A STUDY OF THE POST-SECONDARY OUTCOMES OF IB DIPLOMA ALUMNI IN LEADING UNIVERSITIES IN ASIA PACIFIC

MOOSUNG LEE
UNIVERSITY OF CANBERRA

JOHN A SPINKS
UNIVERSITY OF HONG KONG

EWAN WRIGHT
UNIVERSITY OF HONG KONG

JENNY DEAN
UNIVERSITY OF CANBERRA

JI HOON RYOO
UNIVERSITY OF VIRGINIA

THE RESEARCH TEAM APPRECIATES THE FINANCIAL SUPPORT OF THE IB FOR THIS RESEARCH PROJECT. THE RESEARCH TEAM ALSO THANKS BRADLEY SHRIMPTON FOR HIS INSIGHTFUL COMMENTS AND SUGGESTIONS ON EARLIER DRAFTS OF THIS REPORT. THE TEAM ALSO APPRECIATES KAI-MING CHENG, LEONE NURBASARI, GRAHAM MOLTBY, AND KING CHOW FOR THEIR SUPPORT FOR THIS PROJECT. THE VIEWS EXPRESSED IN THIS REPORT ARE THE SOLE RESPONSIBILITY OF THE RESEARCH TEAM AND DO NOT NECESSARILY REFLECT THE VIEWS OF THE INTERNATIONAL BACCALAUREATE.

To cite this article: Lee, M., Spinks, J.A., Wright, E., Dean, J., & Ryoo, J.H. (2017). *A Study of the Post-Secondary Outcomes of IB Diploma Alumni in Leading Universities in Asia Pacific: Report for the International Baccalaureate Organization*. Bethesda, MD, USA: International Baccalaureate Organization.

Corresponding researcher:
Dr. Moosung Lee
Centenary Professor,
Research Group for Educational Leadership & Policy
C 90 Building 6
University of Canberra
Bruce Canberra ACT Australia
Telephone: (61) 6201 2583
Email: MooSung.Lee@canberra.edu.au

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The International Baccalaureate Diploma Programme (IBDP) is offered by schools in 147 countries and many IBDP alumni are admitted to universities worldwide (IB, 2017a). This project sought to explore the post-secondary experiences and outcomes of IBDP alumni at three leading universities in Asia Pacific; including two universities in East Asia (University A and University B) and one university in Australia (University C). The research team implemented a three-phase, mixed-method study, the phases of which were analytically-separate but conceptually-integrated (Creswell et al., 2003), based on in-house GPA data, online survey data (n = 845 from the three universities), and interview data (n = 54 from the three universities). There were four major objectives: 1) To document IBDP alumni academic performance longitudinally with a comparison with the academic performance of non-IB alumni; 2) To investigate perceptions of 21st century skills held by IBDP alumni, and to compare with non-IB alumni; 3) To document IBDP alumni involvement in extra-curricular activities, compared to their non-IB counterparts; and 4) To explore the perceptions of IBDP alumni about how the IBDP assisted their post-secondary studies and their broader experiences at each institution.

SUMMARY OF FINDINGS

- In-house enrolment data for University B and University C showed that the number of IBDP alumni admitted had increased continuously over time. For University B, IBDP alumni increased from 5.8 percent of the 2013 cohort to 8.0 percent in 2015, while at University C the proportion of IBDP alumni increased from 5.8 percent in 2012 to 7.6 percent in 2014. In terms of programme of study, Business and Economics were among the most popular chosen by IBDP alumni at both universities.
- For University B, in-house data provided details of the cumulative GPA of each IBDP alumni student (2014 to 2016). Findings revealed that the IBDP score of individual students was a significant predictor of GPA. We also observed the significant role of the IBDP score in the growth of GPA over time. This suggests that the IB score is an important predictor of IBDP alumni's academic performance at university, although there was variation across faculties.
- For University C, in-house data provided the GPA of both IB alumni and non-IB alumni (2012 to 2014). First, the only significant predictor in all cross-sectional and longitudinal analyses was the student entrance exam score, which was always positively associated with university GPA. Second, overall, there was no significant difference in academic performance between the IBDP alumni and their non-IBDP counterparts. When we controlled for student entrance exam score and certain student characteristics, longitudinal analyses of the three cohorts showed no significant difference in the change of GPA between the two student groups. We found similar patterns when looking closely at within faculty analyses. Third, despite there being no significant difference in the change of GPA between the two student

groups, it appears that the trajectory of GPA over time among IBDP alumni was more dynamic (or fluctuated) than their non-IB counterparts.

- To investigate 21st century skills perceived by IBDP alumni and non-IB alumni, we conducted a validation study of an online survey instrument designed to measure 21st century skills of university students. We found that on average IBDP alumni at University B and University C reported higher levels than their non-IB counterparts on almost all domains of 21st century skills including Critical Thinking, Global-mindedness, Leadership, Time Management, Communication, Creativity, and Cultural Sensitivity. IBDP alumni in University B and University C were most confident in their capacity for Cultural Sensitivity and Global-mindedness. In addition, IBDP alumni at University B perceived a strong capacity for Critical Thinking.
- The validated survey also asked participants to share their views on how well their senior secondary education programme prepared them for university. Compared with their non-IB peers, the IBDP alumni in both University B and University C were consistently more confident about their preparation for university studies, including for academic content and assessments. In addition, the IB alumni were more likely than their non-IB counterparts to perceive that their secondary education equipped them with 21st century skills (termed 'soft skills' in the survey). Put another way, IBDP alumni were more confident that their senior secondary school experiences prepared them for university studies and 21st century skills compared to students from programmes.
- In our interviews, IBDP alumni at all three universities were highly positive about their IBDP learning experiences. Participants commented on the "skill-based" nature of the IBDP and the "well-roundedness" this developed in students. There was a perception that the IBDP was unique in supporting the development of 21st century skills. In particular, Creativity, Action, Service, Extended Essay, and Theory of Knowledge courses were highlighted as providing opportunities to develop communication, creativity, critical thinking, global-mindedness, cultural sensitivity, and leadership skills. This was perceived to translate into university studies through, for example, greater engagement in classroom discussions, an ability to generate more innovative ideas, a capacity for global perspectives to understanding issues, and to take leadership in group projects. However, taking a critical perspective of the findings, it could be also said that self-perceived strength of IBDP alumni for 21st century skills stemmed from internalising IB "branding" about progressive and holistic educational approaches as well as characteristics of their schooling environment and family background.
- Self-perceived weaknesses and disadvantages reported by IBDP alumni in our interviews were more often described in terms of knowledge of academic content rather than 21st century skills. It was noted at all three case universities that students schooled in local and other regional education systems often had deeper mathematical or STEM knowledge. Other important issues included participants in University B describing that an emphasis on global-mindedness in the IBDP can lead

to a lack of knowledge of localised current affairs, culture, and language. Moreover, participants in University C explained how the heavy workloads and diverse components of the IBDP can result in high levels of stress and anxiety among students.

- There was somewhat of a divide in terms of reported difficulties and barriers in adapting to university. Most participants at University C in Australia reported how the IBDP had prepared them well for a "skill based" and "student-centered" approach to teaching and learning at university, while IBDP assessments were described as well-aligned with styles of university assessments. Conversely, some IBDP alumni at Universities A and B noted that pedagogical approaches and assessment styles were more aligned with local education systems in East Asia. A "teacher-centred" approach was described as limiting opportunities for student interaction, while assessments at university were characterised as "examination heavy" and more often based on multiple choice questions and short answers.
- A remaining question is why there was no significant difference in academic performance between the two student groups at University C, despite the IBDP alumni's high confidence in their 21st century skills and positive views of IBDP experiences. On the one hand, it may simply be that we controlled for entrance exam scores in our analyses, or that admissions policies and procedures accounted for any differences in university preparedness between IBDP and non-IBDP alumni. On the other hand, our interview data provided other potential explanations. Participants often described that they lack a certain set of "hard skills" related to a scope of core academic content, especially in mathematical and STEM knowledge. Further, pedagogical approaches and assessment styles at University A and University B were perceived to provide few opportunities for students to showcase their strengths in 21st century skills. Such challenges were not found in University C in Australia. However, we speculate that the perceived benefits of the IBDP for university studies may not be exclusively available to IBDP alumni, given that non-IBDP counterparts may have also been exposed to "student-centered" and "skill-based" approaches through the local education system in Australia.
- Survey findings on participation in extra-curricular activities between IBDP and non-IBDP alumni in University B and University C were quite similar. The results showed that most IB alumni and non-IB alumni were involved in local student-based activities "at least once since starting university", while both student groups in the case universities reported limited participation in internships and/or international activities. Some interview participants explained that engagement with Creativity, Action, Service did encourage them to pursue extra-curricular activities at university and get involved with activities outside of classroom-based learning. Despite this, IBDP alumni at University B also reported being discouraged from engaging in extra-curricular activities due to the student society culture and activities not being conducted in English, while participants from University C noted that interest in extra-curricular activities often developed independently of their experiences during the IBDP.

1. INTRODUCTION

1.1. RESEARCH BACKGROUND AND GOALS

The IB Diploma Programme (IBDP) is the most commonly adopted curriculum worldwide by international schools. The number of schools adopting the IBDP around the world has increased continuously in response to burgeoning demand for both an internationally oriented education and an internationally validated path to higher education institutions (Lee et al., 2014). In the five years between 2011 and 2016 the number of schools offering the IBDP increased by one-third (32%) to reach 2,908 worldwide with especially strong growth in Asia Pacific (IB, 2017b).

Despite the fast and continual growth (and by implication, popularity) of IBDP schools in recent years, empirical studies exploring the impact of the IBDP on the learning outcomes in higher education settings are still scarce. Specifically, little is known about the post-secondary experiences and outcomes of IBDP alumni studying at leading universities around the world. This research gap is particularly important, given that annually, many IBDP students send applications to the world's leading universities. Lee et al.'s (2014) study of the alumni of IB schools in China found that a vast majority of IBDP alumni had been admitted to higher education institutions ranked among the top universities in the world. Mathews and Hill (2005) reported a similar pattern that alumni of IB schools in the U.S. were significantly more likely than non-IB alumni to be admitted to major U.S. universities. While detailed findings are still thin on the ground, there is an emerging line of research reporting that IBDP alumni are successful with their studies once at university. For example, Taylor and Porath's (2006) case study at two public schools in Canada provided a finding that IBDP alumni perceived that the IBDP addresses a broad range of topics and encourages them to think critically. Similarly, in the context of Australia and New Zealand, Coates et al. (2007) found that IBDP alumni were better equipped than their non-IB counterparts with academic skills including critical thinking skills. A recent study conducted in the University of Western Sydney supports this finding; IBDP alumni were found to be more confident than non-IB alumni in employing critical thinking skills for their university studies (Cole et al., 2015). Another recent study conducted in the U.S. documented that IBDP alumni perceived that the Extended Essay and Language A were particularly helpful for their university studies. The participants also perceived a greater capacity to manage their study time and to meet expectations required by degree-level courses, compared to non-IB alumni (Conley et al., 2014). Lastly, a survey of university admissions officers in the UK revealed a perception that the IBDP is more successful than A Levels in fostering a global outlook, independent inquiry, open-mindedness, and self-management skills, while A Levels provide students with a greater depth of subject expertise (ACS Research, 2017).

To build on this emerging line of empirical studies, the primary goal of this project was to explore the association of IBDP participation with post-secondary outcomes at three leading universities in Asia Pacific. To this end, this project focused on four goals:

- To document IBDP alumni academic performance longitudinally with a comparison with the academic performance of non-IB alumni;
- To investigate perceptions of 21st century skills held by IBDP alumni, and to compare with non-IB alumni;
- To document IBDP alumni involvement in extra-curricular activities, compared to their non-IB counterparts; and
- To explore the perceptions of IBDP alumni about how the IBDP assisted their post-secondary studies and their broader experiences at each institution.

1.2. RESEARCH DESIGN

We planned a three-phase, mixed-method study, the phases of which were analytically-separate but conceptually-integrated (Creswell, Plano, Gutmann, & Hanson, 2003), for the purpose of examining the post-secondary outcomes of IBDP alumni studying at the three leading universities in Asia Pacific; two universities in Asia (University A and University B) and one university in Australia (University C). In other words, we sought to examine the research goals by synthesising findings from three case universities where we employed three different types of interlinked and complementary data or analyses (i.e., university in-house academic performance and enrolment data, survey data, and interview data). For the multiple cases, we purposely selected the three leading universities in the Asia Pacific region. In addition to their commonalities in geographical locations and leading status measured by global university ranking metrics (i.e., top 100 universities in major ranking tables), all the universities have a reasonably high number of IBDP alumni. At the same time, we considered diversity in institutional cultures and organisational features. Given that Universities A and B are located in East Asia whereas University C is an Australian university, we speculate there would be certain cultural differences (e.g., East and West), even though all they are internationalised in terms of student and faculty composition. While all three universities maintain a great reputation in research, University A offers a relatively narrow set of disciplines whereas the other two universities are more comprehensive universities. In short, the selected universities were suitable for our research project.

In the three universities, we conducted quantitative analyses that consisted of three inter-linked components: 1) instrument development and validation, 2) analyses of 21st century skills, involvement in extra-curricular activities, and perception of senior secondary education, and 3) analyses of academic performance. We firstly conducted a study aimed at instrument development and validation about 21st century skills, which was piloted at University A. Few instruments measuring the 21st century skills have been used and validated in university settings in Asia Pacific. In response, we implemented instrument development of the 21st century skills. We chose University A, given its relatively small size which fitted well with the scale of the pilot study.

To this end, we conducted 1) a comprehensive review of literature on 21st Century Skills (see Chapter 2) and 2) a psychometric test of the developed instrument. Given the small

number of the participants (n=22) in this pilot study, at the stage, we checked the reliability of the eleven domains of 21st century skills and response patterns in the pilot study. Following this, we conducted a factor analysis with data from University C (n=89). This was followed by our further investigations of construct validity and cross-validation of the instrument by using the data from University B (n=734). Secondly, we explored patterns of academic performance. Using longitudinal data provided from University C, we compared the longitudinal trajectory of academic performance from three cohorts of students, including both IBDP and non-IBDP alumni. As a complementary analysis, we also explored in-house documents on student academic performance of University B. Thirdly, based on our validation of the instrument, we conducted a series of comparisons between IBDP and non-IBDP alumni in 21st Century Skills, involvement in extra-curricular activities, and perception of senior secondary education.

Next, we conducted the qualitative phase of the research, guided by results from the quantitative research. Using the same interview protocol, initially developed from a study at University A, where we interviewed 22 IBDP alumni in total, we interviewed 20 and 12 IBDP alumni at Universities B and C, respectively. Findings from the interviews verified, complemented, triangulated, and enriched the results of the quantitative analyses. Given our use of the same interview protocol with semi-structured interview approaches, we also undertook cross-case analyses to illuminate commonalities and variations across the three case universities.

In sum, as illustrated in Figure 1, the three case studies are sequentially interlinked in terms of data collection and analysis. This approach yielded a series of datasets and analytical slices to examine the post-secondary outcomes of IB Diploma alumni.

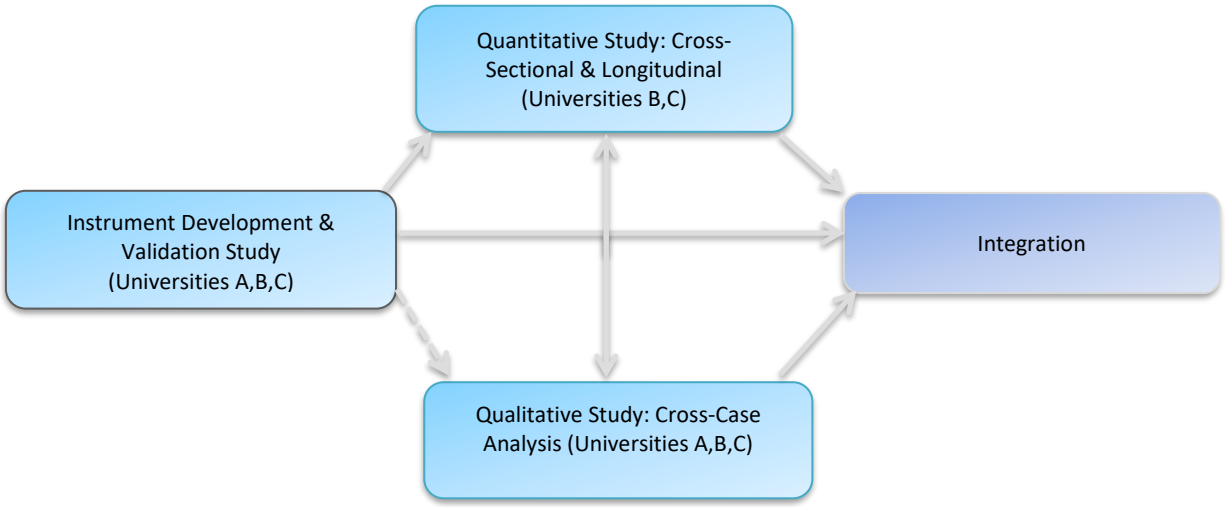

Figure 1.1. Overview of an Exploratory Mixed Methods Research Design

Note: The dotted arrow indicates an indirect contribution of the instrument development/validation study to the qualitative study.

2. INSTRUMENT DEVELOPMENT AND VALIDATION

2.1. REVIEW OF 21ST CENTURY SKILLS

2.1.1. SKILLS FOR 21ST CENTURY

A highly educated population has come to be regarded as a central feature of advanced societies. This is true in terms of a creating a skilled workforce to drive economic growth, promoting social justice by expanding opportunities for upward social mobility, and supporting a strong civil society through maintaining political engaged citizens. However, an educated population is not simply created by ensuring that people attend schooling for a set number of years and pass standardised examinations. Instead, young people need to be given opportunities to develop skills and to fulfil their potential in areas that contribute most to a global, prosperous, just, and engaged society. In particular, the skills demanded in modern societies increasingly go beyond the knowledge of core academic content in traditional disciplines.

A growing body of literature has placed emphasis on a broader set of "21st century skills" that encompass a wide range of foundational, cognitive, and non-cognitive skills. While there are significant overlaps in what skills are included as a 21st century skill, there is currently no commonly agreed upon definition for the term. Many of the recent definitions were influenced and sought to expand on the "Big Five" personality traits that began to recognised in the field of psychology from the late 1980s including extraversion, openness to experience, agreeableness, conscientiousness, and neuroticism (see Tupes & Christal, 1992). As examples, Kyllonen (2012) defines 21st century skills under the three components of "cognitive skills" (including critical thinking, problem solving, and creativity), "inter-personal competencies" (including communication skills, social skills, teamwork, cultural sensitivity, and dealing with adversity), and "intra-personal competencies" (including self-management, self-regulation, time management, self-development (lifelong learning), adaptability, and executive functioning). Further definitions include foundational knowledge of content alongside cognitive and non-cognitive skills. For instance, a report by the World Economic Forum (2015) defined 21st century skills as comprising of "foundational literacies" (including scientific, ICT, financial, and cultural and civic literacies), "competencies" (including critical thinking, creativity, and communication and collaboration), and "character" (including persistence and adaptability, curiosity and initiative, and leadership and social and cultural awareness).

It has been argued that these sets of skills have become progressively more important for individuals and societies since the turn of the century. The proponents of this view are expanding in number and have been described as the "21st century skills movement" (Rotherham & Willingham 2010 p. 18). Notable in this regard are Charles Fadel, Howard Gardener, Daniel Goleman, James Heckman, Daniel Pink, Ken Robinson, and Yong Zhao, among others. While these authors come from diverse academic fields and each has a nuanced view of the topic, they are generally united by a conviction that, 1) educational

practitioners should devote more time and energy to facilitating the development of 21st century skills; and 2) 21st century skills are not recognised by traditional educational assessments, which continue to be dominated by the memorisation and regurgitation of standardised material.

The emphasis on "21st century skills" in large part reflects three core beliefs about education and society. Firstly, proponents point to evidence that 21st century skills can be taught through targeted pedagogical approaches and can have a significant impact on the educational performance of students (Borghans et al., 2015; Heckman & Kautz, 2012). For instance, work by Heckman & Kautz (2012) demonstrated that educational programmes that focus on developing factors such as conscientiousness, curiosity, perseverance, and sociability can have a significant and causal influence on achievement in schooling and later in life. Secondly, it is argued that there is an increasing demand for 21st century skills in the labour market owing to processes of technological advancement (Acemoğlu & Autor, 2012; Autor, 2014; Brynjolfsson & McAfee, 2014). In particular, automation is substituting an increasing number occupations based on routine tasks such as clerical and production line jobs, while simultaneously enhancing a demand for workers in non-routine jobs that rely more on 21st century skills such as creativity, critical thinking, and problem solving. Thirdly, there is a growing recognition that, owing to interactions between nature and nurture, people have a wide spectrum of individual strengths and weaknesses (Gardner, 2004; Pink, 2005; Robinson, 2011). Yet, it is also maintained that education systems tend to neglect 21st century skills through an expectation that all students should develop a pre-determined degree of expertise of core academic content. To reconcile this, 21st century skill proponents contend that students should be given the space to pursue the more diverse range of talents and interests that comprise 21st century skills (Zhao, 2016).

