (2-male) revealed, “if not because of her, I might never have thought of stepping out of the border to study”. Though a small group, this theme could not be ignored due to the poignantly deeply personal nature of the motivation. As the romances had typically started during their prior study years at home institutions, they naturally chose to study in the same university abroad, or at least in the same country destination.

For many students, pursuing life betterment also had a cost since it might involve giving up a permanent position and a comfortable life at home. Furthermore, there could be extra pressure if their spouse had to make career sacrifices and work in casual jobs in the host country. Other pressures included the unknown future ahead, given a possible shrinking job market after graduation. Nevertheless, few participants showed any regret about undertaking their PhD abroad, as simply put by Yan (Grad-male), “Nothing to regret, though.”
Overall, whether it was for life experiences, self-cultivation, research perspectives, future career or quality of life, students’ initial motivations and aspirations revealed the multiple values they placed on the pursuit of undertaking their doctoral study abroad. The strength of their motivations suggests that these values will sustain these CIDS’ participants throughout the course of their doctoral journey.

*Research Question 2: What external influences play a role in CIDS’ decision to pursue a PhD abroad?*

Similar to the complexity of this generation of CIDS’ motivations to study abroad, the external influences playing a role in their decision were also found to be interwoven with each other. In the present study carried out with CIDS studying in Australian institutions, it was found that in many cases Australia was not the first nor the only choice for these students, and this indeed had an impact on their experience and career path for the future. Accordingly, it was essential to investigate CIDS’ accounts of the external influences that played a role in their decision to study abroad, and in Australia in particular. Both micro-level (family, teachers and peers) and macro-level (institutional, supervision and financial) influences were identified.

The majority of participants firmly stated it was their own decision to undertake PhD study abroad, so they were willing to invest effort and be persistent. “I made the decision so that I will go for it” (Kong-4-female). Participants generally had high expectations of success, deriving from their prior academic achievement. As adult students, it was not surprising that they made the final choice, but findings showed that there were always other elements impacting on their decision. These additional elements are discussed below.

*Micro-level: Family, Teacher and Peer Influence*

*Family influence.* The family influence was found to be diverse in nature, either through support or concern. Traditionally in Chinese society, scholars were the first and the highest of the four classes, the other three being farmers, artisans, and merchants (Feng, 1947/2012). Thus parental support was an expected outcome prior to this study.
However, due to a common assumption that a doctoral journey is extremely difficult, and may even cause a “permanent brain damage”, to borrow a popular joke mentioned by one participant (Chen-2-male), some parents were quite hesitant, when learning about their child’s – in the majority of cases the only child in the family – decision to study abroad:

When I was about to start a PhD, my family were a little hesitant. In China, some people think that after doing a PhD, a person might be more introverted… I was an introvert before, so my family was worried that after doing a PhD… an autistic boy, maybe (Laugh). (Feng-2-male)

Though many of the participant CIDS admitted the dilemma in decision making, it appeared most parents were open-minded and trusted their child’s judgement:

My mum is illiterate, and my dad dropped out from junior high. I was the first student who went to university in my village and is still the only one. My decision of going abroad for my PhD was beyond their understanding, so they chose to trust me. (Wei-2-female)

Participants from poor rural families recalled that their parents, while unable to offer material wealth, provided a remarkably rich spiritual nest to accommodate and support their children’s dreams:

Though materially we were poor, in our spiritual world we were very rich. Their modest and benevolent characteristics gave me a surefooted sense all the time. (Wang-2-male)

Another family influence for a few married participants was from their parents-in-law or their spouse, “It was my father-in-law who wished me to have a western PhD degree.” (Qi-Grad-male)

The sense of family responsibility was evident in most responses. Whatever family influences they might have experienced, most of these post 80’s and 90’s only-child generation expressed how they were willing to make their entire families happy and proud of them through their hard work.

