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Chinese International Students' Learning and Post-migration Growth Experiences: An Exploratory Study of a Foundation Studies Education Programme in Australia

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Abstract

International empirical research shows international students experience varying degrees of complex and challenging transitional issues in their host country. Chinese international students (CISs) in particular often find themselves in vulnerable circumstances due to the significant disparities between the Chinese and Australian culture. This exploratory inquiry investigates the interconnections between international students' post-migration growth, attitudes towards learning with a special focus on CISs' experience. Results from this exploratory inquiry shed some new light on the direction of future research about foundation education programmes and international students.

Keywords

Chinese international students – Foundation studies – Post-migration – Australia – transitional issues – attitudes to learning

1 Background

Beginning with the aid-focused Colombo Plan, the international education industry has evolved remarkably (Chaney, 2013). In recent years, increasing geographic mobilities of students, widening pathways of studying abroad and welcoming government policies have led to unprecedented expansion in international education in Australia (Farivar, Coffey & Cameron, 2019; Hawthorne, 2006; Phakiti, Hirsh & Woodrow, 2013). According to the Department of Education and Training [DET] (2019a), the number of international students has increased from under 100,000 in 1994 to 876,399 in 2018. Attracting students from over 200 countries, international education is now the fourth largest export industry in Australia with its economic size reaching AUD\$ 35.2 billion in 2018 (DET, 2019b, 2019c). While the international student population is becoming more diverse, China has been the largest and the fastest-growing source country since 2001 (DET, 2001, 2019d). By the end of 2018, 30% of international students in Australia are Chinese international students (CISS) (DET, 2019d). These students contribute roughly 33% of the total revenue in the industry, and the majority of them, 38.3%, are enrolled in the Australian Higher Education (HE) sector (DET, 2019e). China has also become the largest source country of international students across the Organisation for Economic Co-operation and Development (OECD) countries. On average, 22% of international students in these countries come from China (OECD, 2015). The importance of CISS in Australian HE and the complexity of cross-cultural, academic, psychological and social adaptations that these students encounter have begun to be increasingly recognised by scholars, politicians and the general public (Cao & Ly, 2015; Li et al., 2017; Pan, 2015; Wu, 2015).

In Australian universities, academic performance and English language proficiency are the two major criteria for assessing prospective international applicants (Phakiti et al, 2013). Although direct entry remains open for students who can demonstrate sufficient English language proficiency, an increasing number of Australian tertiary education providers are offering non-proficiency-test pathways, including foundation and English Language Intensive Courses for Overseas Students (ELICOS) programs, to students who do not meet the minimum cut-off language score or who wish to be better prepared for learning and living in an English-speaking environment (Dooey, 2010). Compared to ELICOS education that focuses mainly on developing international students' English language proficiency, foundation education delivers a full spectrum of subjects in English to prepare international students both linguistically and academically ready for university entry (Tertiary Education Quality and Standards Agency [TEQSA], 2019). The emergence of

university-entry pathways is to accommodate more international students and, at the same time, in response to the economic goal addressed in the National Strategy for International Education 2025 (DET, 2016). However, one criticism that it faces is its inordinate focus on the economic return of international education. This skewed view diverts the attention of education institutes away from ensuring that international students are supported in the new academic and cultural context, benefited both educationally and socially from their international experience and being seen as valued members of the local community (Ramachandran, 2011).

Once the exclusive domain of industry elites and scholars, studying overseas has become accessible by many more full fee-paying students as a result of widening university-entry pathways and economic growth (Harvey, Robinson & Welch, 2017). However, whether student graduates from these pathway programs are academically and linguistically ready for university entry is a question that remains unanswered (Birrell, 2006). Compared to the amount research in the field of ELICOS education, there is limited research in students' experiences in foundation education. As an example, Phakiti, Hirsh and Woodrow (2013) have taken the quantitative approach to study international students experience at an Australian university foundational program, but it treated international students as a whole without addressing the unique characteristics of CISS. Given the rising economic importance of international education and the sheer number of CISS in Australia, there is a strong imperative for more research on the special learning and acculturation needs of CISS, to understand their university entry readiness and to create meaningful opportunities that enhance international students' academic and living experiences in Australia.