It should also be noted that there is a growing concern among those associated with the 21st century skills movement; that is, students are failing to develop sufficient such skills during their schooling. This belief is reinforced by empirical studies. Following the analysis of skill indicators from 91 countries, a report by the World Economic Forum (2015) contended that there is a global "21st century skills gap". It was argued that the greatest differences in foundational literacies, competencies, and character qualities are found when comparing developed and developing countries. Nevertheless, the report also identified significant disparities among and within developed countries, especially when comparing students from high-income and low-income family backgrounds. While the validity of such studies as accurate measures of skill development can be questioned, they can be viewed as indicative of common perceptions about a 21st century skills gap among young people around the world.

It must be stated that many countries do have policy documents and guidelines to support the development of 21st century skills. In other words, the importance of 21st century skills has not gone entirely unrecognised by educational policy makers and

practitioners. Nevertheless, in the majority of education systems worldwide, the implementation of 21st century skills into formal assessments of student learning remain extremely limited (Ananiadou & Claro, 2009; Rotherham & Willingham, 2010; Zhao, 2016). One of the major challenges is that there remains a lack of consensus about how to define 21st century skills, which makes such skills difficult to assess in a standardised manner. Instead, there is often only an implicit assumption that 21st century skills will develop as part of the whole curriculum, rather than being assessed as independent subjects (Ananiadou & Claro, 2009). Moreover, the reality of teaching 21st century skills in classroom settings can be highly demanding (Rotherham & Willingham, 2010). As a result, teachers need to be trained in pedagogical approaches to 21stcentury skills and also be provided with sufficient time to focus on such skills alongside the covering of core academic content. A further challenge is that improvements among students in 21st century skills are often difficult to gauge through school-based assessments and may develop over a longer period of time compared with academic content (Zhao, 2016).

Perhaps owing to these challenges to the teaching and assessing 21st century skills, it has been contended that education systems are "heading in the wrong direction" by placing greater emphasis on narrow criteria for measuring educational success (Robinson, 2011; Sahlberg, 2016; Zhao, 2016). In particular, there are concerns that countries around the world are following what has been termed the Global Education Reform Movement based on internationally standardised curriculums and assessments. A central feature of the movement is a rise of market-like competition among schools and education systems measured by test scores in reading, science, and mathematics (Sahlberg, 2016). This competition has been intensified by the proliferation of, and attention to, large-scale international assessments such as Programme for International Student Assessment (PISA). Performance in such international comparisons has come to be regarded by many policymakers as a reliable benchmark to measure educational quality and have provided justification for the direction of educational policy (Meyer & Benevot, 2013). Above all, given the especially high-achievement of countries in East Asia particularly in PISA, education systems in China (Shanghai), Hong Kong, Singapore, South Korea, and Taiwan are now viewed as the gold standard that present a model for education systems in other parts of the world to follow (Lingard et al., 2016).

The weight given to achievement in standardised assessments is not, however, without costs and has been argued to be damaging to students (Robinson, 2011; Sahlberg, 2016; Zhao, 2016). To improve test scores, teachers are under pressure to steadily increase the concentration of time, effort, and resources to ensure all students meet minimum and pre-determined criteria of knowledge in core academic content. This can result in a "trade off" in terms of taking time, effort, and resources away from the development of 21st century skills (Zhao, 2016). Firstly, an emphasis on test scores can encourage practices such as "teaching to the test" and the rote learning of content, without necessarily promoting a wider understanding of the issues being studied. Secondly, the

focus on a narrow set of content undermines the autonomy of the teacher to help students reach their individual potential in a diverse range of skills, beyond knowledge of core academic content. Thirdly, such practices can directly undermine 21st century skills. This is because the development of certain skills such as critical thinking may be antithetical to skills such as a capacity to memorise content for standardised tests. The main point to be made here is that while there is strong evidence that 21st century skills are increasingly important to modern societies, measures of educational quality and educational reforms continue to be narrowly based on student achievement in standardised test scores in reading, science, and mathematics.[1]

2.1.2. 21ST CENTURY SKILLS AND THE INTERNATIONAL BACCALAUREATE

Programmes offered by the International Baccalaureate (IB) could be viewed as running counter to global educational trends and the neglect of 21st century skills in schooling. The educational philosophy of the IB seeks to prioritise a holistic educational approach and whole person development. This is perhaps most clearly indicated by the IB's Learner Profile which covers ten educational goals integrated into IB programmes. These are closely aligned with conceptualisations of 21st century skills in terms of a stated commitment to developing students who are balanced, caring, communicators, inquirers, knowledgeable, principled, open-minded, reflective, risk-takers, and thinkers (IB, 2017c).

The IB Diploma Programme (IBDP) has expanded at a steady rate in recent years. Within the context of IBDP's growth globally, the IB highlights that the IBDP aims to develop "students who flourish physically, intellectually, emotionally, and ethically" (IB, 2016b, n.p.). To this end, students take courses across six subject groups among Individuals and Societies, Language Acquisition, Mathematics, Sciences, Studies in Language and Literature, and The Arts. In addition, IBDP students are required to complete three "core" courses; namely (1) Creativity, Action, Service (CAS); (2) Extended Essay (EE), and (3) Theory of Knowledge (TOK). First, CAS is a non-academic course structured around activities such as community interaction, service projects, expeditions, music, and sports. Second, the Extended Essay is a 4,000 word essay that students are required to write under the supervision of an IBDP teacher. Third, TOK seeks to introduce students to core philosophical issues and debates (IB, 2017a).

It is important to view descriptions of the IBDP through critical lenses in terms of self-promotion or marketing by the IB for its own programmes. Nevertheless, a growing body of empirical research has demonstrated relative success of the programme in terms of academic outcomes of IBDP alumni. The bulk of this research to date has focused on how the IBDP prepares students for university, the university destinations of

[1] We wish to note that, like other wonderful ideas related to human development, the concept of the 21st Century Skills has been appropriated by neoliberal ideology particularly in policy circles. More details about the critical view of the 21st century skills can be found in Urciuoli (2008), Patterson (2015), and Williams, Gannon, & Sawyer (2013), as examples.

IBDP alumni, and the academic performance of IBDP alumni at university. As recent examples, a large-scale study in the UK found that IBDP alumni were significantly more likely to attend a top 20 ranked university, earn a higher degree classification, and continue to postgraduate studies relative to A-Level alumni (HESA, 2016). A project investigating the IBDP at international schools in China found that three-quarters (73 percent) of IBDP alumni attended a university ranked in the top 500 worldwide, while 30 percent attended a top 50 ranked institution (Lee et al., 2014). In the US, research has found that IBDP alumni felt more prepared for their higher education studies compared to Advanced Placement alumni (Inkelas et al., 2013) and that IBDP alumni had significantly higher six-year graduation rates compared with the national average (Bergeron, 2015).[2]

A more limited number of studies have investigated the impact of the IBDP in developing 21st century skills in particular. As some examples, a study of the learning outcomes of IB students in Australia found that critical thinking awareness and use improved following the completion of the TOK course (Cole et al., 2015). Research by Conley et al. (2014) demonstrated that IBDP alumni studying at the University of Oregon self-reported 1) a deeper understanding of the connection of knowledge across disciplines, 2) greater ability to understand issues from multiple perspectives, and 3) greater ability to manage their time to deal with heavy workloads when compared to non-IB alumni. In addition, Wright (2015) undertook interviews to ask alumni of the IB to reflect on the lasting impact of the programme. The participants who ranged from their early 20s to early 60s described that the IB fostered a capacity for international mindedness, critical thinking, and a broad worldview over their life course.

Studies on the academic outcomes and skill development of IBDP alumni have helped reinforce strong conceptions of the "IB brand" as being educationally progressive among a wide range of stakeholders including parents and universities (see Doherty, 2009). However, others have questioned the capacity of schools to implement an IB educational philosophy. For example, Rivzi et al.'s (2014) study of the IB Learner Profile in Australia, India, and Hong Kong found significant diversity among teachers and students in interpretations of the role of the Learner Profile, definitions of the attributes, and for the rationale behind the choice of the ten particular attributes rather than others. There was also concern about the implementation of the Learner Profile. It was reported that as many students and teachers are anxious about academic results, the Learner Profile was often viewed as an additional burden, rather than a meaningful part of the IBDP. Similar findings were noted in Lee et al.'s (2014) study of the IBDP at international schools in China. In particular, there was a concern that the Learner Profile, CAS, EE, and TOK often took a "backseat" in highly competitive academic environments. In contrast, the emphasis was primarily on achieving high grades in

[2] Regarding IB alumni's success in university entrance, it should be noted that, destination universities could be associated with parental expectations and resources.

assessments to support admission to high-ranking universities abroad (see also Tarc, 2009; Wright & Lee, 2014a). Further research has raised doubts over whether the school context of many IBDP schools in East Asia is conducive to a "whole person" education and the development of Learner Profile attributes such as caring and open-mindedness. This is because most IBDP schools in East Asia are restricted to socio-economic elites due to high tuition fees and offer limited opportunities for authentic interactions with other cultural, economic, and social groups in the community (Lee et al., 2016; Wright & Lee, 2014b).

2.1.3. MEASURING 21ST CENTURY SKILLS FOR UNIVERSITY STUDENTS

Research on the capacity for 21st century among IBDP alumni as compared with graduates of other education programmes remain thin on the ground. This research gap is particularly notable in the case of IBDP alumni in higher education in Asia Pacific, especially in terms of international comparative studies. Filling this gap in research seems pertinent given the expansion of the IBDP in Asia Pacific in recent years.

It is necessary to reiterate that there are significant barriers to the measurement and assessment of 21st century skills. There is a lack of consensus about how to define 21st century skills, most existing tools were not designed for mainstream schools or a context of accountability, the development of 21st century skills can take place over a relatively long period, and to assess 21st century skills there is often a need for a high level of training (Zhao, 2016). Notwithstanding these barriers, there are two main approaches to measuring 21st century skills; namely self-ratings and performance tests (Kyllonen, 2015).

First, the most widely-used approach is self-ratings. In this approach, participants are required to self-reflect and self-evaluate in terms of their skill development, attitudes, emotions, behaviours, and participation in various activities. For instance, Walker et al. (2016) developed and validated a questionnaire instrument based on skills included in the IB Learner Profile. This requires participants to self-rate on a five point Likert scale their capacity for Learner Profile skills; including measures for "knowledgeable" (e.g., build on others' ideas to form your own opinion), "inquirers" (e.g., become curious about the things you read, see and hear), "caring" (e.g., show care and compassion for your peers), and "open-minded" (e.g., critically examine your own cultural values and beliefs). The core advantage of the self-rating approach lies in a flexibility to measure multiple types of 21st century skills in a single instrument. In this respect, the approach is especially useful and pragmatic for efforts to gauge an overview of 21st century skill development among a target group of participants. Nevertheless, the approach must be used with caution as it is highly subjective and does not capture external perspectives. Self-ratings are, thus, liable to personal biases such as social desirability.

A second approach to measuring 21st century skills is performance tests. There is a strong tradition in psychology of constructing measures of skills related to personal

qualities with commonly used methods including multiple-choice questions, short answer essays, and interactive games. An example is the Torrance Tests of Creative Thinking (Torrance, 1981) that seeks to assess factors such as active imagination, curiosity, flexibility of thinking, tolerance for ambiguity, and ability to abstract from the concrete through verbal and non-verbal tasks. To achieve this, questions range from picture construction/re-construction to written response to divergent clues. A further example is the California Critical Thinking Disposition Inventory (Facione, 1990) which is designed to measure the extent to which participants exhibit the mind of an "ideal-type" of critical thinker. Participants are asked to provide their level of agreement on a Likert scale to statements such as "the truth always depends on your point of view". Based on the responses, participants are assessed on seven scales including critical thinking, inquisitiveness, analyticity, systematicity, truth-seeking, maturity, open-mindedness, and self-confidence. The clear advantage of these approaches is that the tests purport to offer an objective account of 21st century skill levels. Nonetheless, the tests are resource intensive in terms of time, training requirements for assessors, and financial costs, while also being narrow in scope by focusing on one specific type of skill. As a result, they are not so appropriate for studies seeking to investigate the development of a broader range of 21st century skills among students.

Alternative approaches to measuring 21st century skills include situational judgement tests, biodata, and interviews (Kyllonen, 2015). In situation judgement tests, participants are asked to indicate how they would respond to various hypothetical situations that involve a problem or conflict. Answers are generally assessed in terms of indicators of various 21st century skills such as leadership, teamwork, or problem solving using Likert scales or multiple choice instruments (see MacCann & Roberts, 2012, for example). In biodata approaches, participants are asked to demonstrate evidence of participation in activities that are used to indicate development of skills in particular areas. As an example, in the Creative Achievement Questionnaire (Carson et al., 2005), participants are asked to provide details of achievement across ten domains deemed relevant to creativity such as dance, music, and visual arts. Lastly, interviews can also be used to assess the development of 21st century skills. As Kyllonen (2015) notes, interviews have long been used as a principal means of screening applicants by employers through the assessment of the skill levels of applicants. Indeed, the interview approach appears to have significant value in offering a qualitative and more in-depth counterbalance to the largely quantitative nature of the other approaches to measuring 21st century skills.

The above review of approaches provides three guidelines to inform research seeking to measure 21st century skills among IBDP alumni. First, as one of the primary objectives of the IB is a holistic and whole person education, measures should cover a diversity of 21st century skills. In other words, 21st century skills should be regarded as multidimensional. In this respect, self-reporting approaches will be the most relevant in terms of the feasibility and practicality to measure a wide range of skills in the context

of the current research project. That is, while performance tests have advantages in terms of a more objective measure of skill development, the approaches may not be appropriate for measuring multiple types or multifaceted characteristics of 21st century skills, given the time and cost limitations in a single research context. Second, while some dimensions of 21st century skills closely related to cognitive skills can be more objectively measured (e.g., critical thinking, creativity), other dimensions related to inter-personal competencies (e.g., communication, intercultural understanding) seem to be extremely daunting to measure by using performance tests, given that they are unavoidably subjective to some extent. Third, research on 21st century skills will benefit from mixed-method research designs. In particular, the quantitative analysis of a self-report survey can be reinforced by qualitative analysis of interviews, with the findings of each triangulated and complemented to inform the major conclusions of the research.

This project aimed to provide a holistic measure of 21st century skills. Specifically, a student survey was designed to cover a comprehensive range of eleven 21st century skills: i.e., critical thinking, problem solving, creativity, communication, teamwork, cultural sensitivity, time management, adaptability, leadership, persistence, and global-mindedness. For each of the eleven skills we devised five questions in the form of a Likert Scale for students to self-rate their relative ability. The skills included in the survey were chosen based on an extensive review of definitions of 21st century skills. In particular, we used two definitions as a foundation. The first foundational definition was provided by Kyllonen (2012) and covered "cognitive skills", "inter-personal competencies" and "intra-personal competencies". This definition was refined over time based on studies and workshops conducted by *The National Research Council* and *National Academy of Sciences* in the United States. The second foundation was the definition of 21st century skills from World Economic Forum (2015) that is comprised of "foundational literacies", "competencies", and "character". For this second definition, we excluded "foundational literacies" (including scientific, ICT, financial, and cultural and civic literacies) to retain a focus on cognitive and non-cognitive skills most associated with the 21st century skills literature.

The foundational definitions of 21st century skills were supplemented by definitions of 21st century in the wider literature for this project. This included the most commonly cited 21st century skills of critical thinking (Kyllonen, 2012; Jerald, 2009; World Economic Forum, 2015), problem solving (Kyllonen, 2012; Trilling & Fadel, 2009; World Economic Forum, 2015), creativity (Kyllonen, 2012; Robinson, 2011; World Economic Forum, 2015), communication (Kyllonen, 2012; Wagner, 2008; World Economic Forum, 2015), and teamwork (Kyllonen, 2012; Pellegrino et al., 2012; World Economic Forum, 2015). Moreover, six less commonly cited 21st century skills were included in the survey. These included cultural sensitivity (Kyllonen, 2012; Salas et al. 2011), time management (Kyllonen, 2015), adaptability (Kyllonen, 2012; Wagner, 2008), leadership (Trilling & Fadel, 2009; World Economic Forum, 2015), persistence (World Economic Forum, 2015), and "global mindedness" (Zhao, 2012; Thier, 2015).

The eleven dimensions of the survey instrument were pilot tested for initial validation with IB students at University A, and was further validated with a larger sample of students, including both IBDP alumni and non-IB alumni at University B. Interview data were used to triangulate and complement the findings of the survey instrument. In addition to the self-ratings as a means to measure 21st century skills, the survey employed a biodata approach. That is to say, the survey requires students to report participation in sport, music, art, language training, volunteering, political organisations, student governance, student societies, part-time work, internships, volunteering overseas, student exchanges, and paid work overseas. The objective was to gain an insight into students' social life by looking at their participation in non-academic activities. The survey asks for the frequency of participation to gauge the extent and depth of their engagement in such activities. In designing this part of the survey, we took inspiration from the *National Survey of Student Engagement* (see http://nsse.indiana.edu/). However, we significantly adapted the instrument for our own purposes, including developing a completely new set of questions.

2.2. INSTRUMENT DEVELOPMENT AND VALIDATION OF THE SURVEY OF 21ST CENTURY SKILLS

2.2.1. A PILOT STUDY

To quantitatively measure IBDP alumni's perceived capacity for the 21st century skills, we developed a survey questionnaire. The questionnaire was initially developed, based on our literature review of the 21st century skills, in order to secure theoretical underpinnings of the survey questions. The research team utilised a think-aloud approach (cf. Trenor, Miller, & Gipson, 2011) to tweak question items from qualitative feedback from IB researchers, IB teachers, and a survey expert. Next, we conducted a pilot study with the 22 IBDP alumni in University A by targeting the eleven domains of 21st scentury skills; namely, critical thinking, problem solving, creativity, communication, teamwork, cultural sensitivity, time management, adaptability, leadership, persistence, and global mindedness. The survey questionnaire was based on a 5-point Likert scale (i.e., strongly disagree, disagree, neither agree nor disagree, agree, strongly agree) as illustrated in Figure 2.1, for example.

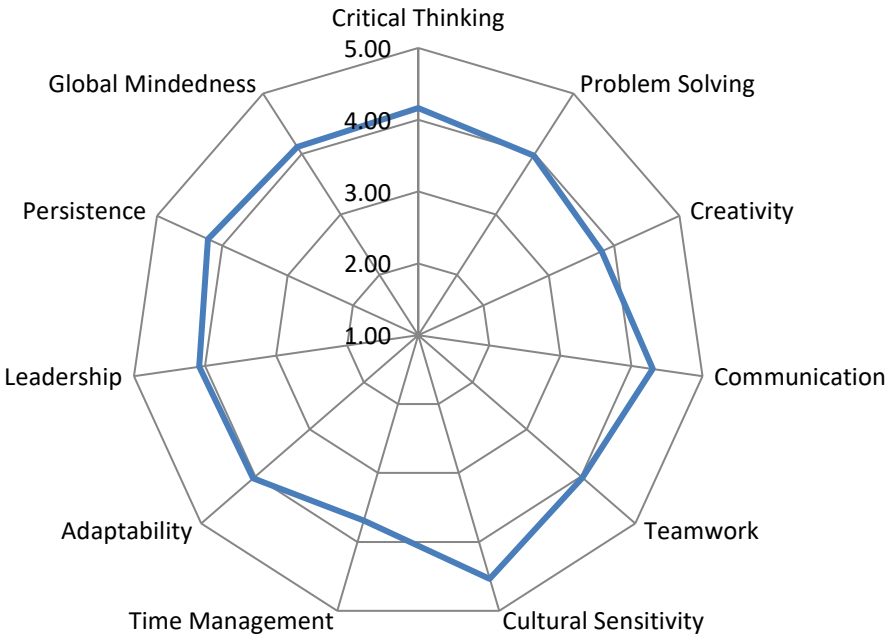

Figure 2.1. Eleven Domains of 21st Century Skills Measured by the Pilot Study (University A)

Table 2.1. shows the initial survey questionnaire developed through the procedure noted above. We first checked reliability – i.e., Cronbach alpha of each domain. Apart from the domain of Critical Thinking, the rest of the domains indicated a high level of reliability (see Table 2.1.). Based on our observations of each item, we noticed that the third item of Critical Thinking was a weak item, lowering the level of the Cronbach alpha. When we removed the item ("I do not readily accept the viewpoints of others"), the reliability was improved – i.e., .525 to .604. Notably, the same pattern was identified later when we checked the reliability by using the data from University B (n=734) and University C (n=89). While the rest of the domains showed a high level of reliability, the Cronbach's alpha of Critical Thinking was .649, which was still lower than .7, the conventional cutoff. In a similar vein, when we tested the reliability with a relatively larger sample (n=734), including both IBDP and non-IB alumni enrolled in University C, the Cronbach alpha of all the domains were high (i.e., higher than .8), except the domain of Critical Thinking, which was .690. Once again, when we eliminated the third item, the alpha became acceptable by a conventional cutoff –i.e., from .690 to .767. Given that the third item of Critical Thinking turned out to be a weak item across the three universities' data, we removed it in the subsequent validation procedure. In addition, while we will detail the procedure of how we finalised the validated question items in the following section, at this stage, we wish to note that the question items coloured in grey in Table 2.1. were also excluded in the finally validated instrument. This was because of their relatively weak psychometric properties in terms of validity and reliability.