Teacher influence. Regardless of background, most participants reported that their potential for research had been identified by their teachers during their previous study,
and this positively enhanced their self-efficacy. As Chinese students call anyone who teaches them as “teacher” (Lao Shi), whether this is at primary school or doctoral level, hence the term “Lao Shi” was used to refer to anyone who taught them at any stage of their education. Indeed, it appeared that teachers’ role in shaping participants’ confidence to pursue a higher education took place at various stages, although their master’s supervisor(s) may have been the most influential:

My master’s supervisor was the person to whom I was most grateful in the world. Without his encouragement, I would not be here at all. We were like friends, but also like father and son. (Ge-2-male)

Several students described their relationship with their master’s supervisor in China as like the parent-child, deriving from an old Chinese saying, “A teacher and an apprentice are like a father and a son.” Hence the authority of teachers was not less than, if not more than, that of parents in the hierarchical Chinese society.

Peer influence. Many participants reported that having senior fellows and peers studying abroad impacted on their decision-making. As more students returned to China after study abroad, they brought home a plethora of information about research in foreign institutions. The reputation of supervisors both in scientific research and in personality was reported as spreading viva voce. Many participants reported seeking suggestions from their senior fellows, and a few had even applied to the same supervisors abroad when strongly recommended.

Overall, in terms of individual, family, teacher and peer influences, students themselves appeared to be the key decision makers. As the only child in their family, even though their decisions impacted the family’s well-being when they left without fulfilling their filial piety, most of the participant CIDS’ parents supported their children to meet their high academic expectations and achieve their dreams, whether in material or spiritual terms, enduring their own concerns and inconveniences without their child at home.

Macro-level: Institutional, supervision and financial influences

International institutional cooperation. Interestingly, with China’s transition to a knowledge-based economy, research cooperation between the CIDS’ home and host
institutions was mentioned as having played a significant role for more than a third of the participants:

*I received several offers from different countries... I came to Australia because the two labs collaborated before on some projects. The fields were close, and my host supervisor recommended me, so I finally chose here.* (Hua-Grad-male)

Home supervisors, who would be well aware of both their students’ research potential and the host supervisors’ field of interest, offered reliable channels for the best match between capable students and supervisors. On the other hand, some host supervisors, through their industrious efforts in visiting and giving lectures or workshops at Chinese institutions, were also found to be harvesting some unexpected crops:

*My current supervisor happened to be visiting my centre in China when I mentioned to my former supervisor the wish to study abroad to broaden and deepen my research knowledge in the field. My current supervisor had just got funding for a project but was short of a doctoral student to do it. As I was right in the area, it was really good timing.* (Han-1-female)

Even more fortunate for some students was to have a supervisory team across a Chinese and a host research institute. Some students admitted that they longed for the benefits of being supervised by a strong collaborative research team:

*I have four supervisors for my PhD. All top researchers. Three from here and one from China, complementing each other in the project. When I realized how strong the team was, I really wanted to be there.* (Hua-Grad-male)

**School’s and university’s ranking.** Given that university and discipline rankings are important for one’s profile and employment, students could hardly escape being influenced by the tiered hierarchies of institutions. However, a few participants revealed that: “at PhD level, a school’s ranking is more important than a university’s ranking, because it’s the research centre you are rooted in” (Sun-1-male).

**Supervisor’s personal reputation and academic profile.** In the painstaking and high-stakes process of the decision-making, the majority of participants appeared to have been proactive in the assessment of potential supervisors. To their mind, personality, international reputation and academic achievement were important indicators.
This supervisor visited my research centre and gave us a report. I was attracted by his report on a project. I had a chat with him after the presentation and found him easily approachable, even though he was an internationally important scholar. Combining both factors, I started thinking of doing a PhD with him. (Li-1-male)

For those participants who completed their previous studies in China or other countries and did not have opportunities to select a supervisor through institutional collaboration, their choice of destination was quite challenging. While some participants jokingly compared the match of a doctoral student and a supervisor to “a marriage”, a few described their application and enrolment as “a blind marriage” (e.g., Kong-female-4), because they had targeted academics through broad literature reviews, prior research experience, or just from random internet surfing (e.g., Chen-2-male).