2 Review of the Relevant Literature

2.1 *Chinese International Students (CISS)*

Australia's proximity to Asia makes it a highly attractive place for Asian students, especially CISS given that China's economic growth in the last few decades has led to a dramatic rise of middle-class families who can afford to pay the cost of overseas study (Salvatore, 2019; Zhu, 2016). Apart from the geographic proximity and the financial capabilities of undertaking overseas study, there are some other major "push" and "pull" factors that prompt Chinese parents to send their children to study in Australia. These factors include pressure from *gaokao* (The National College Entrance Examination), future migration opportunities, recognition of foreign degrees and accessible pathways to world-class universities (Yang, 2007; Cao & Tran, 2015). However, research shows CISS

are confronted by various transitional challenges, and they are more likely to find themselves in unfavourable situations in the host country (Cao & Ly, 2015; Li et al., 2017; Pan, 2015).

While most research studies about CISS are built around cultural models, an increasing number of studies have begun to look into individual factors (Cortazzi & Jin, 2011; Huang, Alfred & Cherrstrom, 2012; Wu, 2015). Considering the complex nature of CISS today and for setting the theme for this inquiry, Cultures of Learning was adopted as a foundation theory to explain the learning shocks CISS experience in Australia.

2.2 *Cultures of Learning*

Developed by Cortazzi and Jin (1996) in the context of an explosive demand for teaching and learning English in China, Cultures of Learning has been frequently applied in studies related to CISS' learning and acculturation experience (Heng, 2018; He & Hutson, 2018; Huang, Alfred & Cherrstrom, 2012;). According to Cortazzi and Jin (1996), differences in culture cultivate various attitudes, values, belief, expectations and perceptions about teaching and learning. Thus, students and teachers' beliefs about ideal behaviours in the classroom are direct reflections of their accustomed culture of learning and the cultural norms they inherited (Parris-Kidd & Barnett, 2011). In a predominately individualistic society, such as Australia, students as the centre of learning are encouraged to make sense of their meaning through experiences (Aldridge, Fraser & Huang, 1999; Parris-Kidd & Barnett, 2011), but in a predominately collectivistic society, such as China, acquisition and duplication of mentors' knowledge have been deeply rooted in students' minds (Cortazzi & Jin, 2011). Some argue that the differences between individualistic and collectivistic cultural norms lead to significant academic and social distance between two cultures of learning (Parris-Kidd & Barnett, 2011).

In the academic dimension, Chinese learners are commonly recognised as diligent but passive learners, and their learning approach focuses more on rote learning and repetition that lacks creativity (Huang et al., 2012). Parris-Kidd and Barnett (2011) observed that CISS are more used to the results-driven education system but struggle with the Australian system that emphasises developing students' independent learning and critical thinking skills. CISS are accustomed to vastly different teaching styles. One can argue that most forms of teaching in China is built on the empty-vessel model where teachers pour knowledge into the empty vessels of students, and, in contrast, Australian students have more autonomy in their learning (Grimshaw, 2007). In addition, Western teachers are also not familiar with the way Chinese learners learn (Harris, 2012). CISS may expect teachers to explain textbooks to them, however Australian teachers

may rarely bring any textbooks but expect students to participate in learning activities and communicate with others. Research shows the majority of CISS may feel uncomfortable in interactive classroom activities. The focus on communication and interaction in learning certainly creates tensions for CISS who are more used to listening to and to obeying orders from their teacher (Durkin, 2011). CISS report difficulty in transiting from the teacher-centred to learner-centred learning approach given that they are accustomed and encouraged by their parents to listen to teachers and obey teachers' instructions (Cortazzi & Jin, 2011). Furthermore, research indicates CISS tend to struggle more in a culturally diverse learning environment because they are more used to listen to standard American or British English rather than English with a strong accent, such as Indian English (Wu, 2015). Several studies have also identified that CISS encounter difficulties in adapting into Western teaching approaches and learning environment that feature individualism and independent learning (Pan, Wong & Ye, 2012; Phakiti et al., 2013; Dooley, 2010).

In the social dimension, the disparities between the two cultures become more obvious. The disparity appears when there is a mismatch between teachers' expectation of learning and students' perception of teaching. Parris-Kidd and Barnett's (2011) observed that CISS are reluctant to speak out and tend to keep quiet even when they have questions in class. This is because how students ask questions in class are quite different in China, and Chinese students are more concerned about losing face in front of others or putting others into a potentially challenging situation. Additionally, evidence shows CISS' experience a series of interpersonal and intrapersonal challenges despite trying to adapt to the new culture, and some of these challenges, such as barriers to effective communication and acculturative stress, are particularly difficult for CISS. Other research studies about CISS in Western contexts have also acknowledged the complexity of the challenges faced by these students (Chen et al., 2015; Pan et al., 2012; Qi, Wang, Pincus & Wu, 2018). During the process of adapting into a new culture, there seems to be evidence that international students' beliefs, attitudes, expectations are expected to undergo significant change (Montuori & Fahim, 2004). Thus, getting to know students' post-migration growth and their attitudes towards learning in the new environment is paramount in understanding students after a period of learning in Australia and before entering an Australian university.