Table 2.1. The Survey Questionnaire of 21st Century Skills and Cronbach Alphas

Domain	**Question Items**	**University A** ***n = 22***	**University B** ***n = 734***	**University C** ***n = 89***
Critical Thinking	I am good at analysing and evaluating information I often make logical connections between ideas I do not readily accept the viewpoints of others [a, b] I am good at detecting weaknesses in dominant theories and perspectives Critical thinking is one of my major strengths	.525 .604[a]	.690 .767[a]	.649 .657[a]
Problem Solving[b]	I am good at solving real world problems I can often find solutions to complex problems I am good at overcoming barriers to find solutions I have lots of ideas about how to solve problems in society Problem solving is one of my major strengths	.806	.854	.748
Creativity	I am a creative person I am good at finding novel answers to old questions I often come up with original ideas I have a range of creative talents Creativity is one of my major strengths	.890	.887	.718
Communication	I am good at communicating clearly and effectively I am active in classroom discussions I can persuasively present my viewpoints to others I can convey complex ideas to non-experts Communication is one of my major strengths	.713	.873	.775
Teamwork[b]	I work effectively when collaborating with others I learn more effectively in teams rather than studying on my own I prefer to work in teams rather than independently I am good at listening to the views of others Teamwork is one of my major strengths	.850	.860	.722
Cultural Sensitivity	I can understand issues and events from a wide range of perspectives I have a strong knowledge of cultures other than my own I get along well with people from different backgrounds I respect the views of people from different backgrounds Cultural sensitivity is one of my major strengths	.846	.827	.807

Time Management	I am good at managing my time to meet deadlines I very rarely miss deadlines I plan detailed schedules when working on a project or piece of work I manage my time so I do not need to rush to meet deadlines Time management is one of my major strengths	.895	.899	.904
Adaptability	I am effective in adapting to new situations If not succeeding I am good at changing my approach to solving a problem I often change my opinion in the face of new evidence I am good at adapting my working style in response to new tasks Adaptability is one of my major strengths	.800	.837	.777
Leadership	I am good at motivating other people I have strong leadership skills People listen and follow my instructions I am good at directing and supporting other people Leadership is one of my major strengths	.852	.914	.908
Persistence	I am good at persisting with my work in spite of difficulties I do not give up when I experience failure Once I start a task I do not give up until it is finished I am good at completing tasks that take a long period of time Persistence is one of my major strengths	.835	.878	.841
Global-mindedness	I am knowledgeable about current events from around the world I consider myself to be a global citizen I relate my studies to issues facing other people around the world I have a good understanding of the values of people in other parts of the world Global mindedness is one of my major strengths	.846	.890	.890

Notes:

[a] *These are the improved Cronbach alphas after excluding the item.*

[b] *These are the question items and corresponding constructs (coloured in grey) that were excluded in the finally validated instrument, given their relatively weak psychometric properties in terms of validity and reliability.*

2.2.2. CONSTRUCT VALIDITY AND CROSS-VALIDATION

To investigate construct validity, we first examined the soundness of the factor structure of the eleven domains of 21st century skills. To this end, we used the survey data from University C in Australia (n=89) and University B in Asia (n=734), given the small number of participants in the pilot study of University A (n = 22). Using University C data, we conducted exploratory factor analysis (EFA). For cross-validation of the results from EFA, we used University B data for confirmatory factor analysis (CFA).[3]

Through the EFA (with principal axis factoring with oblique rotation), we found two issues in several items: 1) cross loadings and 2) weak loadings (lower than .4). These issues emerged from items particularly in Problem Solving and Teamwork. For example, the second and third items in Problem Solving were cross-loaded to Critical Thinking while the first and fourth items showed low factor loadings. As such, in the process of CFA, we removed an additional 11 items with the problem of either cross-loadings or weak loadings—i.e., all items in Problem Solving and Teamwork, plus one item in Creativity (see Table 2.1.).

Using University B data, when we compared CFA results between the first instrument (54 items – i.e., removing one item from Critical Thinking) and the revised instrument based on the EFA factor structure (43 items), the latter indicated a better measurement model fit. Specifically, the former showed CFI=.902, TLI=.894, RMSEA=.05, χ^2= 3735.13, df=1322, whereas the latter showed CFI=.916, TLI=.908, RMSEA = .05, χ^2=2414,56, df=824. The chi-square test reinforced the result that the two models were significantly different ($\Delta\chi^2$=1320, Δdf=498, p<.001) with the revised measurement model indicating far better model fit.

Based on the soundness of the nine-factor structure supported by the CFA measurement model, we further investigated the degree of factor loadings and statistical significance, the average variance extracted (AVE), and construct reliability. These three parts were explored to ensure convergent validity (cf. Walker et al., 2016).

First, the degree of factor loadings (i.e. standardised regression weights) was solid and statistically significant (p<.001). As presented in Table 2.2., most of the survey items demonstrated excellent factor loadings—i.e. higher than .70 (cf. Tabachnick & Fidell, 2007). Second, we checked the average variance extracted (AVE) of each domain to confirm convergent validity. Using the formula below, the AVE was calculated: AVE = (Σsquare standardised loadings)/[(Σsquare standardised loadings)+(Σerror variances)]. A higher AVE value of the domain indicates that the survey items are more

[3] Notably, although we believe that there are certain conceptual underpinnings in our survey instrument, given the range of our literature review, we conducted EFA instead of directly conducting CFA. This was because the survey items and wordings were mainly drafted by the research team. Therefore, doing EFA and follow-up CFA using two different populations would ensure a more rigorous checking in the validation procedure.

representative of the corresponding domain. All of the nine domains obtained convergent validity, higher than the conventional cut-off value (.50). Finally, we also checked construct reliability (also called composite reliability) by using the formula: $(\Sigma\text{standardised loadings})^2/[(\Sigma\text{standardised loadings})^2+(\Sigma\text{error variances})]$. All four of the constructs exhibited higher values of construct reliability than the conventional cut-off value (.70). Taken together, the overall results support convergent validity for the nine domains of 21st century skills in the instrument (see Table 2.2.)

Next, we investigated discriminant validity, another main feature of construct validity (Campbell & Fiske, 1959). By testing discriminant validity, we sought to examine the degree to which each of the nine domains of 21st century skills are distinctive from one another in terms of psychometric properties. As noted earlier, the literature suggests that the idea of 21st century skills is a multifaceted concept. It is not a concept with a monolithic characteristic. In this regard, it is reasonable to assume that the domains of 21st century skills are related to one another to some extent. This is why there are statistically significant correlations among the nine domains, illustrated in Table 2.3. below. At the same time, however, it is also important to make sure that each domain reflects a unique facet of 21st century skills – i.e., each domain should be substantially distinguishable. Looking closely at the correlation matrix, there were a few pairs of domains with relatively high correlations –i.e., Leadership and Communication (.71); Cultural Sensitivity and Global Mindedness (.69). We examined whether the domains in the two pairs were distinctive enough from each other. To achieve this, we conducted multiple approaches to testing discriminant validity: 1) AVE > the square of correlation, 2) Kenny's nested model comparison approach by Chi-square statistics, 3) Kenny's model comparison approach by standardised model fit, and 4) Anderson and Gerbing's test (see also Walker et al., 2014, 2016).

First, we examined whether the AVE values of Leadership and Communication were greater than the square of their correlation, which confirms the presence of discriminant validity (Fornell & Larcker, 1981; Netemeyer, Johnston, & Burton, 1990). As presented in Table 2.2., the AVE values of Leadership and Communication were .745 and 0.62, respectively, which were greater than the square of their correlation (0.500). Likewise, the AVE values of Cultural Sensitivity (0.617) and Global Mindedness (0.684) were higher than the square of their correlation coefficient (0.480). The first test using AVE supported discriminant validity of each pair of the domains whose correlations were the highest in the CFA measurement model.

Table 2.2. Nine-Factor Structure Measurement Model (Revised)

Domain	Question	Factor Loading	AVE	Construct Reliability
Critical Thinking	I am good at analysing and evaluating information	.762	0.59	0.85
	I often make logical connections between ideas	.718		
	I am good at detecting weaknesses in dominant theories and perspectives	.540		
	Critical thinking is one of my major strengths	.696		
Creativity	I am a creative person	.810	0.61	0.86
	I am good at finding novel answers to old questions	.670		
	I often come up with original ideas	.703		
	I have a range of creative talents	.834		
Communication	I am good at communicating clearly and effectively	.788	0.62	0.89
	I am active in classroom discussions	.685		
	I can persuasively present my viewpoints to others	.770		
	I can convey complex ideas to non-experts	.732		
	Communication is one of my major strengths			
Cultural Sensitivity	I can understand issues and events from a wide range of perspectives	.703	0.62	0.89
	I have a strong knowledge of cultures other than my own	.669		
	I get along well with people from different backgrounds	.749		
	I respect the views of people from different backgrounds	.645		
	Cultural sensitivity is one of my major strengths	.772		
Time Management	I am good at managing my time to meet deadlines	.847	0.65	0.90
	I very rarely miss deadlines	.639		
	I plan detailed schedules when working on a project or piece of work	.733		
	I manage my time so I do not need to rush to meet deadlines	.863		
	Time management is one of my major strengths	.914		
Adaptability	I am effective in adapting to new situations	.745	0.64	0.90
	If not succeeding I am good at changing my approach to solving a problem	.713		
	I often change my opinion in the face of new evidence	.501		
	I am good at adapting my working style in response to new tasks	.812		
	Adaptability is one of my major strengths	.798		
Leadership	I am good at motivating other people	.678	0.74	0.94
	I have strong leadership skills	.910		
	People listen and follow my instructions	.824		

	I am good at directing and supporting other people Leadership is one of my major strengths	.807 .908		
Persistence	I am good at persisting with my work in spite of difficulties I do not give up when I experience failure Once I start a task I do not give up until it is finished I am good at completing tasks that take a long period of time Persistence is one of my major strengths	.746 .741 .771 .777 .809	0.69	0.74
Global-mindedness	I am knowledgeable about current events from around the world I consider myself to be a global citizen I relate my studies to issues facing other people around the world I have a good understanding of the values of people in other parts of the world Global mindedness is one of my major strengths	.692 .783 .766 .821 .876	0.68	0.73

Note: N = 734 (University B)

Second, we crosschecked the AVE test result with other investigations. First, following Kenny's approach (2011), we examined model fit by comparing a competing model, which constrained the correlation of the two domains to one domain, with the current model. The result suggests that the current model is a better model than when constraining the correlation between Leadership and Communication and also between Cultural Sensitivity and Global Mindedness into one: The current model (CFI = .916, TLI = .908, RMSEA = .05, and χ^2= 2414.562, *df* = 824) vs. The competing model (CFI = .901, TLI = .892, RMSEA = .056, and χ^2 = 2704.283, *df* = 826). The chi-square test indicated that the two models were also significantly different ($\Delta \chi^2$ = 289.7, Δdf = 2) with the current model indicating far better model fit. The model comparison indicated that there exists discriminant validity between the domains.

Third, we also tested another model comparison by collapsing the highly correlated domains and combining them into one larger domain (e.g., Cultural Sensitivity and Global Mindedness as one larger construct). This presumed that the two constructs are not distinguishable. Since the two models (i.e., the current 9-factor structure model vs. the 7-factor structure model with combining the correlated domains into one domain) are not nested, we used standardised model fit indices instead of chi-square statistics. The result showed that the current model demonstrates a better model fit than the 7-factor structure model (CFI = 0.846, TLI = 0.834, RMSEA = 0.069, and X^2= 3763.992, *df* = 839). Once again, the result supported the presence of discriminant validity.

Finally, we employed a complementary assessment using the correlation coefficient and standard error between the two pairs of the correlated domains. According to Anderson and Gerbing (1988), if the confidence interval ($\pm$ two standard errors) of the correlation estimate between the two constructs includes 1, then discriminant validity between the constructs should be questioned. As the Anderson and Gerbing test showed, discriminant validity between the correlated constructs was supported: Leadership & Communication [.707 + 2 x .028 = .651∼.763], Cultural Sensitivity & Global Mindedness [.693 + 2 x .024 = .645∼.741].

In conclusion, the survey instrument to measure 21st century skills in this study demonstrated solid psychometric properties that support construct validity (i.e., convergent and discriminant validity) and measurement reliability. Given the rigorous procedure of our development and validation of the instrument described above, we believe that the instrument is a reliable survey questionnaire for measuring the nine domains of 21st century skills.

Table 2.3. Correlations of the Nine Domains of 21st Century Skills

Constructs			Correlation Coefficients
Critical Thinking	<-->	Global-mindedness	.485
Critical Thinking	<-->	Leadership	.477
Critical Thinking	<-->	Adaptability	.532
Critical Thinking	<-->	Time Management	.368
Critical Thinking	<-->	Communication	.604
Critical Thinking	<-->	Creativity	.450
Critical Thinking	<-->	Persistence	.508
Cultural Sensitivity	<-->	Critical Thinking	.603
Global-mindedness	<-->	Leadership	.427
Global-mindedness	<-->	Adaptability	.518
Global-mindedness	<-->	Time Management	.286
Global-mindedness	<-->	Communication	.497
Global-mindedness	<-->	Creativity	.403
Global-mindedness	<-->	Persistence	.422
Cultural Sensitivity	**<-->**	**Global-mindedness**	**.693**
Leadership	<-->	Adaptability	.509
Leadership	<-->	Time Management	.377
Leadership	**<-->**	**Communication**	**.707**
Leadership	<-->	Creativity	.424
Leadership	<-->	Persistence	.435
Cultural Sensitivity	<-->	Leadership	.506
Adaptability	<-->	Time Management	.489
Adaptability	<-->	Communication	.526
Adaptability	<-->	Creativity	.462
Adaptability	<-->	Persistence	.599
Cultural Sensitivity	<-->	Adaptability	.652
Time Management	<-->	Communication	.366
Time Management	<-->	Creativity	.278
Time Management	<-->	Persistence	.544
Cultural Sensitivity	<-->	Time Management	.318
Communication	<-->	Creativity	.423
Communication	<-->	Persistence	.464
Cultural Sensitivity	<-->	Communication	.649
Creativity	<-->	Persistence	.332
Cultural Sensitivity	<-->	Creativity	.438
Cultural Sensitivity	<-->	Persistence	.514

Notes: Note: N = 734 (University B), p<.001

3. QUANTITATIVE ANALYSIS

In this chapter, we report results from our quantitative analysis on 1) university-based academic performance data and 2) online survey data on student perceptions of 21st century skills, participation in extra-curricular activities, and senior secondary school experiences. We gathered those two datasets from two universities located in East Asia (University B) and Australia (University C), respectively. The academic performance data, including enrollment information, were obtained from University B and University C. For the survey data, the validated survey questionnaire described in the previous chapter was distributed to students via email with collaboration with the administration office at each university. Notably, the datasets from University B and University C had different strengths and limitations. University B offered cross-sectional data with limited scope of information; GPA information of IBDP alumni students only. University C provided longitudinal data of three cohorts including both IB and non-IB groups without missing values in the academic performance data. In terms of the online survey data gathered by the research team, 734 students responded to the survey from University B, whereas only 89 students responded from University C. In this regard, the datasets from the two universities are complementary, given the different strengths and limitations in sample size and coverage.

This chapter consists of four sections. The first section provides a picture of the academic performance of IBDP alumni in the two universities. The second section captures the perceived capacity for 21st century skills among IBDP alumni in comparison with non-IB alumni in each university. The third section explores involvement in extra-curricular activities. The final section details perceptions of the student groups of their senior secondary school education in relation to their preparation for university studies.

3.1. POST SECONDARY ACADEMIC PERFORMANCE

3.1.1. CROSS-SECTIONAL ANALYSES: UNIVERSITY B

Before we report the results of our analysis on academic performance of IBDP alumni in University B, we provide a snap shot of student enrollment of IBDP alumni in order to provide background information. We obtained the enrollment information of students admitted in 2013, 2014, and 2015 in terms of three major admission channels (i.e., IBDP, General Certificate of Education A levels (GCEA), and local academic qualification for university entrance). We further classified the students into the faculty structures in the university (e.g., Faculty of Business & Economics, Humanities & Social Sciences).

According to the enrollment information, during the period from 2013 to 2015, the number of the IBDP alumni admitted to the university had increased continuously: 173 in 2013 to 259 in 2015. Overall, the proportion of the IBDP alumni enrolled in University B during the period ranged from 5.8% to 8.0%. In terms of programme chosen, the Faculty of Business & Economics was one of the most popular among the

IBDP alumni. The proportion of IBDP alumni accounted for 6.9% in the 2013 cohort and 12.2% in the 2015 cohort (see Figure 3.1.). The Faculty of Medicine and the Faculty of Engineering showed the smallest number (and also proportion) of IBDP alumni. They only accounted for 2.6% of students in 2014, for example. The low proportion may be an artifact due to the deletion of students from most programmes of the Faculty of Medicine because a full data set (and specifically the cumulative GPA data) is not available in those curricula.

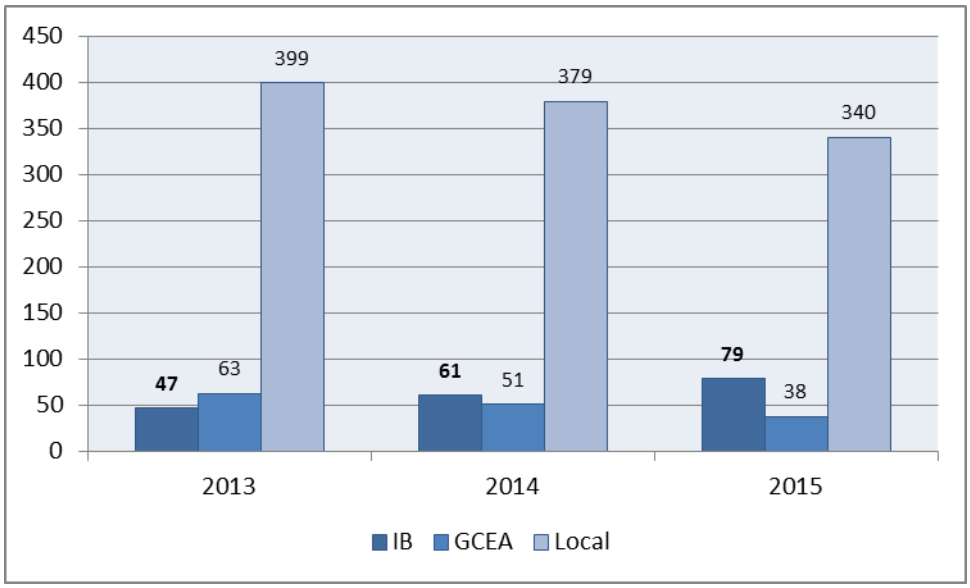

Figure 3.1. Enrollment Patten in Business and Economics

We refer here to analyses of academic performance data of IBDP alumni (n= 227) admitted to University B in 2014. Given the limited nature of the cross-sectional data, without having a comparison group (i.e., non-IBDP counterparts), we only report descriptive statistics of the academic performance of IBDP alumni. The data provided included a cumulative GPA of each IBDP alumni student (2014 to 2016), course, program, nationality, and locality (local vs. international student).

The average IB score of the whole student group was 38.2 (SD =2.9). The lowest entry score was 32 and the highest one was 44 (see Figure 3.2.). University B admits a number of students with 45/45 each year, but they enrol in a programme for which cumulative GPAs were not available, and their cases have therefore been deleted from the data set. The average cumulative GPA of the whole IBDP alumni was 2.97 (SD = .50) on a scale from 0 to 4.3.

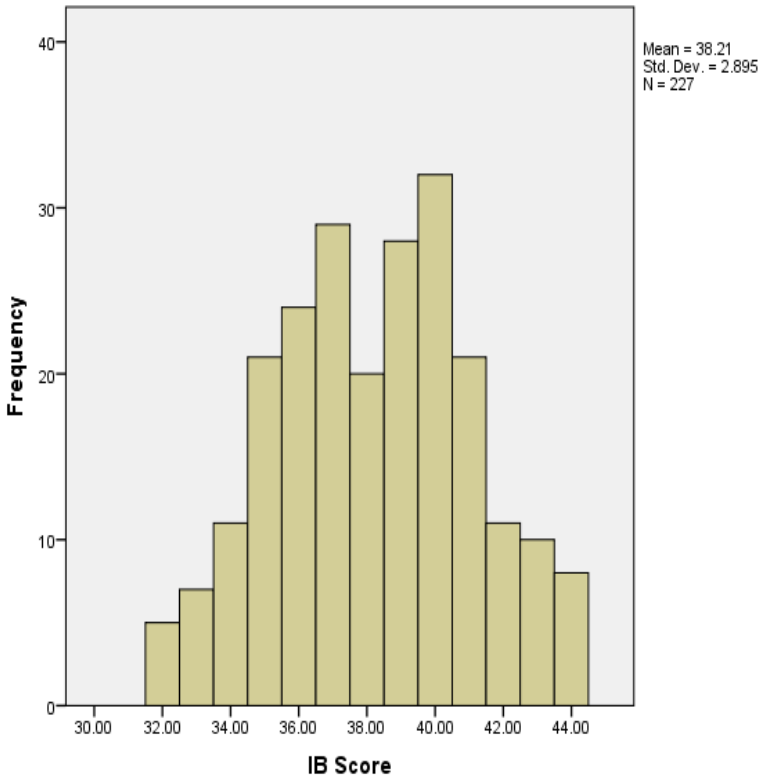

Figure 3.2. The Frequency of IB Scores of the 2014 Cohort

While the IBDP alumni were enrolled across every faculty, a majority of them were enrolled in Business & Economics programmes. Approximately, one in three IBDP alumni in the 2014 cohort were enrolled in Business and Economics (32.6%) programmes, while 22% were in the Social Sciences. The least enrolled programme was Engineering (2.6%) and Medicine (2.6%).