A few participants described the methods they used to seek out any available additional information. As returnees are gradually populating top Chinese research institutions, word-of-mouth has enabled the possibility of learning more about a potential PhD supervisor than what is presented on a profile page. Another popular tactic reported was to browse websites (e.g., www.muchong.com) with particular forums of study abroad. “It is a small world in one’s research field” (Peng-1-female).

Financial influences. As tuition-paying international students, but also as mature adult students, a decisive factor was inevitably the steady and secure financial income that would cover for the high-priced tuition fees and living expenses while abroad. Many students declared that the availability of a scholarship was a key influential factor in their final choice of destination. For example, Qian reported applying for universities in the US, Japan, and Australia in the last year of his postgraduate study, and eventually making his decision based on the availability of a scholarship:

I got several offers, but this Australian university was the first one that granted me a full scholarship. I confirmed with them within two days and here I came. (Qian-1-male)

In the present study, students’ major source of financial support for their doctoral program came from a scholarship, either from the host university, the Chinese Scholarship Council, or the Australian government. Notably, there were only three out of 35 students without a scholarship. These students revealed that they relied on family sponsorship and part-time jobs to sustain the study. Although their families might have
been prepared to assist, they all awkwardly described the tremendous pressure that they felt from being the recipients of parental patronization. The availability of a scholarship, therefore, was perceived as not only providing for financial assistance, but positively contributing to their self-efficacy and self-esteem.

**Discussion**

Taking an expectancy-value perspective as conceptual grounding, this study examined the motivations for study abroad among the present generation Chinese STEM doctoral students in the context of China’s transition to the knowledge-based economy. While some themes may be common among all PhD students across countries, some may be more salient to CIDS in this study. One such example is the finding that CIDS’ most salient motivation for study abroad was the expectation of its intrinsic value to enrich their life experiences and research perspectives. This is consistent with Ning and Downing’s (2012) study, conducted with undergraduate students at the University of Hong Kong, which revealed that intrinsic motivation might play a mediator role in the learning experience and academic performance relation. Furthermore, the importance given to expectation of personal and professional growth as attainment motivation is consistent with recent findings from other specific cohorts, including Wu’s (2014) study of Chinese Master’s students in the UK, and Liu et al’s (2015) report on doctoral students and young academics within China; but it is inconsistent with earlier studies that found utility values such as economic benefit or immigration as Chinese students’ major motivations to go abroad (Bodycott, 2009; Cao, 2008).

The transition in motivations over recent years may relate to the growing strength of the Chinese economy, and the substantial investment in R&D, which signals a platform of opportunities for advancing the fields of STEM research in China. CIDS’ accounts in the present study, nevertheless, suggest that the reputation of quality education in Anglophone and European countries is still highly valued by Chinese students in choosing a foreign destination for their doctoral study, a finding that is consistent with Han, Stocking, Gebbie and Appelbaum’s (2015) study on foreign-born STEM graduate students in the USA. Therefore, Chinese doctoral students’ decision to study abroad may be driven by its intrinsic and attainment value, at the relative cost of their personal effort and time, to reach a high level of personal cultivation and
professional attainment so as to improve the quality of life for themselves and their families.

This study also probed significant influential factors in CIDS’ decision to embark on a PhD abroad. One noteworthy factor that appeared to directly impact on some participants’ PhD destination was the long-term research cooperation between their home and host institutions. The participants who commenced their PhD through this channel had been selected as most promising young researchers for study abroad within a cooperation arrangement. It is, therefore, not surprising that they were generally very satisfied with their study experiences with the host institutions and supervisors. Two elements were mentioned by these participants as related to their satisfaction: one was the doctoral project itself; another was sufficient project funding from host supervisors being secured before commencement. Once known, these students’ positive experiences could have an important effect in influencing more Chinese students at home to follow their path. Interestingly, research cooperation between China and other countries has been expanding not only at the institutional level but also at national level. The website of the Chinese Scholarship Council (2016) listed 179 cooperation programmes with 36 countries, each offering opportunities for Chinese students to undertake PhD or professional doctoral degrees abroad. Furthermore, and although host supervisors could come from different countries of origin, as found in Tanyildiz’s (2015) research, the foreign labs led by Chinese directors are more likely to be populated by students from China. Hence one could speculate that the years of Chinese “brain drain” at high end could in time benefit future international collaboration and recruitment of talented Chinese students. This is a topic worthy of further investigation.