2.3 *CISS' Post-migration Growth*

In the context of migration, research shows cross-cultural transition induces development in relationships, identity, intercultural competency, self-perception and philosophy of life (Tedeschi & Calhoun, 1996; Ye, 2006). Pan,

Ye, Chen, & Park (2010) defined such positive change of students' psychological development as post-migration growth (PMG). Indeed, the disparities between cultural norms could trigger stress-related growth of migrants. This is evidence that manageable acculturative stressors could contribute to positive changes and post-migration growth (Aldwin & Levenson, 2004; Gill, 2007; Warring, 2010). Past acculturation research focuses mainly on negative adaptation outcomes, which could lead to an insufficient understanding of migrants' post-migration experience (Pan et al., 2012). Recently, more research shows migrants are capable of negotiating their new culture of learning, overcoming challenging situations and adapting into the host country culture (Parris-Kidd & Barnett, 2011; Ye & Edwards, 2015). Pan et al. (2012) find CISS' personal growth from the overseas study experience appear to be a bi-dimensional construct, which consists of intrapersonal and interpersonal dimension.

2.3.1 Intrapersonal Dimension

Intrapersonal growth for CISS is manifested in three aspects: self-perception, intercultural competence and academic competence (Pan et al., 2012). According to Montuori and Fahim (2004), cross-cultural encounters create opportunities to get to know and, more importantly, to change the perception of oneself. Brown (2009) discovered that learning in a new culture encourages international students to enhance their cross-cultural communication skills and to develop intercultural competence (Gill, 2007; Pan, 2015). Research studies about CISS' post-migration experience have identified that CISS are competent in independent learning, and they are able to adopt individualistic characteristics in their attitudes as well as their way of thinking and perception (Gill, 2007; Pan, 2015).

2.3.2 Interpersonal Dimension

Moving away from the home-country social networks may create acculturative stress for CISS, but, at the same time, create opportunities for them to establish new relationships and to re-construct social networks in the new culture (He & Hutson, 2018). By making connections with the host society, international students not only become more connected with society and others, but they also become more grateful for their relationship with others (Gill 2007). The development of interpersonal skills benefits international students the most in terms of their personal development while studying overseas (Gu, Schweisfurth & Day, 2010). Further to that, CISS' interpersonal growth not only manifest in improved interpersonal skills but also reflect on a greater appreciation of the family and improvement of connections with their families who are commonly also their financial sponsors (Pan et al., 2012). Chinese families have

a substantial influence on CISS. Thus, besides the improvement of interpersonal skills, signs of a strengthened relationship with families is also an important predictor of CISS interpersonal growth. Empirical research also suggests the growth of students' interpersonal skills is a key indicator of their personal growth, especially for students who come from a collectivistic culture, such as CISS (Pan et al., 2012).

2.4 *CISS' Attitudes towards Learning Mathematics*

It has been widely acknowledged that students' attitudes towards learning mathematics have a significant influence on their academic achievement (Grootenboer & Marshman, 2016; Hemmings & Kay, 2010). Research shows students' mathematics achievement is strongly correlated with their future overall post-secondary education outcomes (Middleton, Jansen & Goldin, 2017; Scott & Ingels, 2007). According to a study conducted by Cvencek, Nasir, O'Connor, Wischnia & Meltzoff (2015) in America, students, as early as grade five, are aware that Asian students are particularly good at mathematics. As they grow up, this awareness of the Asians and mathematics stereotypes could be internalised and endorsed as personal beliefs. As mentioned in the last section, CISS' attitudes, belief and competency undergo significant change post migrating into a new country. Thus, considering the unspoken relationship between Chinese learners and mathematics and the scope of this exploratory study, mathematics was used as the targeting subject to study how CISS learning attitudes were affected by the experience of overseas study. Empirical studies have discovered that the psychological factors, such as anxiety, level of confidence, belief and attitudes towards mathematics teachers are positively related to Chinese learners' attitudes towards learning mathematics (Fan & Zhu, 2004; Wang, Zhang & Cai, 2019). This inquiry focuses on mathematics learning confidence.