Table. 3.1. The Frequency of the IBDP Alumni by Faculties

Faculty	**Frequency**	**%**
Architecture	14	6.2
Arts	25	11.0
Business and Economics	74	32.6
Education	17	7.5
Engineering	6	2.6
Law	17	7.5
Medicine	6	2.6
Science	18	7.9
Social Sciences	50	22.0

Note: N = 227

Figure 3.3. shows average of IBDP scores by faculty. Another figure below (i.e., Figure 3.4.), illustrating the average of cumulative GPA by faculties, shows quite a similar pattern to that of IB scores by faculty. Indeed, there was a significant correlation between IBDP scores and cumulative GPAs (.354, p=.01). After excluding four outliers (i.e., student cases with a very low GPA, despite their relatively good IB scores), the

correlation coefficient increased to .370, p=.01. This suggests that the IB score is an important predictor of IBDP alumni's post-secondary performance although there is some variation across faculties.

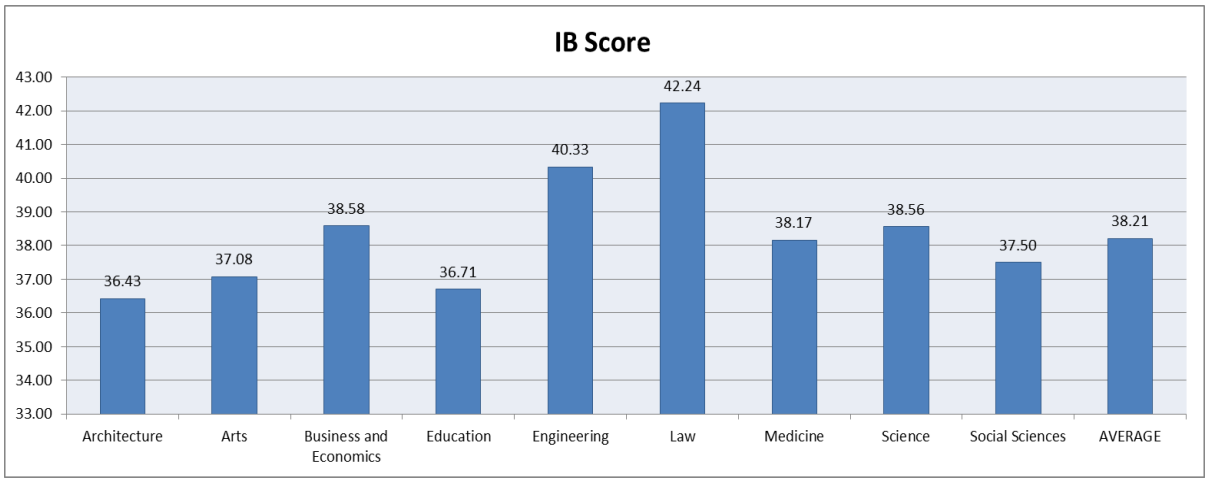

Figure 3.3. Average IB Scores by Faculties

Note: N = 227

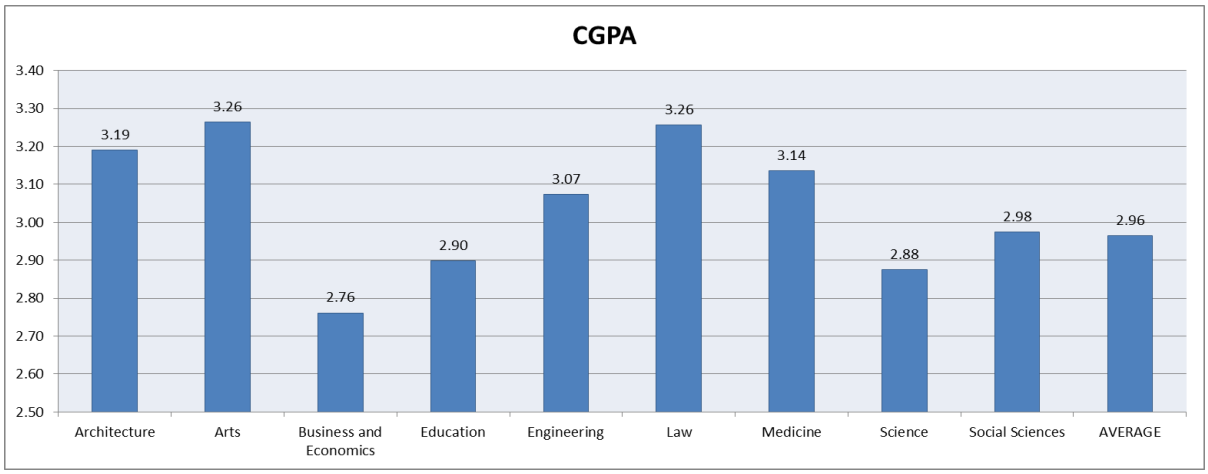

Figure 3.4. Average of cumulative GPA by Faculties

Note: N = 227

As illustrated in Figure 3.5., the result of the simple linear regression (i.e., independent variable=IB score, dependent variable=CGPA) confirmed that the IBDP score of individual students was a significant predictor of their CGPA (R-square = .137). As we will demonstrate in the following section, drawing from University C's longitudinal data, we could also observe the significant role of the IBDP score in the growth of GPA over time.

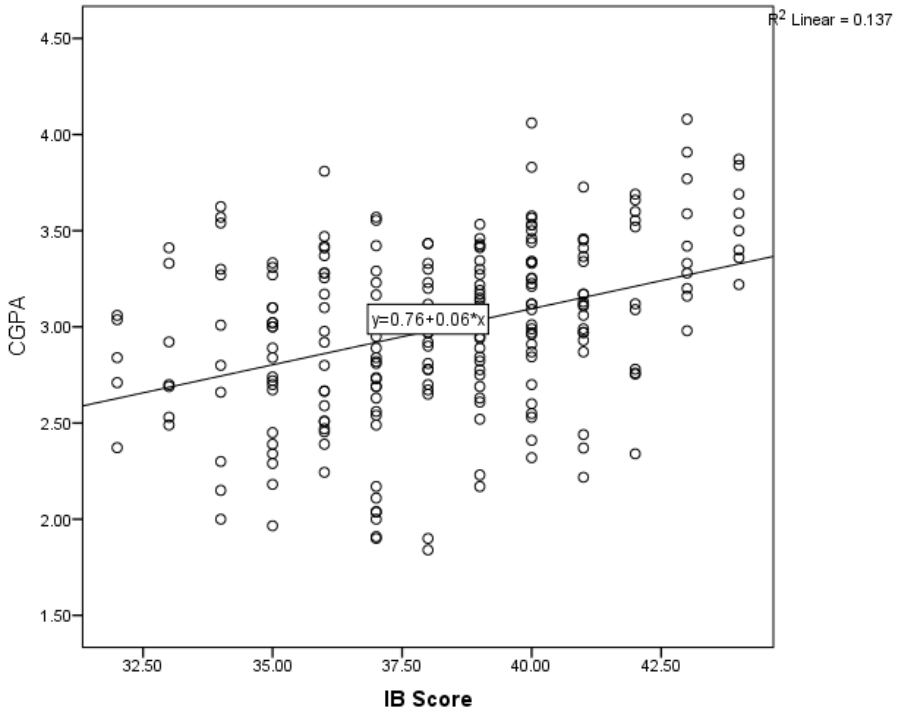

Figure 3.5. Scatter Plot of Cumulative GPAs with a Regression Line

3.2.2. LONGITUDINAL ANALYSES: UNIVERSITY C

We obtained the GPA data of students admitted to University C in 2012, 2013, and 2014 without any missing values in the academic performance data. The data included enrollment information of the three cohorts as well. We further classified them into the university faculty structures (e.g., Faculty of Business & Economics, Arts & Social Sciences).[4]

During the period from 2012 to 2014, the number of the IBDP alumni admitted to the university had increased continuously: 83 (in 2012) 92 (in 2013) and 121 (in 2014). Overall, the proportion of the IBDP alumni enrolled in University C during the period increased from 5.8% to 7.6%, which is a very similar pattern and proportion of IB graduate enrollment in University B over a similar time period (see above). In terms of programme chosen, programmes in Business & Economics were among the most popular chosen by IBDP alumni. Interestingly, this was also the same pattern in University B in East Asia. The proportion of IBDP alumni accounted for 6.9% in the 2013 cohort to 12.2% in the 2015 cohort. The Faculty of Medicine, Biology, & Environmental Sciences and the Faculty of Engineering & Computer Sciences showed the smallest proportion of IBDP alumni at University C (see Figures 3.6. to 3.8.). Once again, a similar pattern was identified in University B in East Asia.

[4] We excluded a handful of cases (19 cases from the 2012 cohort, 5 cases from the 2013 cohort, and 3 cases from the 2014 cohort) in classifying the whole cases by faculty structures. Specifically, student cases enrolled in foundation programmes were excluded, because those programs are preparatory programs (not regular programs). Also, two cases belonging to a joint programme from each cohort were excluded, given the very small size for statistical analysis.

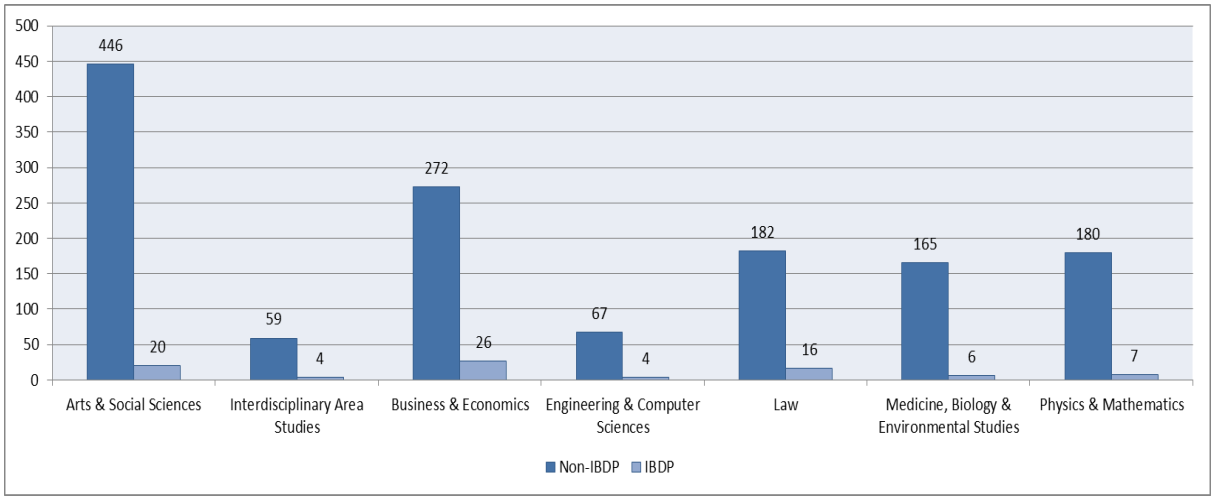

Figure 3.6. Enrollment Pattern by Faculties (2012 Cohort)

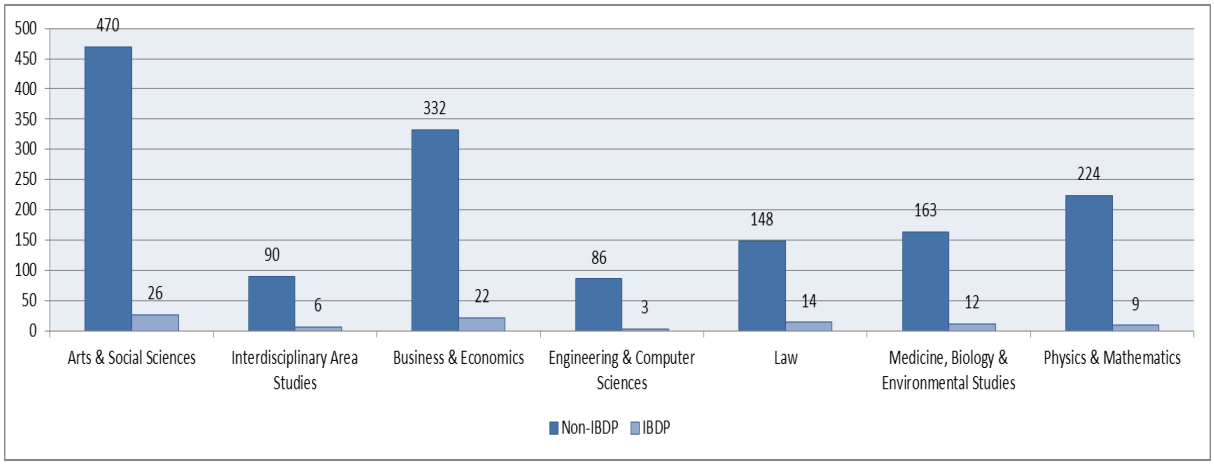

Figure 3.7. Enrollment Pattern by Faculties (2013 Cohort)

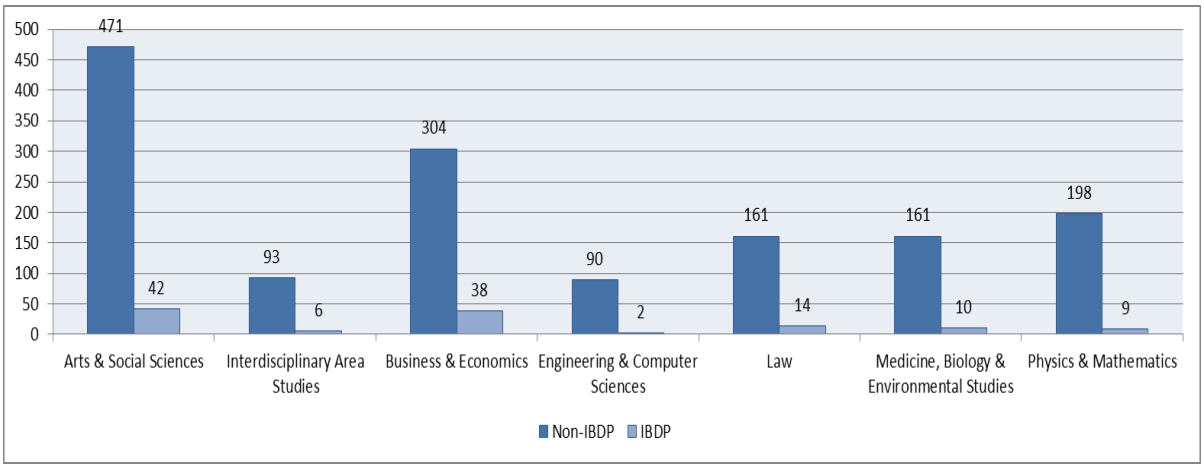

Figure 3.8. Enrollment Pattern by Faculties (2014 Cohort)

In the following section, we report results of longitudinal analyses on the effect of the IBDP on the growth of GPA at University C in Australia. Notably, we obtained the university in-house data of "all" students in the three cohorts. The data also included key variables such as GPA by term, IB status, domestic vs. international students, characteristic of high school where student graduated (i.e., whether or not schools were classified as socio-economically disadvantaged by government records) faculty affiliation, and entrance exam scores (ATAR scores and IBDP scores).[5] In our longitudinal analyses, we utilised GPAs from major semesters (i.e., Semesters 1 and 2), meaning that we excluded GPAs from unconventional semesters (i.e., summer sessions,) where a relatively small number of students were enrolled.

We analysed the data by cohorts. In doing so, we also conducted a series of separate analyses by faculty because of quite substantial variation in admission scores. In other words, we thought that it is fairer to compare IBDP alumni with non-IBDP peers "within" the same faculty, given the variation in admission scores across different faculties.

All of three cohort analyses consist of (1) finding the best fitting model for the growth with the whole data, (2) identifying significant covariates among student's entrance exam score, international status, and disadvantaged school status, (3) examining the effect of IB status based on the best fitting model, and (4) investigating the effect across student enrollment of faculty separately including model selection and identification. Table 3.2. summarises the total number of students in each cohort included in the GPA only model (i.e., the initial model) and the final model.

[5] IB scores were converted to ATAR scores by the university's administration office. We used raw ATAR scores, not including bonus points (e.g., bonus points given to students in certain circumstances such as economic hardship).

Table 3.2. The Total Number of Students Included in the Longitudinal Analyses (University C)

		2012 Cohort			2013 Cohort			2014 Cohort	
		GPA Only Model	**Final Model**		**GPA Only Model**	**Final Model**		**GPA Only Model**	**Final Model**
The Whole Group	Data Points	8939	8939	Data Points	8035	8035	Data Points	5654	5654
	Student Number	1473	1473	Student Number	1608	1608	Student Number	1604	1604
Arts & Social Sciences	Data Points	2643	2553	Data Points	2342	2342	Data Points	1738	1738
	Student Number	466	450	Student Number	496	496	Student Number	513	513
Interdisciplinary Area Studies	Data Points	357	357	Data Points	458	458	Data Points	345	345
	Student Number	63	63	Student Number	96	96	Student Number	99	99
Business & Economics	Data Points	1867	1867	Data Points	1800	1682	Data Points	1223	1223
	Student Number	298	298	Student Number	354	329	Student Number	342	342
Engineering & Computer Sciences	Data Points	458	458	Data Points	469	469	Data Points	328	328
	Student Number	71	71	Student Number	89	89	Student Number	92	92
Law	Data Points	1395	1395	Data Points	896	896	Data Points	655	655
	Student Number	198	198	Student Number	162	162	Student Number	175	175
Medicine, Biology & Environmental Studies	Data Points	994	994	Data Points	877	877	Data Points	595	571
	Student Number	171	171	Student Number	175	175	Student Number	171	165
Physics & Mathematics	Data Points	1141	1141	Data Points	1177	1143	Data Points	744	744
	Student Number	187	187	Student Number	233	226	Student Number	207	207

The 2012 Cohort

The Whole Cohort Group. In the first instance, we analysed the whole group. We found that the quadratic polynomial model was the best fitting model, as presented in Figure 3.9. below (see also Table 3.3. for details about model fit).[6]

Based on identifying the best fitting model, we included the following variables as covariates: entrance exam scores (ATAR), international status (domestic vs. international students), whether or not students were from a disadvantaged high school, and IBDP status.

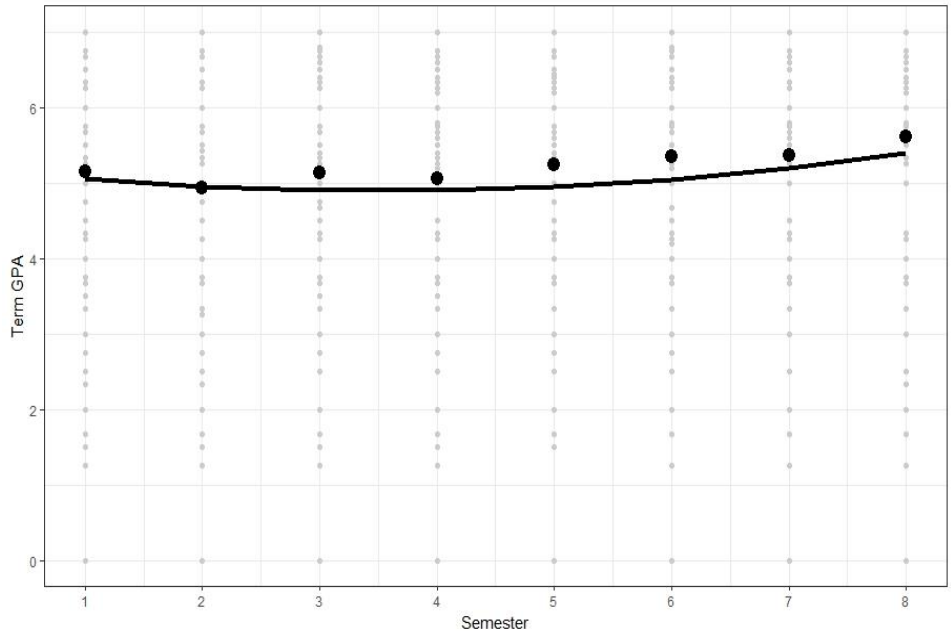

Figure 3.9. Mean Growth Curve of 2012 Cohort (All of Faculties)

Note: N = 1,473, Data Points = 8,939

Results indicated that both the entrance exam score (i.e., ATAR) and international student status were positively significant covariates (see Table 3.3. for details). When controlling for these two significant covariates, there was no statistically significant GPA difference at the first semester between IB and non-IB groups, although the average GPA of IBDP alumni at the time point was slightly lower than non-IB peers, as illustrated in Figure 3.10. below. In addition, although we observed that the GPA gap between non-IB and IB students reduced gradually, the rate of change in the GPA gap was not statistically significant (see Table 3.3. for details).

[6] The range of Y axis (i.e., term GPA) slightly varies across figures in this chapter in order to closely capture the common and different patterns of GPA changes between the IB students and their counterparts. However, because this means that there is inconsistency in the range of Y axis, caution should be exercised in interpretation of the findings.