The fact that about a third of the participants were from low socioeconomic rural backgrounds and in some cases, with illiterate parents, was unexpected. It is in contrast with other research reporting that Chinese international postgraduates were mostly from middle and upper socioeconomic backgrounds and graduated from highly selective undergraduate institutions, while rural youth was left far behind (e.g., Hail, 2015; Kim, Bankart & Isdell, 2011). Though, as Mok (2016) found, the massification of higher education in China since 1999 has not necessarily led to more occupational opportunities or upward social movement, the present study revealed that the opening of wider channels to higher education has provided opportunities for innovative talents
in research, regardless of family background and limited early education resources. As Marginson (2016) noted, “Education is a positional good subject to an absolute scarcity of high-value opportunities” (p.430). Most importantly, this study revealed that the strength of benevolent support of parents, even if they were poor and illiterate, were among some of the most important factors in shaping students’ self-confidence. When further equipped with access to a variety of scholarships, students with academic aptitude and strong motivations appeared to be able to open the door towards study abroad for higher degrees.

Methodologically, one key feature of this study was to interview these students in Chinese by a Chinese researcher who shared not only the same cultural background but also the international doctoral study experience, which effectively avoided being a “social intruder” in cross-cultural research (Shah, 2004). Due to the complexity of “Chineseness” (Tu, 2005), establishing a bond of trust and showing due respect to participants were found crucial in in-depth explorations of the innermost thoughts of participants (Lee, 2015). The personal life experience of the Chinese interviewer gave her a genuine opportunity to be an empathetic “insider” close to the hearts of participants. As researchers, we cannot escape our past histories and have “pre-judgement”, but it can be a strength that positively attributes to our deeper understandings (McNess, Arthur & Crossley, 2015).

Although a limitation of this study is that it relied essentially on one-off self-reports, the face-to-face discussion in participants’ first language was a valuable method for enabling open and rich, in-depth discussion of experiences. While participants’ accounts and reflections provided valuable understandings, the findings are limited to this particular Chinese PhD student generation, studying in STEM fields and the Australian context. Chinese students deciding to embark on a doctoral program in other fields and in other countries maybe driven by some alternative motivations and may have experienced other influences, although some general factors may be similar across disciplines and host countries. Another limitation of this study is that some participants were advanced in their studies and, therefore, may have reconstructed their initial motivations and influential factors. Future studies could adopt a longitudinal design with initial interviews conducted before students’ commence their study to reveal their hesitations, dilemmas, discussions with important parties,
considerations during the application process and the most influential factors in their actual decision-making process.

**Conclusion and Educational Implications**

This study contributes to the literature on international students’ motivation to study abroad and the influential factors in decision-making. Though completing a PhD abroad was predominantly a personal decision, important people in their life, institutional cooperation, supervisor’s reputation, school rankings and the grant of a scholarship all co-contributed to students’ final choice.

Since embarking on a doctoral journey in a foreign land is a choice of major consequences to international students, it is critical for host institutions, departments and supervisors to gain an in-depth understanding of their best and brightest students’ innermost motivations and expectations for their doctoral journey, and the influential factors that led to their decision to complete that journey abroad. This appears essential to enhance the likelihood that their aspirations are met, and their academic achievement is facilitated within the scope and requirements of a doctoral degree. Finally and most importantly, explicit reciprocal understandings between supervisors and students towards each other’s expectations of a doctoral journey in a specific field of research – and perhaps even specific research institute or programme of research – may also be critical to enhance the success of international doctoral education.

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