Mathematics anxiety is the feeling of tension or even fear when dealing with mathematics problems and numbers in real-life or academic settings (Richardson & Suinn, 1972; Metje, Frank & Croft, 2007). It relates to under-performance in mathematics courses and avoidance of mathematics-related majors, content and careers (Metje et al., 2007; Suinn & Winston, 2003). Factors such as the inappropriate starting level of mathematics knowledge, insufficient language skills, lack of textual understanding, inappropriate use of pedagogies in mathematics classrooms and mismatched perceptions and expectations between teachers and students could all lead to students' development of mathematics anxiety (Metje et al., 2007; Sparks & Patton, 2013).

Confidence in learning is defined as students' belief about their ability to achieve a certain level of academic standard (Phakiti et al., 2013). Multiple

research shows a high level of confidence relates to high academic-efficacy and willingness to undertake subject-related activities, which could result in improved performance and independent learning ability (Caprara et al, 2008; Pastorelli et al., 2001; Lent et al., 1991; Stevens et al., 2004). Research also shows language proficiency and the lack of ability to understand mathematical concepts in English have significant negative impacts on students' level of confidence and others' recognition of their mathematics competency. This, in turn, have negative effects on students' attitudes towards learning mathematics and their academic achievement (Stoffelsma & Spooren, 2019; Mosqueda & Maldonado, 2013).

3 The Relevance of the Inquiry

Empirical research indicates CISS are more vulnerable than other international students given the disparities between the two very distinct cultures. However, to date, no known research has focused specifically on studying the interconnections between CISS' post-migration growth, their attitudes towards learning and students' academic achievement in the context of foundation education. Given the scope of this exploratory study and considering the significance of mathematics in the Chinese culture and in predicting students' post-secondary education outcomes, students' mathematics achievement was used as a representation of their overall academic achievement. By reviewing the literature, it is expected that post-migration growth intercorrelates with attitudes towards learning mathematics and mathematics achievement. This exploratory article aims to explore three broad research questions alongside more specific queries:

- (1) What is the status of CISS' post-migration experiences?
- (2) What (if any) are possible relationships between CIS' post migration experiences with perceived academic achievement, represented in this inquiry as Mathematics Confidence skills?
- (3) What are conditions that could possibly amplify (or diminish) these hypothesised relationships?

4 Methodology

4.1 *Context and Participants*

This inquiry was conducted in the context of a foundation College that offers academic pathways for international students to enter undergraduate

programs at a leading Australian university. Ethics approval was obtained from the University of Queensland Ethics Committee.

With support from the College and teachers, posters that include a short description of the project were distributed to students in class and around the campus, inviting them to participate in an online survey. Snowball sampling approaches was used to spread the word and to recruit students. Before students accessed the survey, they were asked to read the information sheet and sign the online consent form. In the end, 30 valid responses were collected, 76% of them come from the February cohort and 24% come from August cohort; 63% of them are female and 37% of them are male; all participants are between 18–20 years old. Of the 30 responses, only 18 could be considered as CIS. which prompted this inquiry to use non-parametric data analysis allowing the careful scrutiny of small sample sizes that do not represent parametric features (i.e. data that do not reflect typical population traits such as normal distribution). Consequently, the data analysis conducted for this inquiry consisted of employing contingency tables (also known as Crosstabulations) on non-parametric data.

4.2 *Research Instruments*

While only a small number of CISS participated in the survey, the pre-selected instruments with a special focus on characteristics of CISS were selectively used. Relevant items from the Post-Migration Growth Scale (PMGS) and selected scales from the Fennema-Sherman Mathematics Attitudes Scales (FSMAS) were used as references to investigate students' individual post-migration growth and their attitudes towards learning mathematics at the research site. The PMGS is a 14-item scale that consists of two sub-scales: interpersonal growth scale and intrapersonal growth scale. This instrument was specifically designed for measuring CISS' post-migration growth and was rigorously tested in quantitative studies conducted in both Hong Kong and Australia. The instrument shows satisfactory concurrent validity and high internal consistency reliability in measuring CISS' individual growth in the host country (Pan et al., 2012).