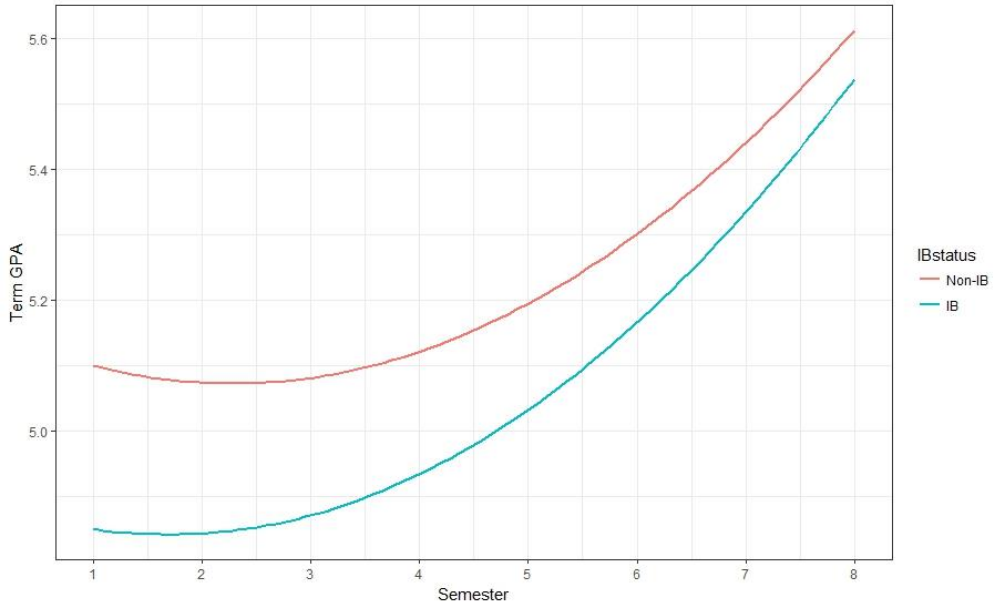

Figure 3.10. Mean changes of GPAs conditioned on the IB variable

Note: N = 1,473, Data Points = 8,939

Next, we conducted a series of separate analyses by faculty because, as mentioned above, there were quite substantial variations in entrance exam scores by faculties. We identified the quadratic polynomial model as the best fitting model across the seven academic units (Arts & Social Sciences, Interdisciplinary Area Studies, Business & Economics, Engineering & Computer Sciences, Law, Medicine, Biology & Environmental Sciences, and Physics & Mathematics). Looking closely into a more homogenous subgroup in academic ability through the "within" faculty comparison, we found that different covariates played a role in shaping student academic performance across different faculties in the 2012 cohort. It should be noted that we do not report some of these within faculty analyses when the number of IBDP alumni in the faculty was too small to generate rigorous statistical findings. For example, there were only four IBDP alumni enrolled in the Faculty of Interdisciplinary Area Studies.

Faculty of Arts and Social Sciences. We identified both the entrance exam score and the disadvantaged school status as significant covariates. Interestingly, on average, students from disadvantaged schools showed a higher GPA than their counterpart in the first semester. When controlling for these two significant covariates, there was no statistically significant GPA difference in the first semester or in the subsequent semesters between IB and non-IB groups, although we observed that the IBDP group was more dynamic and was catching up with the non-IBDP group over time (Figure 3.11. below).

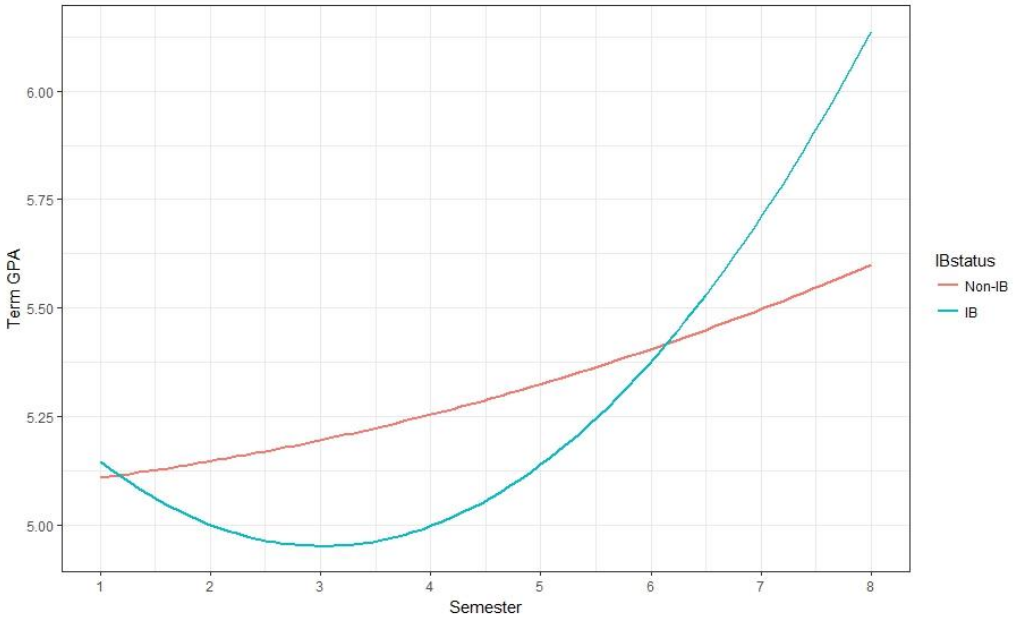

Figure 3.11. Mean changes of GPAs conditioned on the IB variable

Note: N = 450, Data Points =2,553

Faculty of Business & Economics. We identified both the entrance exam score and international student status as significant covariates. The GPA of international students in the first semester was, on average, lower than their domestic peers. More importantly, IBDP status was a significant factor. On average, IBDP alumni started with a lower GPA but they were catching up with their non-IB peers from Semester 4. Notably, they had a higher GPA than their counterparts in the final semester (Semester 8) of university (Figure 3.12. below).

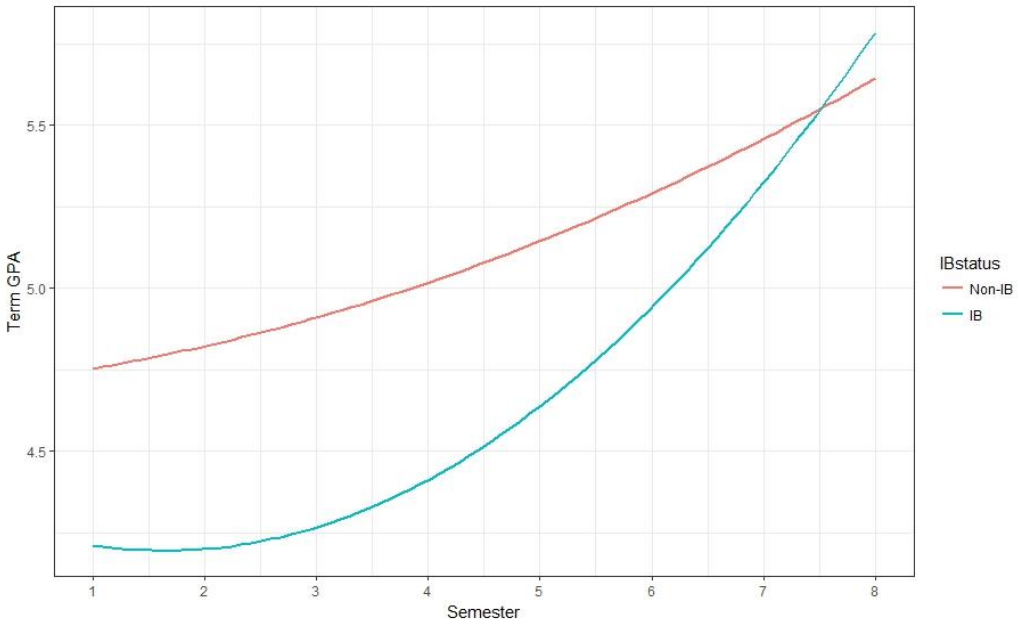

Figure 3.12. Mean changes of GPAs conditioned on the IB variable

Note: N = 298, Data Points =1,867

Faculty of Law. We identified the entrance exam score as the only significant covariate. When controlling for the entrance exam score, the IBDP status was not a significant factor. While not statistically significant, the gap between IB and non-IB groups narrowed until between Semester 1 and Semester 5, but began to widen in the following semesters (Figure 3.13. below).

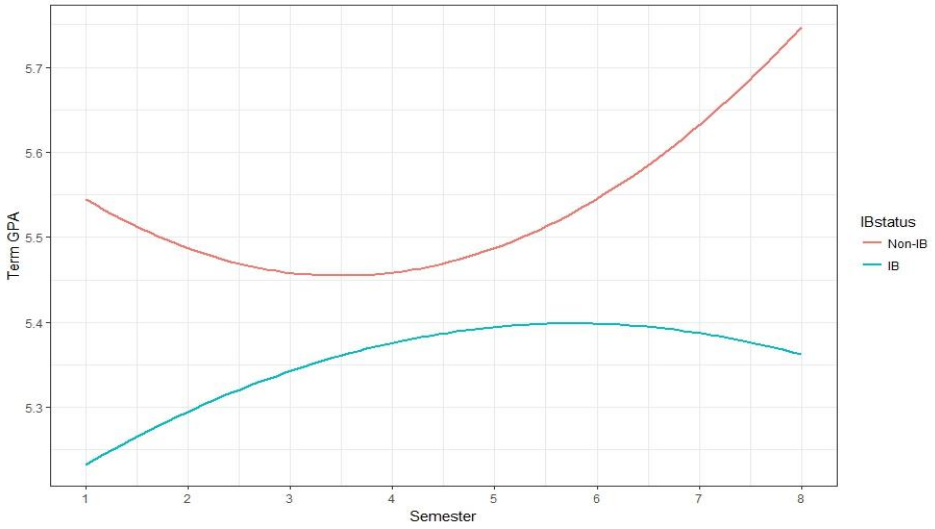

Figure 3.13. Mean changes of GPAs conditioned on the IB variable

Note: N = 198, Data Points =1,395

Faculty of Medicine, Biology, and Environmental Sciences. We identified the entrance exam score as the only significant covariate. When controlling for the entrance exam score, the IBDP status was not a significant factor. Albeit not statistically significant, the IBDP group was catching up with initial gaps in GPA and improved faster than the non-IB group and, again, the gap between the groups eventually diminished (Figure 3.14. below).

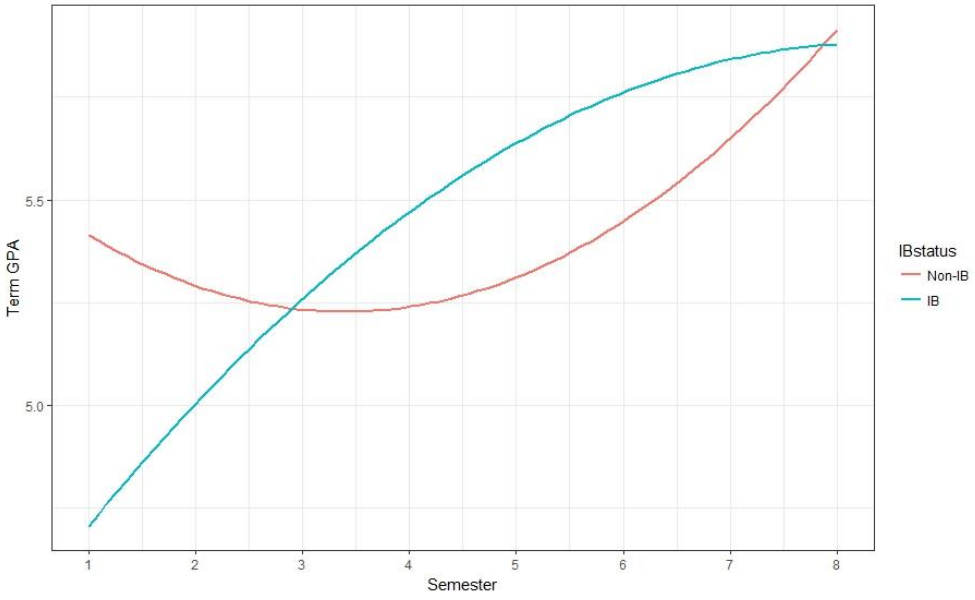

Figure 3.14. Mean changes of GPAs conditioned on the IB variable

Note: N = 171, Data Points = 994

Table 3.3. Statistical Values (The 2012 Cohort)

		ATAR				**International Student**				**Disadvantaged School**				**IB Status**			
		$\Delta\chi^2$	P-value	Estimate	P-value	$\Delta\chi^2$	P-value	Estimate	P-value	$\Delta\chi^2$	P-value	Estimate	P-value	$\Delta\chi^2$	P-value	Estimate	p-value
Whole	Intercept	232.86	0	0.327	>0.05	18.977	0	0.0553	<0.05	1.13	0.77	N/A	N/A	3.496	0.321	-0.3379	>0.05
	Linear			0.0066	<0.05			-0.1071	>0.05			N/A	N/A			0.0467	>0.05
	Quadratic			-0.0009	<0.05			0.0189	>0.05			N/A	N/A			-0.0013	>0.05
Arts & Social Sciences	Intercept	48.317	0	0.0305	<0.05	3.2199	0.359	N/A	N/A	12.328	0.006	1.1531	<0.05	3.85	0.278	0.029	>0.05
	Linear			0.0092	<0.05			N/A	N/A			-0.2179	>0.05			-0.3824	>0.05
	Quadratic			-0.0009	>0.05			N/A	N/A			0.0089	>0.05			0.00388	>0.05
Inter-disciplinary Area Studies	Intercept	8.3822	0.039	0.0912	<0.05	3.867	0.276	N/A	N/A	1.4388	0.697	N/A	N/A	10.31	0.016	-0.8027	>0.05
	Linear			-0.0138	>0.05			N/A	N/A			N/A	N/A			-0.1395	>0.05
	Quadratic			0.0018	>0.05			N/A	N/A			N/A	N/A			-0.0174	>0.05
Business & Economics	Intercept	92.001	0	0.1753	<0.05	11.078	0.011	-0.8387	<0.05	1.6457	0.649	N/A	N/A	8.2817	0.041	-0.4112	>0.05
	Linear			-0.0263	<0.05			-0.107	>0.05			N/A	N/A			-0.1574	>0.05
	Quadratic			0.0009	>0.05			0.02865	>0.05			N/A	N/A			0.02863	>0.05
Engineering & Computer Sciences	Intercept	41.271	0	0.1984	<0.05	2.7812	0.4266	N/A	N/A	4.6158	0.2022	N/A	N/A	1.1028	0.7764	0.3286	>0.05
	Linear			-0.0132	>0.05			N/A	N/A			N/A	N/A			-0.3815	>0.05
	Quadratic			-0.00001	>0.05			N/A	N/A			N/A	N/A			0.0343	>0.05
Law	Intercept	59.463	0	0.2348	<0.05	6.3155	0.097	N/A	N/A	1.6216	0.6545	N/A	N/A	3.9165	0.2706	-0.5939	>0.05
	Linear			-0.0015	>0.05			N/A	N/A			N/A	N/A			0.1985	>0.05
	Quadratic			-0.0019	>0.05			N/A	N/A			N/A	N/A			-0.0219	>0.05
Medicine, Biology & Env. Studies	Intercept	18.953	0.0003	0.0621	<0.05	3.7901	0.285	N/A	N/A	1.9639	0.5799	N/A	N/A	3.6275	0.3046	-1.1069	>0.05
	Linear			0.0021	>0.05			N/A	N/A			N/A	N/A			0.5228	>0.05
	Quadratic			-0.0003	>0.05			N/A	N/A			N/A	N/A			-0.0448	>0.05
Physics & Mathematics	Intercept	30.55	0	0.1039	<0.05	1.9354	0.5859	N/A	N/A	7.18	0.0664	N/A	N/A	11.341	0.01	-0.2978	>0.05
	Linear			0.0059	>0.05			N/A	N/A			N/A	N/A			0.9424	<0.05
	Quadratic			-0.0009	>0.05			N/A	N/A			N/A	N/A			-0.0964	>0.05

The 2013 Cohort

The Whole Cohort Group. We firstly analysed the whole group for the 2013 cohort. We found that the quadratic polynomial model was the best fitting model, as presented in Figure 3.15. below (see also Table 3.4. for details about model fit).

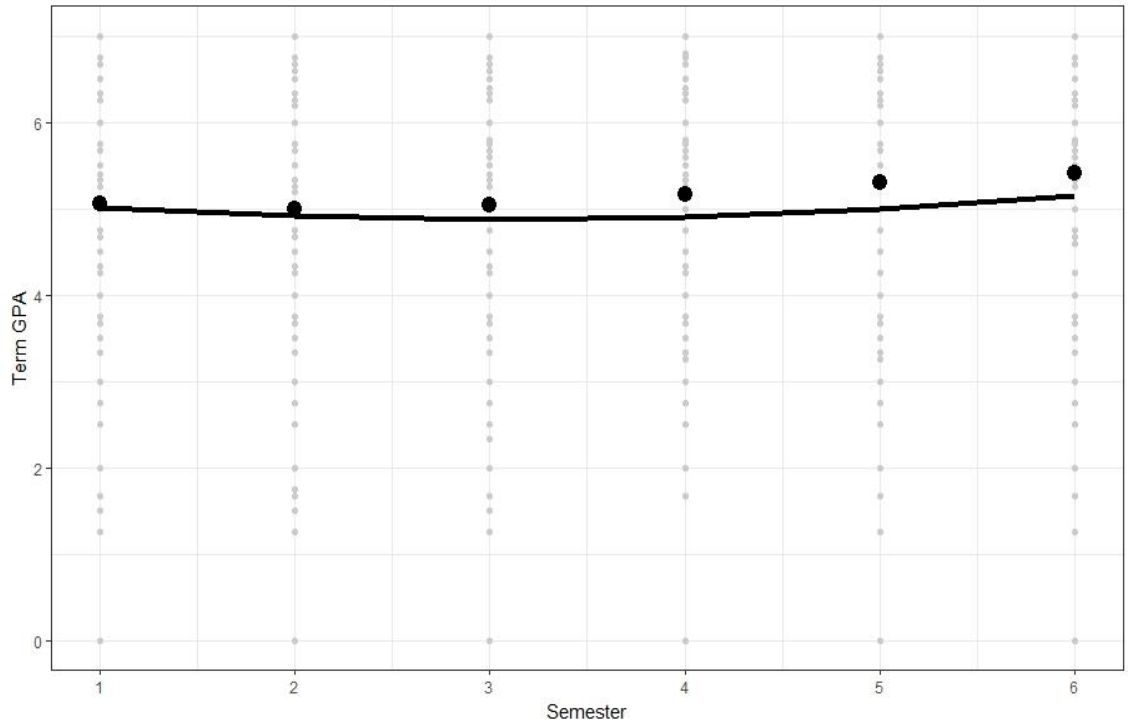

Figure 3.15. Mean Growth Curve of 2013 Cohort (All of Faculties)

Note: N = 1,608, Data Points = 8,035

Based on identifying the best fitting model, we included the below variables as covariates: entrance exam scores (ATAR), international status (domestic vs. international students), whether students were from a disadvantaged high school, and IBDP status.

The 2013 cohort data indicated that both the entrance exam score (i.e., ATAR) and international student status were significant covariates. The 2013 cohort data showed that the international student status was a negatively significant covariate (see Table 3.4. for details). Controlling for entrance exam score and international student status, there was no statistically significant GPA difference in the first semester between IB and non-IB groups. Unlike the previous cohort, the IBDP alumni cohort in 2013 showed a higher GPA than their non-IBDP peers. Again, there was no significant difference in the change of GPA between the two groups (Figure 3.16. below).

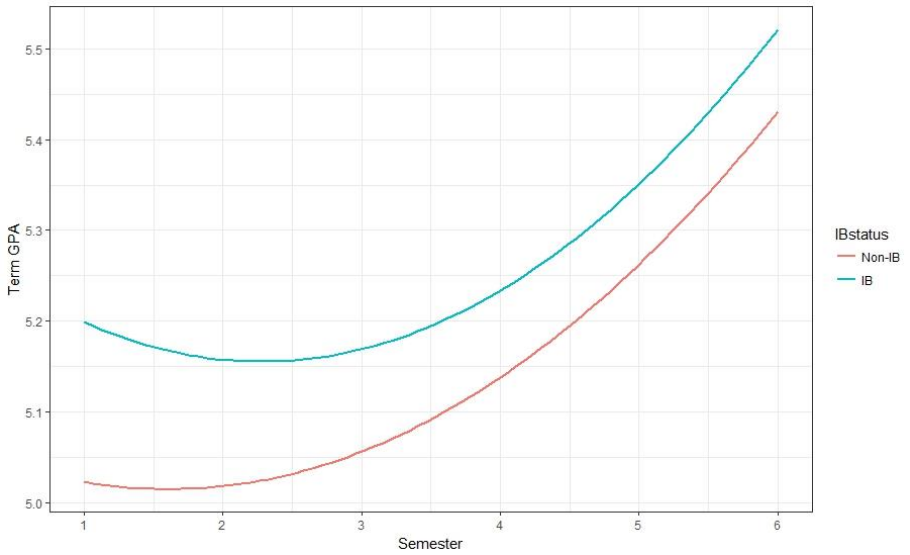

Figure 3.16. Mean changes of GPAs conditioned on the IB variable

Note: N = 1,608, Data Points = 8,035

The same analytical procedures were applied to the 2013 cohort; we conducted a series of separate analyses by faculty. We do not report some of these analyses when the number of IBDP alumni in the faculty was too small to generate rigorous statistical findings (e.g., Faculty of Engineering and Computer Sciences).