The FSMAS has 108 items in nine sub-scales, which can be combined or used individually (Fennema & Sherman, 1976). It is one of the most prominent and extensively used psychometric instrument for investigating people's attitudes towards learning mathematics (Mulhern & Rae, 1998). The full scales are the teacher scale, the confidence scale, the anxiety scale and the usefulness scale, and the shortened scale is named parents attitude scale. The Cronbach's alpha coefficients for the full scales and the shortened scales provided satisfactory outcomes in empirical studies (Fennema & Sherman, 1976; Mulhern & Rae,

1998; Sachs & Leung, 2007). Owing to the exploratory nature of this inquiry, relevant items from the aforementioned psychometric scales were selected for analysis in order to capture a glimpse of CISS' attitudes towards learning mathematics during their foundation study. Other items were removed because they do not address the research questions.

In total, this survey contains 83 items which are the combination of 12 demographic questions, 14 items from PMGS, 48 items from FSMAS and 9 items from the shortened FSMAS. Participants were asked to give their response on a five-point Likert-type scale (from '1' = 'Strongly Disagree' to '5' = 'Strongly Agree') about the degree to which they disagree or agree with the questions.

Due to the administrative complexities and time restriction, students were asked to provide their mathematics test results. Using self-reported grades rather than obtaining grades directly from the institution database could influence data reliability. Table 1 provides a snapshot of the demographic characteristics of the sample.

TABLE 1 Frequency distribution—Unit of analysis (N=18)

	Number	Percent %
Gender		
Male	6	33.3
Female	12	66.7
Total	18	100
Previous Schooling		
Government Schooling	13	72.2
Private School	3	16.7
International Programme	1	5.6
Catholic School	1	5.6
Total	18	100
Self-reported Academic Scores (Grade Point Average)		
60 and below	5	27.8
61–70	4	22.2
71–80	3	16.7
81–90	2	11.1
90 and above	4	22.2
Total	18	100

TABLE 1 Frequency distribution (*cont.*)

	Number	Percent %
<i>How long have you been living in Australia?</i>		
less than 6 months (<6)	4	22.2
6–12 months ($6 \leq \text{months} \leq 12$)	14	77.8
13–18 months ($13 \leq \text{months} \leq 18$)	0	0
19–23 months ($19 \leq \text{months} \leq 23$)	0	0
above 24 months ($24 \leq \text{months}$)	0	0
Total	18	100
<i>Have you experienced paid work in Australia?</i>		
No	17	94.4
Yes	1	5.6
Total	18	100
<i>Have you participated in any voluntary activity in Australia?</i>		
No	14	77.8
Yes	4	22.2
Total	18	100
<i>Math Confidence</i>		
<i>“I can handle most subjects okay, including Math”</i>		
Strongly Disagree	0	0
Disagree	6	33.3
Neither Agree nor Disagree	6	33.3
Agree	5	27.8
Strongly Disagree	1	5.6
Total	18	100
<i>Intrapersonal Skills</i>		
<i>I have become more down-to-earth.</i>		
Strongly Disagree		
Disagree		
Neither Agree nor Disagree	7	38.9
Agree	10	55.6
Strongly Disagree	1	5.6
Total	18	100

TABLE 1 Frequency distribution (*cont.*)

	Number	Percent %
<i>Interpersonal Skills</i>		
<i>I am able to relate to others with a peaceful mind.</i>		
Strongly Disagree		
Disagree	1	5.6
Neither Agree nor Disagree	5	27.8
Agree	11	61.1
Strongly Disagree	1	5.6
Total		100

5 Analysis and Discussion

5.1 *What is the Status of CIS's Post-migration Experiences?*

The majority of CISS who participated in this survey graduated from public schools with only three students graduating from a private institution, one student graduated from an international school and another one graduated from a Catholic school (see Table 1). This may indicate that public schools are the predominant type of schools for the home contexts of the CISS. It is important to point out that in China, the history of the private school system is much shorter than that of the public system. This is because private schools in China were only allowed to recruit students from the public after the Open-Door Policy introduced in 1978, and the re-emergence of it is solely in response to economic development rather than religious purposes like most countries in the West (Kwong, 1997). Furthermore, the sheer proportion of students from public schools indicates the competitive nature of the Chinese educational system, which makes the 'new rich' Chinese families look for alternative university pathways for their children (Young, 2018).

There is a concerning number (28%) who indicated ambivalence and disagreement to the notion of gaining self-confidence and overcoming difficulties after relocating to Australia consistent with scholarly work about stress that accompany post-migration experiences of learners (Tedeschi & Calhoun, 1996; Qi et al., 2018). More importantly a majority of the CIS respondents (72%) report that they seem to have adjusted well in a new country reinforcing the works of Aldwin and Levenson (2004); Gill (2007) and Warring (2010).