Faculty of Arts and Social Sciences. We identified the entrance exam score as the only significant covariate. When controlling for the entrance exam score, there was no statistically significant GPA difference in initial GPA and GPA growth between the IBDP and non-IBDP groups, although the change in GPA among IBDP alumni seemed to be more dynamic over time. Also, we wish to note that the overall pattern of the GPA trajectory of both groups was very similar to that of their previous cohort enrolled in the same faculty (Figure 3.17. below).

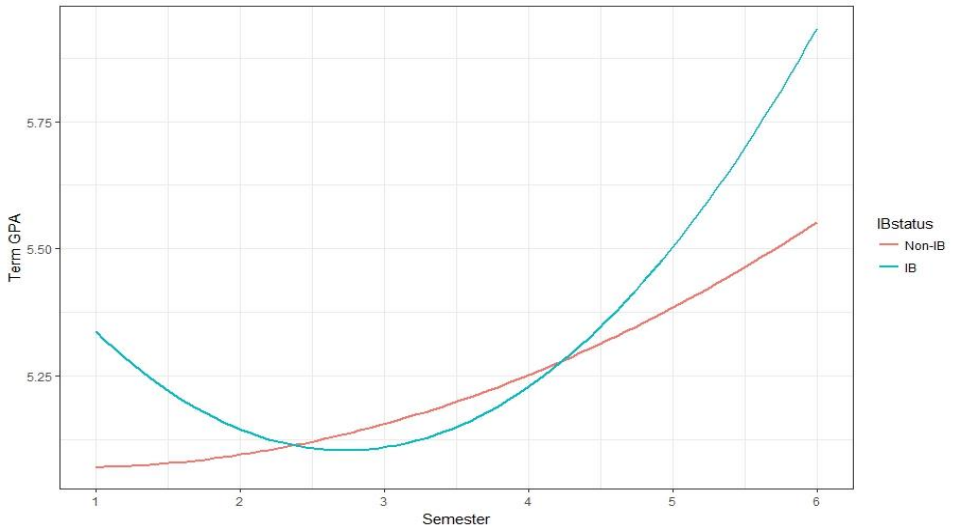

Figure 3.17. Mean changes of GPAs conditioned on the IB variable

Note: N = 496, Data Points =2,342

Faculty of Interdisciplinary Area Studies. The entrance exam score was a positively significant covariate, while international student status was a negatively significant covariate. When controlling for the two covariates, IBDP status was not a significant factor. Although caution should be exercised given statistically insignificant group differences, the model suggests that, on average, IBDP alumni started with a lower GPA but they were catching up from Semester 3. They showed a higher GPA than their counterparts at the final measurement point (Semester 6) (Figure 3.18. below).

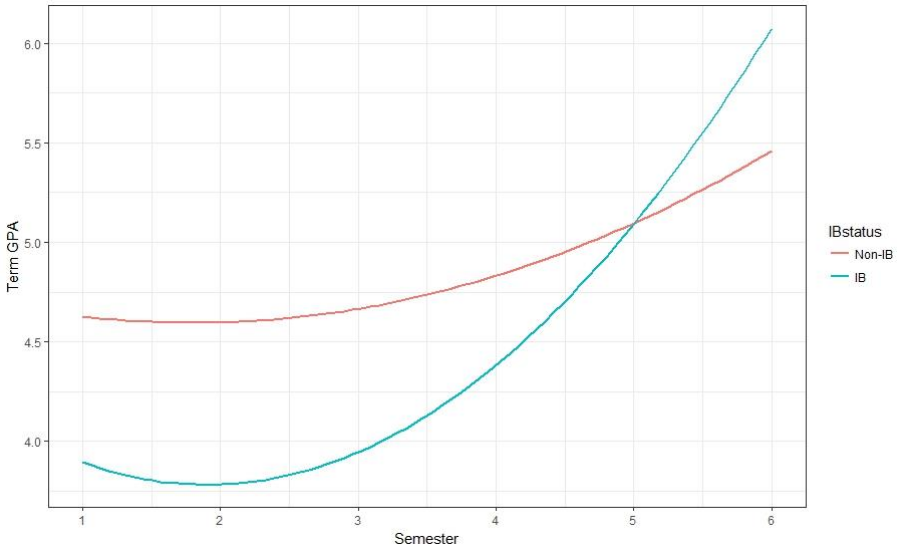

Figure 3.18. Mean changes of GPAs conditioned on the IB variable

Note: N = 96, Data Points = 458

Faculty of Business & Economics. We identified three significant covariates: the entrance exam score, international student status, and whether or not students were from a disadvantaged high school. The GPA of international students in the first semester was, on average, lower than their domestic peers. International students and domestic students who graduated from disadvantaged schools initially lagged behind each of their counterparts in academic performance. Domestic students who graduated from disadvantaged schools demonstrated different vertexes, meaning that their GPA turning points were earlier than their counterparts, whereas their GPA change rates were slower than their counterparts. When controlling for these three covariates, IBDP status was not a significant factor, which is different from the previous cohort. It should be recalled that in the 2012 cohort, on average, the IBDP alumni started with a lower GPA but they were catching up from Semester 4. They showed a higher GPA than their counterpart at the final semester (Semester 8) of their university studies. However, this was not the case for the 2013 cohort. Rather, the IBDP alumni seemed to lag behind over time (Figure 3.19. below).

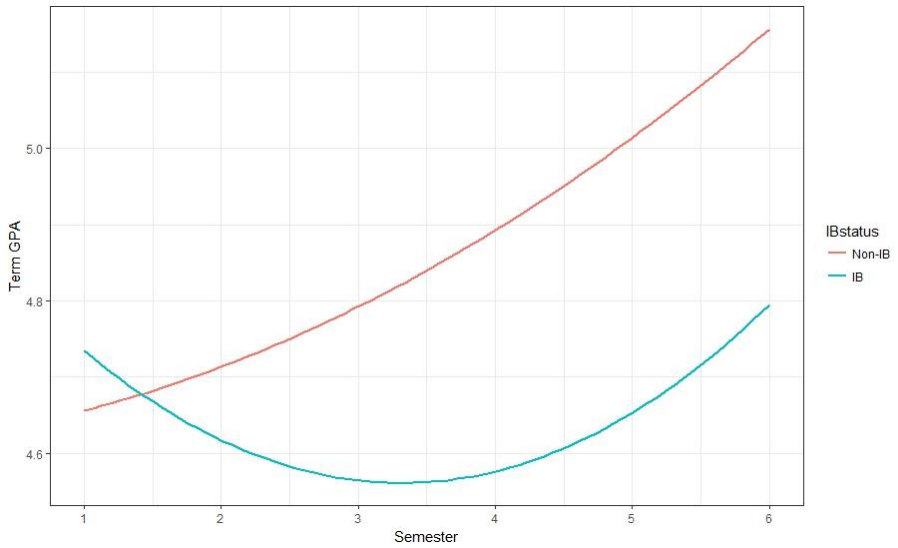

Figure 3.19. Mean changes of GPAs conditioned on the IB variable

Note: N = 329, Data Points =1,682

Faculty of Law. We identified the entrance exam score as the only significant covariate. When controlling for the entrance exam score, IBDP status was not a significant factor. While not statistically significant, the gap between IB and non-IB groups got narrower from the fourth semester (Figure 3.20. below).

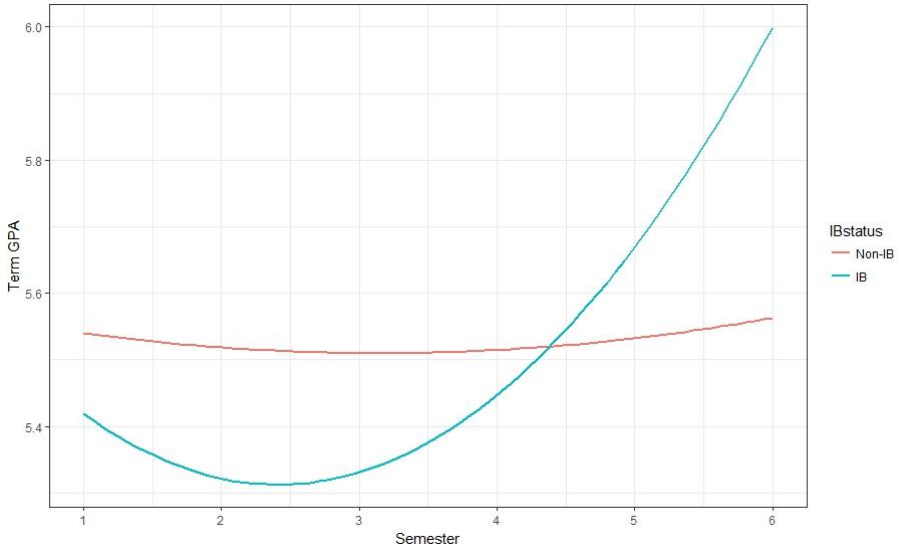

Figure 3.20. Mean changes of GPAs conditioned on the IB variable

Note: N = 162, Data Points = 896

Faculty of Medicine, Biology, and Environmental Sciences. We identified the entrance exam score and international student status as positively significant covariates. When controlling for the covariates, the IBDP status was not a significant factor. The IBDP group's GPA diminished over time, although this was not statistically significant (Figure 3.21. below).

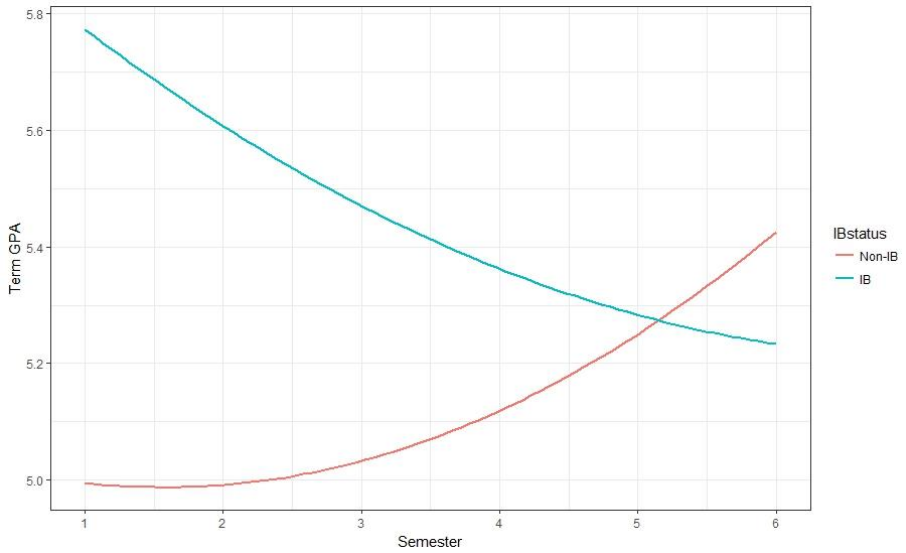

Figure 3.21. Mean changes of GPAs conditioned on the IB variable

Note: N = 175, Data Points = 877

Faculty of Physics and Mathematics. We identified the entrance exam score and the origin of disadvantaged school as positively significant covariates. When controlling for the covariates, IBDP status was not a significant factor. Albeit not statistically significant, the IBDP group started with a higher GPA than their non-IB peers in the first semester and maintained the gap to some extent (Figure 3.22. below).

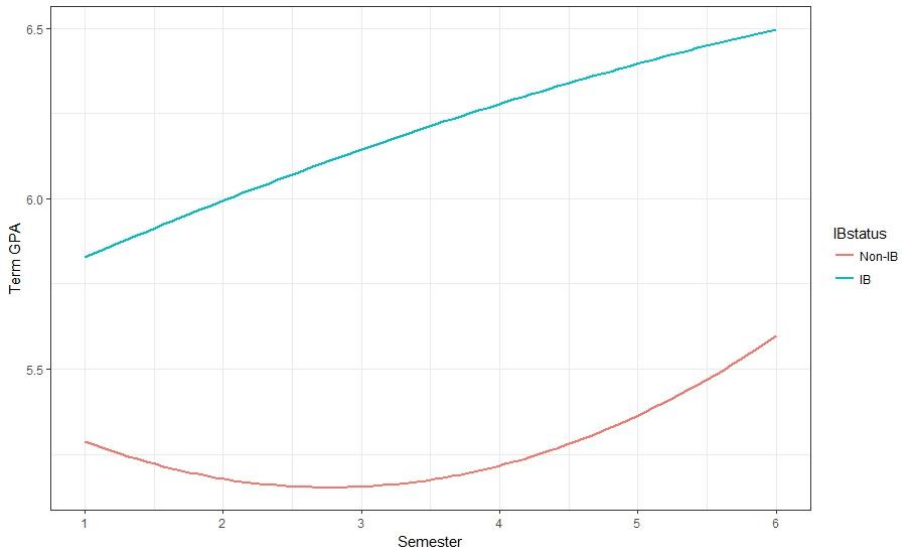

Figure 3.22. Mean changes of GPAs conditioned on the IB variable

Note: N = 226, Data Points =1,143

Table. 3.4. Statistical Values (The 2013 Cohort)

		ATAR				**Int'l Student**				**Disadv. School**				**IB Status**			
		Δχ²	*p*	*Estimate*	*p*	*Δχ²*	*p*	*Estimate*	*p*	*Δχ²*	*p*	*Estimate*	*p*	*Δχ²*	*p*	*Estimate*	*p*
Whole	Intercept	244.82	0	0.0887	<0.05	39.091	0	-0.9083	<0.05	7.1594	0.067	N/A	N/A	0.3597	0.948	0.0538	>0.05
	Linear			0.0005	>0.05			-0.0911	>0.05			N/A	N/A			-0.0709	>0.05
	Quadratic			-0.0009	>0.05			0.0195	>0.05			N/A	N/A			0.0112	>0.05
Arts & Social Sciences	Intercept	46.464	0	0.06172	<0.05	1.6919	0.638	N/A	N/A	0.2257	0.9733	N/A	N/A	4.3962	0.221	0.4503	>0.05
	Linear			-0.00249	>0.05			N/A	N/A			N/A	N/A			-0.5127	>0.05
	Quadratic			0	>0.05			N/A	N/A			N/A	N/A			0.0732	>0.05
Inter-Disciplinary Area Studies	Intercept	13.638	0.0034	0.1325	<0.05	17.171	0.001	-2.710	<0.05	2.1842	0.5351	N/A	N/A	3.5459	0.314	-0.2663	>0.05
	Linear			-0.0216	>0.05			0.106	>0.05			N/A	N/A			-0.1358	>0.05
	Quadratic			0.002	>0.05			0.003	>0.05			N/A	N/A			0.054	>0.05
Business & Economics	Intercept	49.323	0	0.1492	<0.05	14.695	0.002	-0.700	>0.05	11.872	0.0078	-4.0517	<0.05	1.0762	0.782	-0.6587	>0.05
	Linear			-0.0192	>0.05			-0.233	>0.05			2.623	<0.05			0.3149	>0.05
	Quadratic			0.001	>0.05			0.048	>0.05			-0.409	<0.05			-0.045	>0.05
Engineering & Computer Sciences	Intercept	38.65	0	0.1705	<0.05	2.5343	0.469	N/A	N/A	N/A	N/A	N/A	N/A	2.8533	0.414	0.2508	>0.05
	Linear			-0.0096	>0.05			N/A	N/A			N/A	N/A			0.0684	>0.05
	Quadratic			-0.0004	>0.05			N/A	N/A			N/A	N/A			-0.0528	>0.05
Law	Intercept	24.114	0	0.0604	>0.05	N/A	N/A	N/A	N/A	30.99	0	N/A	N/A	3.4995	0.320	-0.0097	>0.05
	Linear			0.0545	>0.05			N/A	N/A			N/A	N/A			-0.2945	>0.05
	Quadratic			-0.0074	>0.05			N/A	N/A			N/A	N/A			0.0466	>0.05
Medicine, Biology, & Env. Studies	Intercept	33.374	0	0.1055	<0.05	9.3368	0.025	1.292	>0.05	3.5307	0.3168	N/A	N/A	1.1091	0.774	0.5991	>0.05
	Linear			-0.0048	>0.05			-1.150	>0.05			N/A	N/A			-0.1312	>0.05
	Quadratic			-0.0014	>0.05			0.118	>0.05			N/A	N/A			0.0066	>0.05
Physics & Mathematics	Intercept	72.261	0	0.0772	<0.05	4.2014	0.240	N/A	N/A	13.936	0.003	1.1298	>0.05	2.1798	0.535	-0.1017	>0.05
	Linear			0.0291	>0.05			N/A	N/A			-0.6654	>0.05			0.2554	>0.05
	Quadratic			-0.0034	>0.05			N/A	N/A			0.0637	>0.05			-0.0206	>0.05

The 2014 Cohort

The Whole Cohort Group. For the 2014 cohort we firstly analysed the whole group. We found that the quadratic polynomial model was the best fitting model, as presented in Figure 3.23. below (see also Table 3.5. for details about model fit).

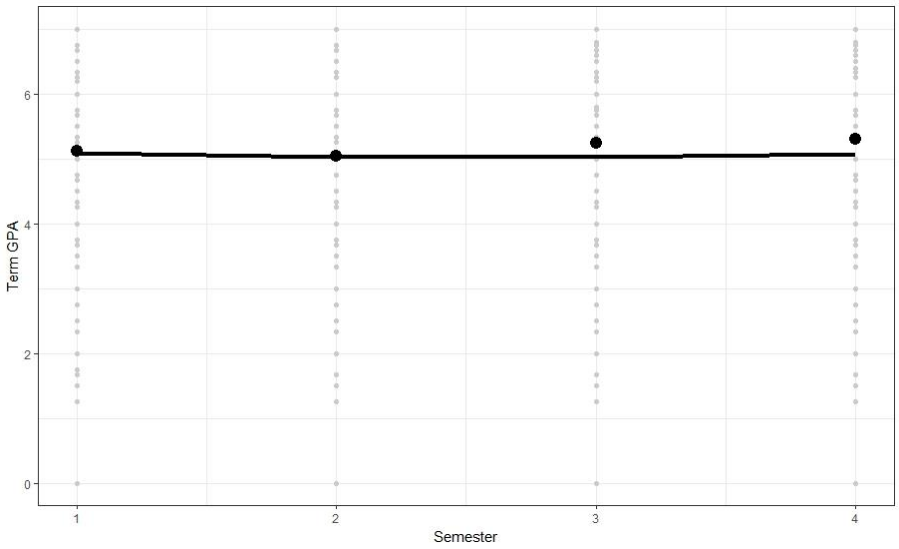

Figure 3.23. Mean Growth Curve of 2014 Cohort (All of Faculties)

Note: N = 1,604, Data Points = 5,654

Based on identifying the best fitting model, we included the following variables as covariates: entrance exam scores (ATAR), international status (domestic vs. international students), whether or not students were from a disadvantaged high school, and IBDP status.

Similar to results from the 2012 cohort, the 2013 cohort data indicated that both the entrance exam score (i.e., ATAR) and international student status were significant covariates. In addition, similar to the 2013 cohort data, the 2014 cohort data showed that the international student status was a negatively significant covariate (see Table 3.5. for details). When controlling for these two significant covariates, there was no statistically significant GPA difference at the first semester between IB and non-IB groups, which is the same result as for the previous two cohorts. In the 2014 cohort, the IBDP alumni showed a lower GPA in the first semester than their non-IBDP peers and the gap narrowed over time. The overall trajectory was similar to the 2012 cohort's GPA change, but it should be recalled that this pattern was not statistically significant (Figure 3.24. below).

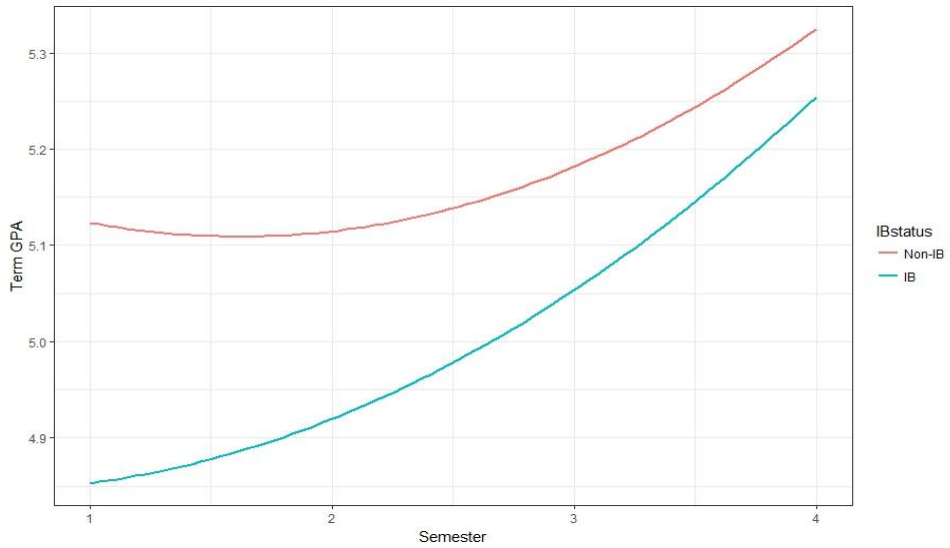

Figure 3.24. Mean changes of GPAs conditioned on the IB variable

Note: N = 1,604, Data Points = 5,654

Next, the same analytical procedures were applied to the 2014 cohort; we conducted a series of separate analyses by faculty. We do not report some of these within analyses when that the number of IBDP alumni in the faculty was too small to generate rigorous statistical findings (e.g., Faculty of Engineering and Computer Sciences).

Faculty of Arts and Social Sciences. We identified the entrance exam score as the only significant covariate. Controlling for entrance exam scores, IBDP status was found as a significant factor. The change in GPA in the IBDP alumni group was more dynamic than other students; initially their GPA declined, but this reversed from Semester 3 (Figure 3.25. below).

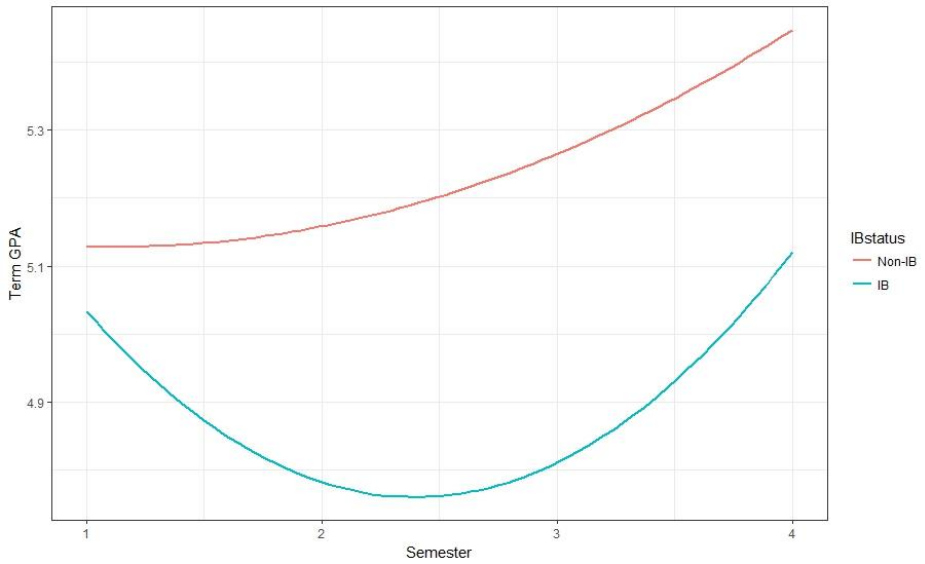

Figure 3.25. Mean changes of GPAs conditioned on the IB variable

Note: N = 513, Data Points =1,738

Faculty of Interdisciplinary Area Studies. Both the entrance exam score and international student status were significant covariates, where international status was a negative factor. When controlling for the two covariates, IBDP status was not a significant factor. Although caution should be exercised given the statistically insignificant group difference, the model suggests that, on average, IBDP alumni started with a lower GPA but they were catching up from Semester 3 and showed a higher GPA than their counterpart at the final measurement point (Semester 4). This pattern was very similar to that of the 2013 cohort (Figure 3.26. below).

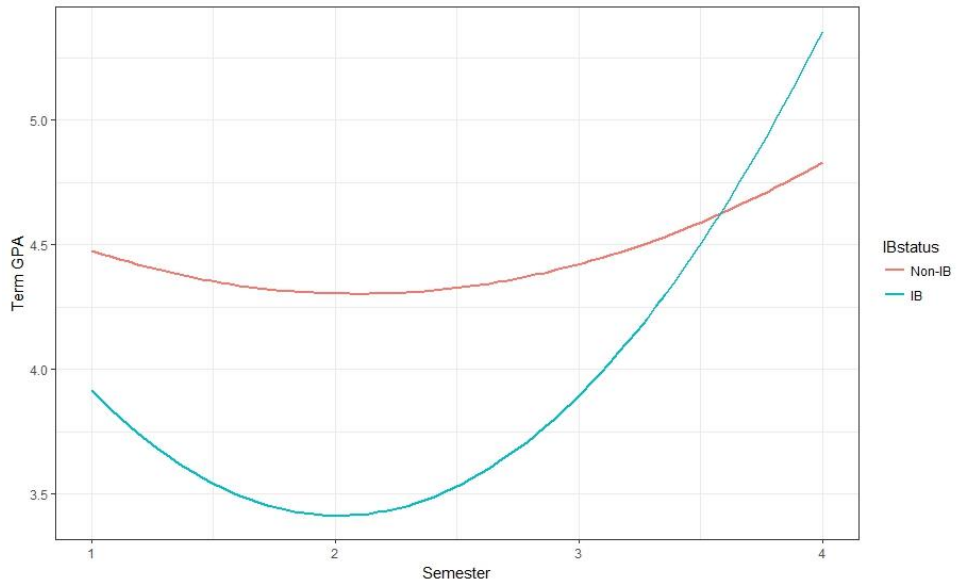

Figure 3.26. Mean changes of GPAs conditioned on the IB variable

Note: N = 99, Data Points = 345

Faculty of Business & Economics. We identified the entrance exam score as the only significant covariate. When controlling for this covariate, IBDP status was not a significant factor. It should be recalled that in the 2012 cohort, on average, the IBDP alumni started with a lower GPA, but they were catching up from Semester 4. The IBDP alumni showed a higher GPA than their counterpart at the final semester (Semester 8) of their university studies. However, this was not the case for the 2014 cohort, as the IBDP alumni lagged behind over time (Figure 3.27. below).

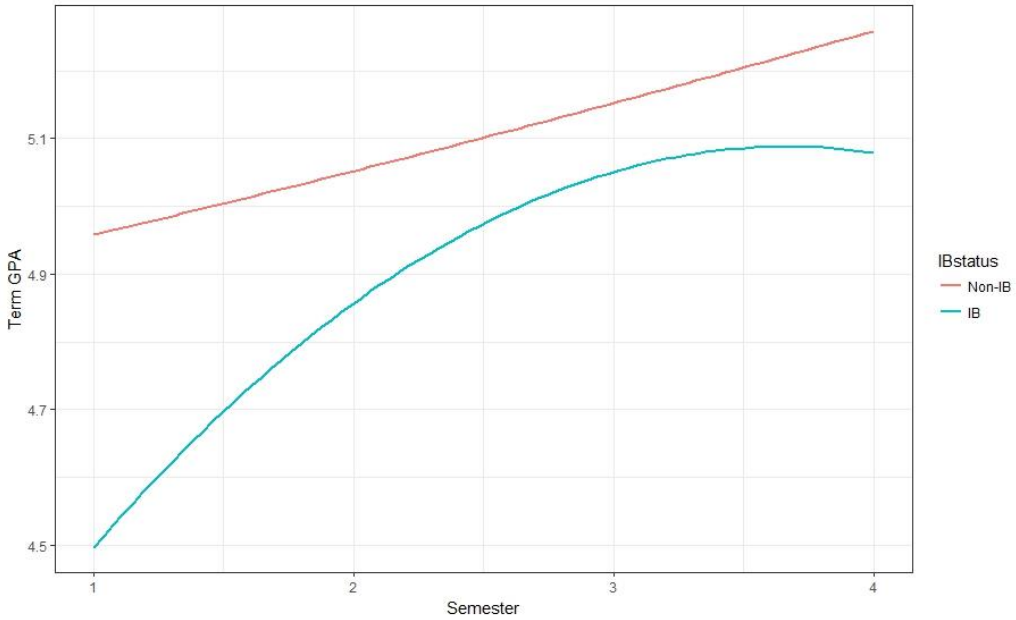

Figure 3.27. Mean changes of GPAs conditioned on the IB variable

Note: N = 342, Data Points =1,223

Faculty of Law. We identified the entrance exam score as the only significant covariate. When controlling for the entrance exam score, IBDP status was not a significant factor. Although IBDP status was not statistically significant, the growth model suggests that the IBDP alumni started with a lower GPA in the first semester, but outperformed their non-IBDP peers from Semester 2 (Figure 3.28. below).

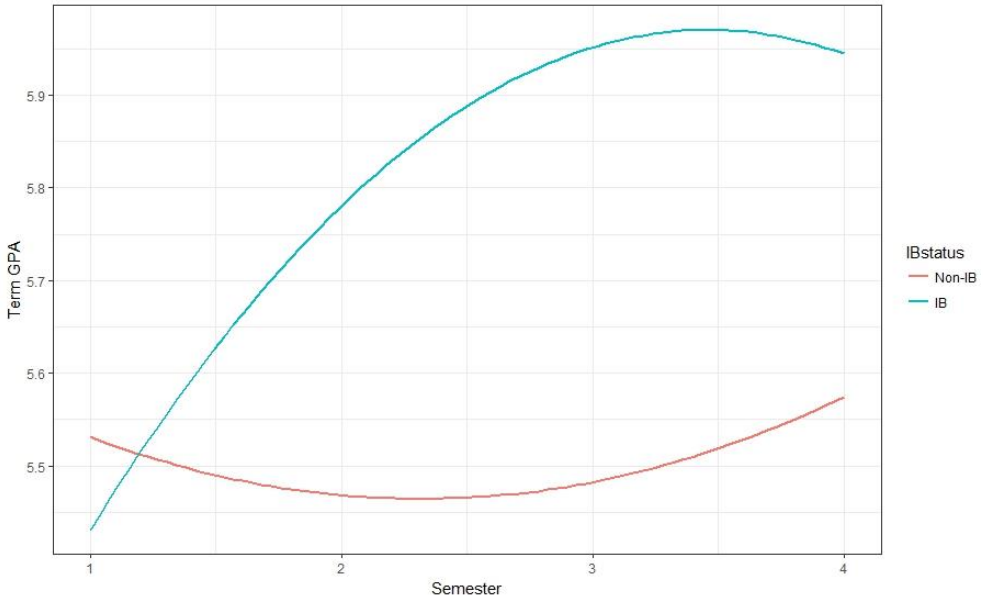

Figure 3.28. Mean changes of GPAs conditioned on the IB variable

Note: N = 175, Data Points = 655

Faculty of Medicine, Biology, and Environmental Sciences. We identified the entrance exam score the international student status as positively significant covariates. This was

also the case for the 2013 cohort. When controlling for the covariates, IBDP status was not a significant factor. Overall, the IBDP group's GPA change was more dynamic while the group's GPA was always lower than non-IBDP group (Figure 3.29. below).

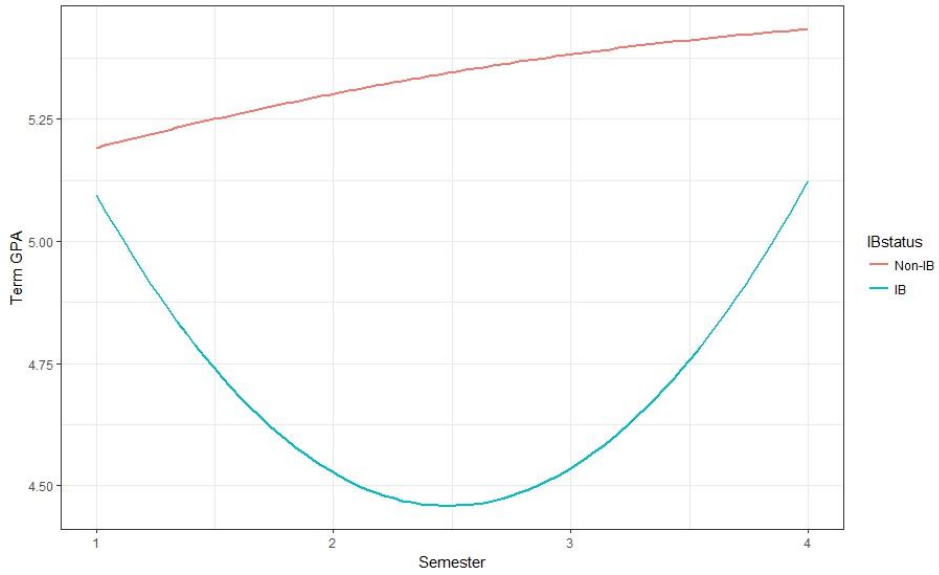

Figure3.29. Mean changes of GPAs conditioned on the IB variable

Note: N = 165, Data Points = 571

Faculty of Physics and Mathematics. We identified the entrance exam score as the only significant covariate. When controlling for the covariate, IBDP status was not a significant factor. Apart from the statistical insignificance of the results, the growth model suggests that the IBDP group started with a lower GPA than their non-IB peers in the first semester and improved steadily over time (Figure 3.30. below).

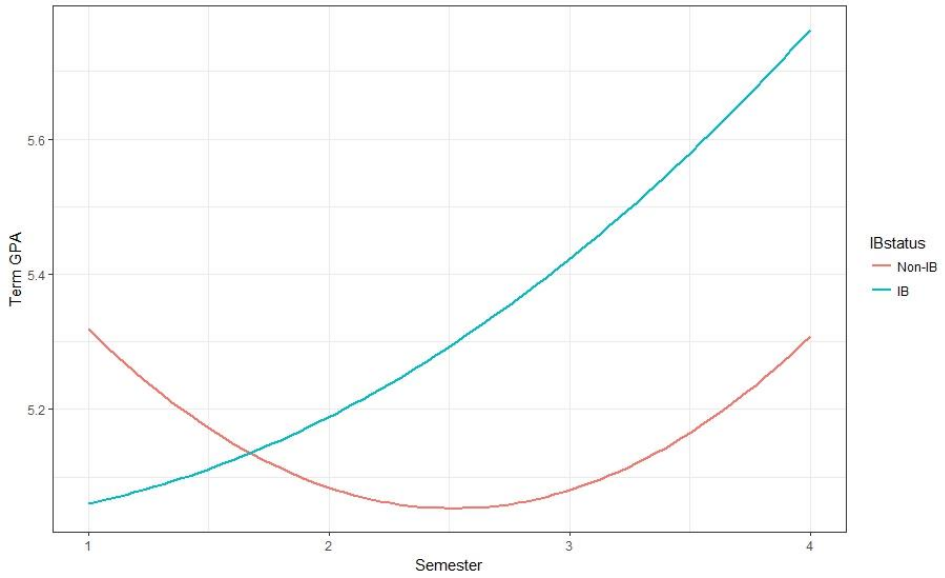

Figure 3.30. Mean changes of GPAs conditioned on the IB variable

Note: N = 207, Data Points =744

Table 3.5. Statistical Values (The 2014 Cohort)

		ATAR				**Int'l Student**				**Disadv. School**				**IB Status**			
		$\Delta\chi^2$	*p*	*Estimate*	*p*	$\Delta\chi^2$	*p*	*Estimate*	*p*	$\Delta\chi^2$	*p*	*Estimate*	*p*	$\Delta\chi^2$	*p*	*Estimate*	*p*
Whole	Intercept	250.24	0	0.091	<0.05	26.632	0	-0.7424	<0.05	4.7241	0.1932	N/A	N/A	6.5183	0.089	-0.4193	>0.05
	Linear			0.0054	>0.05			0.0162	>0.05			N/A	N/A			0.04321	>0.05
	Quadratic			-0.0021	>0.05			-0.0038	>0.05			N/A	N/A			0.0008	>0.05
Arts & Social Sciences	Intercept	39.303	0	0.0746	<0.05	1.6779	0.641	N/A	N/A	1.5393	0.6732	N/A	N/A	10.74	0.013	0.1584	>0.05
	Linear			-0.0109	>0.05			N/A	N/A			N/A	N/A			-0.483	>0.05
	Quadratic			0.0018	>0.05			N/A	N/A			N/A	N/A			0.0647	>0.05
Inter-Disciplinary Area Studies	Intercept	19.23	0.0002	0.0608	>0.05	8.74	0.032	-2.6427	>0.05	3.3305	0.3434	N/A	N/A	1.6909	0.639	-1.268	>0.05
	Linear			0.059	>0.05			0.6471	>0.05			N/A	N/A			0.412	>0.05
	Quadratic			-0.01182	>0.05			-0.0394	>0.05			N/A	N/A			-0.083	>0.05
Business & Economics	Intercept	53.786	0	0.1598	<0.05	6.0918	0.107	N/A	N/A	4.0199	0.2593	N/A	N/A	3.0937	0.377	-0.7102	>0.05
	Linear			-0.0561	<0.05			N/A	N/A			N/A	N/A			0.2671	>0.05
	Quadratic			0.0087	>0.05			N/A	N/A			N/A	N/A			-0.0266	>0.05
Engineering & Computer Sciences	Intercept	40.3	0	0.2045	<0.05	4.7764	0.188	N/A	N/A	N/A - no data	N/A	N/A	N/A	3.1671	0.366	-4.435	>0.05
	Linear			0.00517	>0.05			N/A	N/A			N/A	N/A			3.073	>0.05
	Quadratic			0.00012	>0.05			N/A	N/A			N/A	N/A			-0.5999	>0.05
Law	Intercept	13.115	0.0044	0.1007	>0.05	N/A	N/A	N/A	N/A	0.4893	0.9212	N/A	N/A	6.2967	0.098	-0.9532	>0.05
	Linear			-0.012	>0.05			N/A	N/A			N/A	N/A			0.8521	>0.05
	Quadratic			0.0011	>0.05			N/A	N/A			N/A	N/A			-0.1338	>0.05
Medicine, Biology & Env. Studiees	Intercept	26.773	0	0.0842	<0.05	16.815	0.001	-5.4521	<0.05	15.115		0.9761	>0.05	3.5549	0.313	0.6912	>0.05
	Linear			0.0044	>0.05			3.0771	<0.05			-0.1187	>0.05			-1.2961	>0.05
	Quadratic			-0.003	>0.05			-0.4518	0.05			-0.132	>0.05			0.2647	>0.05
Physics & Mathematics	Intercept	62.7	0	0.0233	>0.05	7.8819	0.049	0.4315	>0.05	2.8439		N/A	N/A	12.086	0.06	-0.9057	>0.05
	Linear			0.1152	<0.05			-1.169	>0.05			N/A	N/A			0.6985	>0.05
	Quadratic			-0.0237	<0.05			0.1806	>0.05			N/A	N/A			-0.0962	>0.05

3.2. CAPACITY FOR 21st CENTURY SKILLS

In this section, we report results from our quantitative analysis of the online survey data on student self-perceptions of 21st century skills, participation in extra-curricular activities, and senior secondary school experiences. The questionnaire survey included key attributes related to IBDP learning outcomes in the areas of cognitive skills (e.g. critical thinking), interpersonal skills (e.g. communication), and intrapersonal skills (e.g. time management). The respondents were asked to self-rate their abilities for a range of skills and competences, with four or five statements covering each dimension, on a five-point Likert scale. As described earlier, we investigated construct validity by using the online survey data from both University B and University C.[7] We conducted exploratory factor analysis (EFA) in order to identify a factor structure by using data from University C (n = 89).[8] Following this, we conducted confirmatory factor analysis (CFA) by using data from University B (n= 734) for cross-validation. Through this procedure, we finalised the nine domains of 21st century skills including critical thinking, creativity, communication, teamwork, cultural sensitivity, time management, adaptability, leadership, and global mindedness.

Figure 3.31. illustrates the perceived capacity for 21st century skills of students from University C. In total, 89 students responded to the survey. Of them, 62 students were IBDP alumni. As seen in the figure, IBDP alumni indicated slightly higher ratings of their capacity for 21st century skills than non-IB counterparts in most of the domains, especially in Cultural Sensitivity and Global-mindedness. Indeed, there were statistically significant differences in the dimensions of Cultural Sensitivity (4.4 compared to 4.0; $t(87) = 2.36$, $p = .02$) and Global Mindedness (4.0 compared to 3.4; $t(86) = 3.54$, $p = .001$). The widest gap between the two groups was found in Global-mindedness (by 0.6). At the same time, however, we wish to note that caution should be exercised in interpreting results above, given the small sample size of the participating students (n= 89), plus the over-representation of the IB students in the samples (n = 62).

Despite these sampling issues of the survey data from University C, we also wish to note that similar patterns on the perceived capacity for 21st century skills were identified from University B where we gathered more solid survey data in terms of sample size and proportion of IBDP alumni. The same procedure for data collection used for University C in Australia was conducted in University B in East Asia; i.e., an invitation email was sent by the university's main administration office to potential survey participants with the on-line survey attached as a link to the invitation email. In total, 734 students responded to the survey. Of them, 63 students were IBDP alumni. The

[7] Using the same survey questionnaire used for Universities B and C, we collected survey data through an on-line instrument hosted on SurveyGizmo. An invitation email was sent by the university's main administration office to potential survey participants with the on-line survey attached as a link to the invitation email. Survey respondents voluntarily provided their email addresses in case that they wish to participate in a possible further interview.

[8] Regarding demographic details of the survey participants in Universities B and C, see Appendices 1 and 2.

proportion of the IB students participating to this survey (i.e., 8.5%) quite similarly reflected the proportion of the entire IBDP alumni to the entire students at the university (7%).