Most of the respondents (except for one) have never experienced paid work in Australia, and only a few of them have participated in volunteer work in

Australia (see Table 1) despite having the right to work in Australia. Loo (2016) suggests engaging international students in career development not only builds their career management competencies but also creates more language experience for students and enhances their experience of cultural adaptation. For international students, especially CISS, who come from a very different cultural background, the first-year overseas study experience plays an essential role in influencing their post-migration behaviours, attitudes, belief and expectations (Li et al., 2017). Given the majority of students have limited or no working experience in Australia, getting to know their post-migration growth becomes even more important.

Spearman's rho correlation coefficient was used to test the hypothesized relationships between Post-migration experiences and key variables pertaining to respondents' attitudes (i.e. interpersonal skills and intrapersonal skills) and perceived academic achievement. The results of the Spearman Rho tests revealed several important findings: see Table 2.

5.2 *What Relationships Exist: Mathematics Confidence and Self-Reported Academic Success?*

There was a significant correlation between *Mathematics Confidence* and *Self-Reported Academic Success*, ($r_s [18] = .462, p < .05$). The effect size of this relationship was small (Cohen, 1988). Squaring the correlation coefficient reveals that 21.4% of the variance in the percentage of self-reported academic success was explained by the presence of mathematics confidence skills and vice-versa. Henceforth, mathematics confidence skills, which represents the respondents' measurable change in their post-migration learning experience was used as the dependent variable for the subsequent analysis.

5.3 *What Relationships Exist: Mathematics Confidence and Interpersonal skills?*

There was also a significant correlation between *Mathematics Confidence* and *Interpersonal skills*, ($r_s [18] = .532, p < .05$). The effect size of this relationship was small (Cohen, 1988). 28% of the variance (after squaring the correlation coefficient) in the percentage of Mathematics confidence was explained by the presence of Interpersonal skills and vice-versa. Similarly, 28% of the variance in the percentage of Interpersonal skills was accounted for by the presence of Mathematics confidence.

5.4 *What relationships exist: Mathematics Confidence and Intrapersonal skills?*

There was a significant correlation between *Math Confidence* and *Intrapersonal skills*, ($r_s [18] = .618, p < .00$). The effect size of this relationship was moderate

TABLE 2 Spearman correlation matrix

Measure	1	2	3	4	5	M	SD
<i>Math Confidence—</i> I can handle most subjects OK including Mathematics	—	.462*	.532*	.618**	.325	3.06	.938
<i>Self-reported Academic</i> Scores— These are my most recent academic marks in Mathematics	.462*	—	.381	.398	2.78	2.78	1.555
<i>Interpersonal Skills—</i> I am able to relate to others with a peaceful mind	.532*	.381	—	.092	3.67	3.67	.686
<i>Intrapersonal Skills—</i> I have become more down-to-earth.	.618**	.398	.092	—	3.67	3.67	.594
<i>Length of Stay—</i> How long have you been in Australia	.325	-.237	3.67	.147	—	1.78	.428
M	3.06	2.78	3.67	3.67	1.78		
SD	.938	1.555	.594	.594	.428		

* $p < .05$; ** $p < .001$

(Cohen, 1988). Squaring the correlation coefficient reveals that 38% of the variance in the percentage of *Mathematics Confidence* was explained by the presence of Intrapersonal skills and vice-versa. This result is consistent with the empirical research finding that intrapersonal growth correlates with academic competence (Pan et al., 2012), and the fact that mathematics anxiety and belief about the usefulness of mathematics are positively related to academic performance (Metje et al., 2007; Stipek, 2002).

5.5 *What conditions amplify (or diminish) these hypothesised relationships?*

In order to be able to answer this question, a non-experimental correlational study (employing cross-tabulations) was pursued as the methodological approach of this inquiry. This article contends that CIS's post-migration growth experiences have an impact on CIS's perceptions of academic achievement. This hypothesized relationship is tested in the subsequent sections of

this paper with the use of cross tabulations analysis (also known as contingency tables) based on the sample for this inquiry. In the subsequent cross-tabulations, the columns are treated as the independent variables and the row is seen as the dependent variable. The universal hypothesis tested in the cross-tabulations is that both variables are independent and have no relation with each other. Moreover, these subsequent analyses interrogate “measures of association”—describing the strength of dependence between two variables. In cross-tabulations, one of the most powerful ways of interpreting measures of association is through the Proportional Reduction of Error (PRE): quantifying the extent to which the independent variable helps in predicting the dependent variable (Liebetrau, 1993). The statistical tests employed are Goodman and Kruskal’s Gamma (γ), as well as the measurement of change indicated by the percentage point change or the epsilon (ϵ) (Liebetrau, 1993). Essentially the analyses tried to establish “correlation” among variables and therefore no attempt is made to make definitive causal relationships.

Undertaking cross-tabulations analysis produced statistically significant results (approx. sig. for Gamma is less than .05). An examination of the absolute value of Gamma (.735) means that there was a 74% reduction in error in predicting the dependent variable when the independent variable was taken into account. In other words, the statistically significant relationship between the dependent and the independent variable is moderate. An interpretation of this could be that information about Interpersonal skills, specifically the respondents’ ability to relate to others with a peaceful mind greatly helps in improving the prediction of the outcomes of the perceptions of *Mathematics Confidence*: “I can handle most subjects including mathematics” by about 74%.

Investigating possible relationships through cross-tabulations analysis revealed statistically significant results (approx. sig. for Gamma is less than .05). An examination of the absolute value of Gamma (.829) means that there was an 83% reduction in error in predicting the dependent variable when the independent variable was taken into account. The statistically significant relationship between the dependent and the independent variable is strong. Information about Intrapersonal skills, specifically the respondents’ perception of being more down-to-earth assists greatly in improving the prediction of the outcomes of the perceptions of *Mathematics Confidence*: “I can handle most subjects including mathematics” by about 83%.

The preceding analyses provide empirical proof that both Interpersonal and Intrapersonal skills were directly and positively correlated with the respondents’ perceived *Mathematics Confidence*. A closer examination of the results revealed that for the sample used for this inquiry, the reported Intrapersonal skill of “I have become more down-to-earth” has a higher positive correlation and a greater

effect size to the variable of *Mathematics Confidence*. In order to determine conditions that could possibly amplify (or diminish) the hypothesised relationships key variables pertinent to CISS' post-migration experience, a series of partial tables—introducing control variables—between *Mathematics Confidence* and Intrapersonal Skill using Crosstabulations analysis were generated.

To determine conditions that amplify or diminish the positive correlation between the key variables, what would be more insightful would be to add *Length of stay in Australia* (as a controlling variable) to the existing independent variable (Intrapersonal skill) and see how this addition makes an impact on the dependent variable (*Mathematics Confidence*).

Table 3 revealed interesting results. A careful inspection of the partial tables reveal that the controlling variable of Length of Stay is a condition that affects original hypothesised relationships. A careful inspection of the epsilon (or Percentage Point change) reveals a definite impact. The partial scores provided greater explanatory power by introducing the control variable Length of Stay: The category of “Disagree” and “Neither Agree nor Disagree” decreased by 5%. At the same time, the category of “Agree” increased by almost 9%. These crosstabulations were also statistically significant, with $\gamma = .913$ indicating that there was a 92% reduction in error in predicting the outcome variable.

In other words, Table 3 revealed that the impact of the Intrapersonal Skill: “I have become more down-to-earth” on perceived *Mathematics Confidence*, vary according to the Length of Stay of the respondent. The data suggests that a length of stay which is less than 6 months has no statistical significance, while respondents who have indicated a length of stay of between 6 to 12 months recorded a marked positive impact on the dependent variable—perceived *Mathematics Confidence*.

6 Limitations and Future Research Direction

There are several limitations of this inquiry that should be noted. First, using self-reporting approach to collect students' GPA data is less reliable compared to obtaining data directly from the research site. Future research should consider longitudinal studies that partner up with the research site to get more administrative support and resources. Second, only students' Mathematical achievement was collected for analysis. It is acknowledged that CISS' academic achievement should include more than one subject. Third, the small sample size limits the scope of analysis that could be undertaken. Future research should consider more creative recruiting strategies that are attractive to the target group.

TABLE 3 Partial Tables: Math Confidence * Intrapersonal—I have become more down-to-earth * How long have you been living in Australia?

Less than 6 months	Math Confidence—I can handle most subjects including Math	Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree Total
6–12 months .913; p = .000	Math Confidence—I can handle most subjects including Math	Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree Total
Total	Math Confidence—I can handle most subjects including Math	Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree Total

* $r = .913$; $p < .001$ (FOR PARTIAL TABLES 6–12 MONTHS)

7 Our Reflections

This exploratory study focusing on a Foundation Education Programme in Australia allowed us to paint a preliminary picture of CISS. From the cultures of learning perspective used in this inquiry, a speculative identity of CISS emerges: He/She is a young adult who undoubtedly is experiencing the various stresses of being in a new context. Nonetheless, this young adult gains confidence in learning mathematics. Our preliminary tests indicate that the

Intrapersonal—*I have become more down-to-earth*

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total
		50%	50%		50%
		50%	50%		50%
		100%	100%		100%
	60%	12.5%			28.6%
	40%	25%			28.6%
		62.5%			35.7%
				100%	7.1%
	100%	100%		100%	100%
	57.1%	20%			33.3%
	42.9%	30%			33.3%
		50%			27.8%
			100%		5.6%
	100%	100%	100%		100%

longer time spent in the new country positively correlates with the acquisition of greater confidence. More importantly, selected intrapersonal and interpersonal skills employed in this study pointed to how they can possibly contribute in shaping this identity of the CIS—confident, sociable and more grounded. We recognise that what would greatly increase the insights derived from this study would be an attempt to carefully document and describe changes in math confidence experienced by CISs in conjunction with relevant aspects of cultures of learning perspectives.

This exploratory inquiry set out to accomplish three key questions: (1) determining the status of CISS' post-migration experiences; (2) discovering possible relationships between CISS' post-migration experiences with perceived skills—interpersonal, intrapersonal and academic achievement; and (3) measuring the conditions that amplify or decrease these hypothesised relationships between CISS' post-migration experiences and perceived new skills. In doing so, a survey of current students in an Australian foundation program was undertaken. Due to a relatively small sample that participated, the subsequent analyses undertaken were a series of non-parametric tests: the conduct of a Spearman correlation test and the implementation of a series of cross-tabulations.

The inquiry revealed statistically significant positive correlations between CISS' post-migration experiences with selected intrapersonal, interpersonal as well as perceived academic achievement skills. Furthermore, the inquiry provided evidence that in this relatively small sample, intrapersonal skills registered higher positive correlations with variables that measured academic achievement, represented here as *Mathematics Confidence*. Furthermore, with the inclusion of a control variable represented by length of stay in the new country, the inquiry was able to prove that a longer length of stay translated to perceived higher levels of academic achievement—represented by *Mathematics Confidence*—by the respondents.

Empirical research about post-migration growth is still at a developing stage, and there is only a limited number of studies that have attempted to quantify this type of personal growth without mentioning studies that focus solely on a particular ethnic group, such as CISS (Pan et al., 2012). The authors envision that this article can engage with scholarly attempts to investigate this incipient area of research. A critical engagement with current theories of CISS's post-migration experiences and hypothesised relationships these may have with academic achievement provides valuable reflection as well as concrete policy and practice implications. Another potentially fertile research trajectory that may be pursued is the exploration of how identities of CISS are shaped alongside their academic achievement performance and other important variables such as length of stay in the new country.

For Higher Institutes of Learning such as universities and foundation colleges that accept CISS and similar international students, recognition of positive relationships between the development of interpersonal and intrapersonal skills to academic achievement could be valuable inputs in devising curricular offerings that recognise these critical overlaps. More specifically for foundation colleges, and other similar international education providers, that offer leadership or inter-cultural programs for students, there appears to

be a lack of tailored career development service that can support the special needs of international students. One specific suggestion that this inquiry proposes is the need for education providers to engage international students in career development at an earlier stage, which could potentially enhance students' post-migration social experiences, improve their language proficiency, develop students' cross-cultural competency and ultimately make them better prepared for studying, living and working in Australia (Loo, 2016). For scholars and practitioners engaged in this scholarly field, interrogating the findings of this exploratory study with the end of replicating it with a bigger sample and more diverse contexts could provide valuable analytical illumination to an emerging area of study.

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Wenbo Zhang is a teacher at Indooroopilly State High School, Queensland Australia. Wenbo is also a recent Master of Education Studies graduate from the University of Queensland. As a Chinese international student himself, Wenbo is devoted to studying the academic and personal development of international students, especially students from China, in Australian context. Thanks to his background in statistics, Wenbo has a strong interest in quantitative research methodology with undivided attention in studying Chinese international students' post-migration development. As a critical thinker and a 21st-century global citizen, Wenbo is determined in pursuing research inquiries into Chinese international students, international education, and global citizenship. His multicultural background and learning and working experience in Australia offered him unique insights into relevant topics in the field of international education.

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