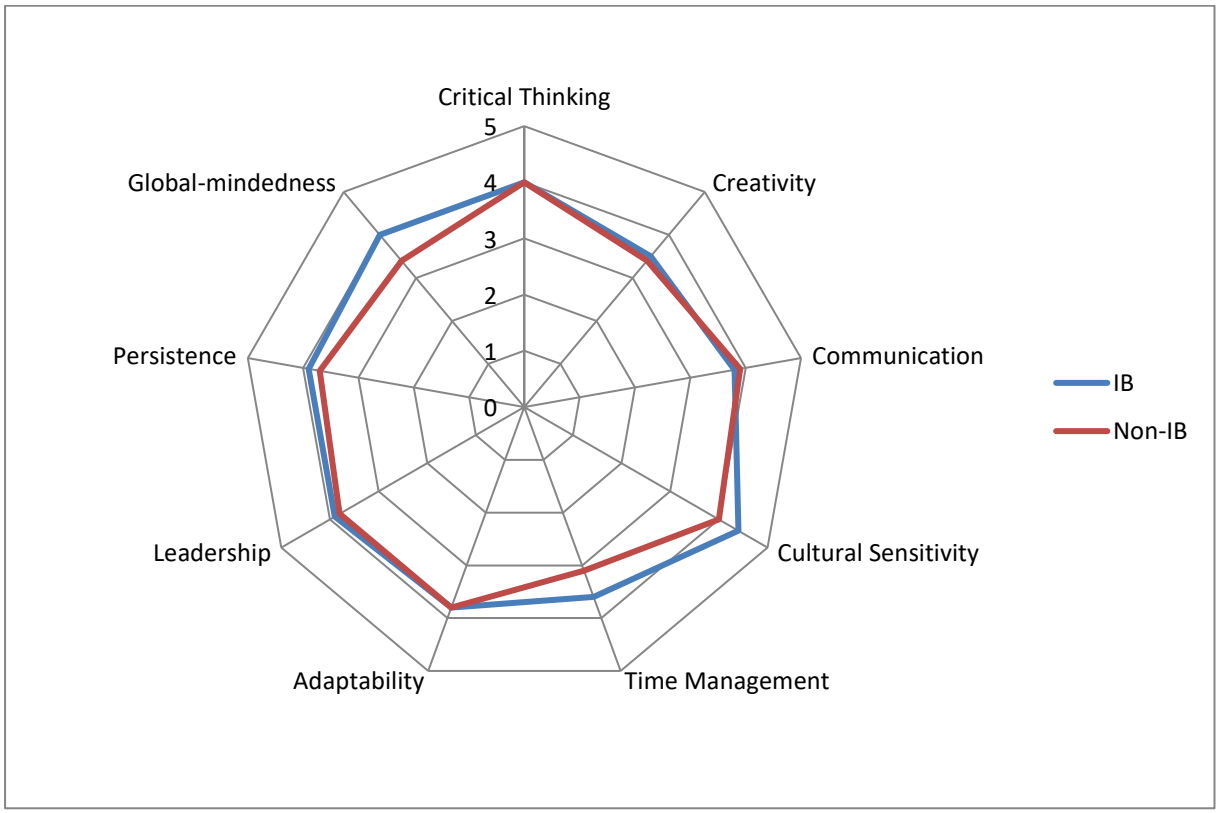

Figure 3.31. Perceived Capacity for 21st Century Skills (IBDP vs. Non-IBDP)

Note: N = 89 (University C in Australia)

As illustrated in Figure 3.32., overall, the respondents showed moderately positive views of their capacity for 21st century skills across the nine dimensions (i.e., averages ranging from 3.2 to 4.1). Notably, the averages of IBDP alumni were consistently higher than their non-IB counterparts on every dimension of 21st century skills; the averages of IBDP alumni were higher by up to 0.3 points on every dimension than non-IB alumni. This is a similar pattern from University C in Australia where IBDP alumni tended to indicate slightly higher ratings on most of the dimensions of 21st century skills than non-IB counterparts in their university.

Another similar pattern in the responses of IBDP alumni between University B and University C is that they seemed to be most confident in their capacity for Cultural Sensitivity (4.1 from University B, 4.4 from University C). In a similar vein, one of the widest gaps between IB and non-IB alumni in University B was found in Global-mindedness (by 0.3), which was also the case for IBDP alumni in University C (by 0.6).

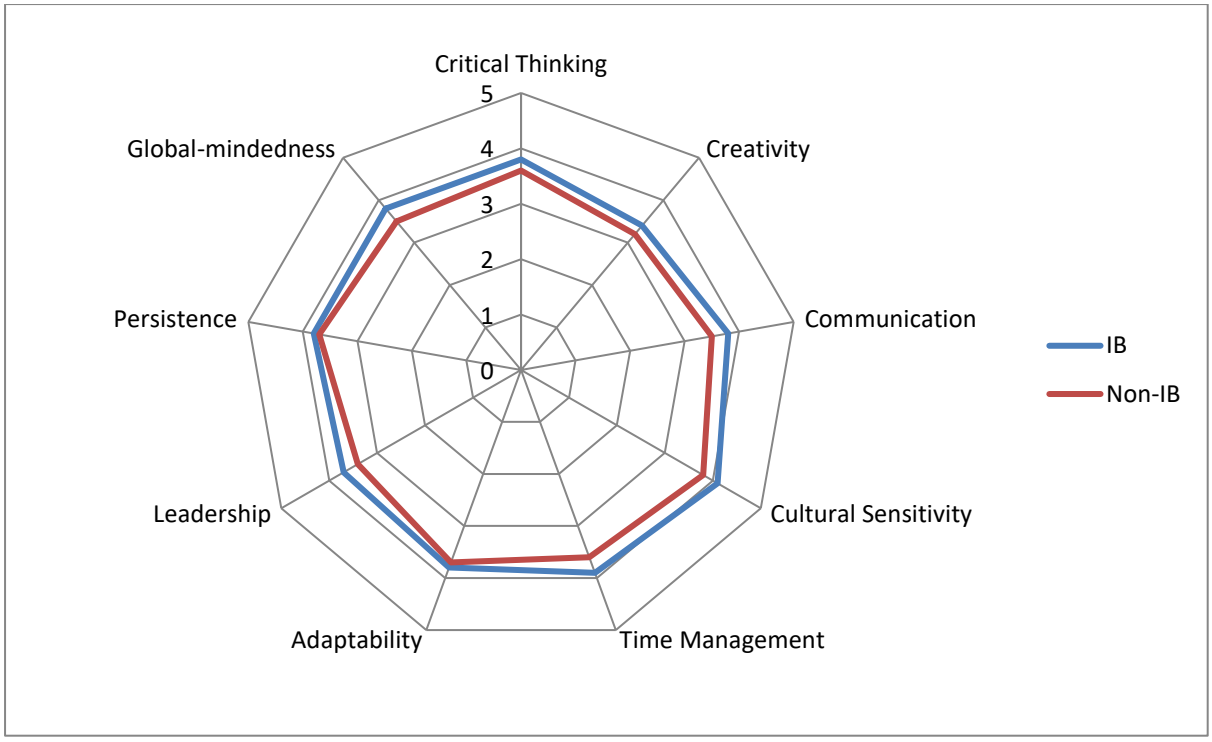

Figure 3.32. Perceived Capacity for 21st Century Skills (IBDP vs. Non-IBDP)

Note: N = 734 (University B in Asia)

Given the substantial size of survey respondents from University B, we further investigated whether there is a statistically significant difference in the perceived capacity for 21st century skills between IB and non-IB student groups. To this end, we conducted a multi-group latent mean analysis, a form of structural equation modelling. We chose a latent mean analysis approach over a series of t-tests or MANOVA, because 1) the sample size sufficiently supports latent mean analysis, and 2) latent mean analysis has analytical advantages over a series of t-tests, which may inflate Type-I errors, and MANOVA, which has limitations in detecting measurement errors (Aiken et al., 1994; Cole et al., 1993; Hancock, 1997). In other words, latent mean analysis functions effectively in taking into account measurement error (see Hallinger & Lee, 2013).

As preliminary statistical tests suggest no significant statistical difference in Persistence and Adaptability between IB and non-IB groups, we further explored possible group differences in the remaining seven domains of 21st century skills (i.e., Critical Thinking, Global-mindedness, Leadership, Time Management, Communication, Creativity, and Cultural Sensitivity). First, we tested configural, metric, scalar, and factor variance invariance for the two student groups (i.e., IB vs. non-IB). As presented in Table 3.6., the data met requirements for configural invariance, metric invariance, scalar invariance, and factor variance invariance, which were pre-requisites for latent mean analysis.

The latent mean model indicated an acceptable overall model fit (see Hu and Bentler, 1999): χ^2 (1000) = 2266.9, CFI = .913, TLI = .908, and RMSEA = .042. As seen in Figure

3.32., IBDP alumni showed stronger capacity on every domain of 21st century skills over their non-IB peers: Critical Thinking (.242, p=.007), Global-mindedness (.277, p= .002), Leadership (.190, p=.023), Time Management (.277, p=.031), Communication (.313, p = .008), Creativity (.254, p=.031) and Cultural Sensitivity (.404, p<.001). The effect sizes (Cohen's d)[9] in Table 3.7. further support this conclusion of significant and substantial differences between the two student groups. The effect sizes ranged from .37 (Creativity) to .97 (Cultural Sensitivity), suggesting that across the seven domains of 21st century skills, IB students perceived stronger capacity for those skills than their non-IB peers. In particular, IBDP alumni seemed to perceive that they have much stronger capacity for Critical Thinking, Global-mindedness, and Cultural Sensitivity.

Table 3.6. Tests for invariance between IB and non-IB student groups

	χ^2	df	TLI	CFI	RMSEA
Configural invariance (base model)	2221.7	948	.903	.913	.043
Metric invariance	2244.4	974	.906	.913	.042
Metric & scalar invariance	2283.2	1007	.908	.913	.042
Metric, scalar, & factor variance invariance	2298.3	1014	.908	.912	.042

Note: N = 734 students (63 IB students and 671 IB students)

Table 3.7. Latent Mean Comparison of Perceived Capacity for 21st Century Skills

	Estimate	S.E.	P	Effect Size
Critical Thinking	.242	.089	.007	**0.68**
Global-mindedness	.277	.089	.002	**0.68**
Leadership	.190	.084	.023	**0.54**
Time Management	.277	.128	.031	**0.39**
Communication	.313	.118	.008	**0.45**
Creativity	.254	.118	.031	**0.37**
Cultural Sensitivity	.404	.106	.001<	**0.97**

Note: N = 734

3.3. EXTRA-CURRICULAR ACTIVITIES (ECA)

Research literature suggests that non-cognitive as well as cognitive skills are important in predicting the education performance of young people and developing their future skills (Kautz et al., 2014). Non-cognitive skills include the development of personal attributes and character traits, which are considered to be more malleable until later ages of development than cognitive skills (Heckman & Kautz, 2013). One key aspect of non-cognitive skill development is that fostered through participation in extra-curricular activities (ECA). These can be defined as activities that occur outside classroom time and the assessment processes of a school or university (Seow & Pan

[9] . The effect sizes were computed by the following formula: difference in latent mean between the two groups ÷ estimated variance from factor variance invariance test.

2014). ECA participation includes activities such as sport, community service activities, student governance, voluntary work and general political and social activities, as well as employment-based activities such as internships, and full and part-time work (Tchibozo, 2007).[10]

The extent to which students participate in ECA varies. In the United States, the ECA participation rates of school students have been documented to be between 58% (Darling et al., 2005) and 81% (HREC, 2000), while participation among university undergraduates has been reported at 64% (Levine and Curaton, 1998). Also in the United States, Marks and Jones (2004) identified that 48% of a longitudinal sample of university students either sustained their involvement in community service from high school through to university, or commenced community service at university. By comparison, the Australian Bureau of Statistics reported that 36% of students aged 18-24 participated in voluntary work for an organisation or group in the previous 12 months (ABS, 2011), although this figure could understate some types of community service involvement by young people still at school or unemployed.

There are mixed findings on the effects of involvement in extra-curricular activities on aspects of student performance and skill development at both school and university level. The balance of literature indicates that ECA experience has some positive effects (Bohnert et al., 2010; Fredricks & Eccles, 2006) and that it also protects participants against the onset of negative social behaviours, such as delinquency and alcohol use (Barber et al., 2001; Eccles & Barber, 1999; Bohnert et al., 2007; Mahoney, 2000). Research by Broh (2002) suggests that participation in sporting activities improved school achievement and the development of social networks, while participation in other ECA activities may diminish achievement. Larson et al. (2006) found a link between ECA activities and the development of young people's ability to set goals. They found that sports and arts programmes provided experiences which led to the development of initiative, while service activities were more likely to be associated with the development of teamwork and social capital. Brown-Liburd and Porco (2011) showed that university accounting students who participated in extra-curricular activities had higher levels of cognitive moral development compared with those who did not participate. Fredricks (2011) explored the breadth and intensity of ECA participation in Year 10 of high school and found that it positively influenced students' mathematics performance through to the end of high school. This indicates that the effects from extracurricular activities may take time to become evident. Wood et al. (2011) also identified a relationship between ECA participation and the development of skills such as teamwork, self-direction, interpersonal skills and project management. In contrast, several studies have explored the non-linear relationship between ECA and academic performance, on the premise that excessive time commitments and the stress

[10] We wish to note that the review of ECA in this section focuses primarily on non-market activities (e.g., sport, community service activities, student governance), given their close relation to IBDP's CAS.

of balancing ECA and academic pursuits ultimately reduce the positive value of student involvement and ECA skills development (Fredericks & Eccles, 2010; Marsh & Kleitman, 2002; Randall & Bohnert, 2012; Seow & Pan, 2014). Further, some studies indicate there is no relationship between ECA and academic performance (Chan, 2016; Huang & Chang, 2004; Leung et al., 2011).

Several studies have documented the effects of ECA participation across the transition from school to university, and the reasons for participation. In an examination of annual data on first year university students, only 24% of students expected to continue their activities into university (HREC, 2000). Marks and Jones (2004) examined respective levels of students' patterns of volunteering across the final year of high school and into university and found that students who were socialised into volunteering during early high school were more likely to keep volunteering into their university years. However, when there was a requirement on students to complete community service activities in high school, they tended to drop the service in university. Further, some research indicates that young people may be mainly motivated to undertake ECA through self-interest, often fulfilling a desire to "play the game" (Brooks, 2007, p. 16). Participation in these circumstances is removed from a sense of responsibility and may instead be prompted by a desire to cement new friendships at university, establish a power base in the student community, or support career development. Indeed, there is some suggestion from research that adolescents may involve themselves in organised activities to provide themselves with a way to feel socially accepted and curb feelings of loneliness (Bohnert et al., 2007). Students may also be likely to participate in ECA only from time to time, suggesting that participation is dependent on the personal circumstances of those who volunteer (Marks & Jones, 2004). Conversely, Astin et al. (1999) reported that the frequency of volunteering across high school correlated highly with the frequency of volunteering after college graduation and as long as nine years later. They also found that involvement in community activities were dependent on the benefits that students perceived in participating, and the investment of time and effort they made in those activities.

The educational philosophy of the International Baccalaureate (IB) seeks to prioritise a holistic approach to schooling which is articulated through the IB's Learner Profile (IBO, 2013). As such, it is one of the few international or national curricula that is built around the principle that students should acquire both cognitive and non-cognitive skills through a range of assessed and non-assessed curriculum modules (Wright & Lee, 2014a). Central to the non-assessed curriculum is the Creativity, Action, Service (CAS) component which includes community service projects, music, theatre and sports. According to the IB, CAS is at the heart of the DP and is designed to strengthen personal and interpersonal learning (IB, 2015, p.1). The IB also states that CAS aims to develop students who:

- Enjoy and find significance in a range of CAS experiences
- Purposefully reflect upon their experiences

- Identify goals, develop strategies and determine further actions for personal growth
- Explore new possibilities, embrace new challenges and adapt to new roles
- Actively participate in planned, sustained and collaborative CAS projects
- Understand they are members of local and global communities with responsibilities towards each other and the environment.
  (IBO, 2015, p. 1)

There is relatively little information available which evaluates the effectiveness of the IBDP in delivering the above aims, or on the outcomes of CAS for students. Most existing studies relate to the IBDP's immediate benefits within the schooling context. In a survey of 71 higher education institutions in the UK, Jenkins (2003) reported that CAS and other core elements of the IBDP were viewed positively by most institutions. In another study, researchers found that both students and CAS coordinators reported that after completing the CAS, students became more service-oriented and caring, more open-minded and reflective, and also developed self-confidence and maturity (Billig, 2013; IB, 2017a). Similar studies carried out in a range of countries on small numbers of IB schools have often found that CAS helped to develop a sense of community responsibility (Kulundu & Hayden, 2002) and understanding of global citizenship (Brunold-Conesa, 2010) and was perceived by students to be "beneficial, although initially overwhelming" (Culross & Tarver, 2007, p. 57). Based on student and teacher interviews, Saavedra (2016) found that both students and teachers perceived that the IBDP's curriculum and pedagogy fostered civic mindedness and model citizenship to a greater extent than alternative secondary school programmes. Further, in a 2008 survey of US public high schools, most IBDP teacher coordinators stated that developing ethical values (60%) and civic responsibility (56%) were important in their school's decision to implement the IBDP (Siskin & Weinstein, 2008). In a study of five schools in China, Wright and Lee (2014a) found that the "service" component of CAS was particularly favorable to the development of interpersonal non-cognitive skills in students, including being balanced, caring and open-minded. While CAS is focussed primarily on students' learning, in a study of IBDP schools in developed and developing countries, Brown and Ohsako (2003) found that both students and the recipients of their assistance benefitted from CAS, and that schools and communities were more likely to work together as a result of CAS activities.

On balance, research seems to suggest positive benefits from the CAS, but there are some counter findings. In research comparing IBDP and non-IB alumni at the University of Oregon (Conley et al., 2014), there were mixed views from IBDP alumni on the value of CAS when compared with the effort that students felt they had to devote to it. However, students perceived that the IBDP generally gave them strong social and emotional skills, compared with the Advanced Placement programme which had a more exclusive focus on academic content. Kulundu and Hayden (2002) found that students and teachers of an IBDP school in Lesotho were confused about the aims of CAS and that

it was not designed for the "developmental growth of the students" (p. 34). In a study of university institutions, it was reported that many senior academics and administrative staff devalued CAS and other components compared to the academic subject requirements of the IBDP (Coates et al., 2007). More generally, research on a school in Egypt (Belal, 2015) concluded that the outcomes of the IBDP, including the CAS, were very dependent on how the school chose to implement the IBDP, on teachers' interpretations of the IBDP curriculum and aims, and on students' choices in participation.

While there is little research on the longer-term outcomes of IBDP participation relating to extra-curricular activities, several studies have reported some findings on the sustainability of the community orientation that is valued in the IBDP. In a longitudinal study of alumni from two schools in British Columbia (Taylor & Porath, 2006), among respondents who were just finishing their undergraduate studies or were in the first years of employment, more than 80% reported that they had maintained their involvement in extracurricular activities. An Australian qualitative study of respondents aged between 20 and 63 years sought to understand the influence of the IB on social life and community engagement beyond the academic years (Wright, 2015). Overall, CAS was viewed as a significant part of their IBDP experience. In addition, CAS and other IBDP components were perceived by some respondents to have influenced their attitudes towards service, volunteering and activism more generally. The researchers found that the "IB provided many people in this study with a deep appreciation of the value of service" (2015, p. 46); although for many respondents it was difficult for them to separate the impact of the IB as distinct from other aspects of their lives including family, religion and culture.

3.3.1. PARTICIPATION IN EXTRA-CURRICULAR ACTIVITIES (ECA)

In the online questionnaire survey, respondents were asked how often they took part in extra-curricular activities during their time at university. Drawing from responses, we explored the pattern of the participation in ECA of the student groups in University B (n = 734) and University C (n = 89). First, responses were obtained for participation in local activities through a five point scale using the categories 'Never', 'At least once since starting university', 'At least once per semester', 'At least once per month' and 'At least once per week'. Second, responses were obtained for participation in internships and international activities through a five point scale using the categories 'Never', 'One time', 'Two times', 'Three times' and 'Four times or more'. Both items were scaled to a mean score for each component.

Table 3.8. below shows the pattern of the participation in ECA of the student groups in University B in East Asia. There were several distinctive patterns in participation in ECA between the two groups. For example, IBDP alumni seemed to be more actively involved in sports and artistic activities than non-IB peers. Also, IBDP alumni tended to

participate more in ECA activities where their language proficiency and skill (i.e., English) can be maximised.

Both student groups were less likely to participate in workplace or career related activities and/or international activities such as part-time work, full-time work, short-term internship, long-term internship, and international volunteering, in comparison with local activities. In the case of participation in such activities, there was little difference between the two student groups, except participation in short-term internship where non-IB graduates tended to show more active involvement: $t(95.5) = 2.96$, $p = .004$. alumni

Table 3.8. Participation in ECA (University B)

	IBDP alumni n = 63	**Non-IBDP alumni n = 671**
	Mean	Mean
Participation in local student-based activities:		
Organised sport activities	2.4	2.0
Organised music activities	1.9	1.7
Organised arts activities	1.9	1.8
Language proficiency	2.7	2.3
Local volunteering	2.3	2.3
Political organisations	1.2	1.3
Student governance	2.0	1.9
Student societies	2.6	2.3
Full-time work	1.2	1.4
Part-time work	2.5	2.9
Average across all activities	*2.1*	*2.0*
Participation in internships and international activities:		
Short-term internship	1.2	1.5
Long-term internship	1.5	1.6
International volunteering	1.3	1.4
Exchange with overseas university	1.3	1.4
International work	1.1	1.1
Average across all activities	*1.3*	*1.4*

Note: N = 734

Table 3.9. below shows the pattern of the participation in ECA of the student groups in University C in Australia. The average scores across all ECA suggest that most IBDP alumni in both University B and University C were involved in local student-based activities "at least once since starting university", which was similar to non-IB alumni in both universities. Also, there were some similarities in the patterns of IBDP alumni participation in local student-based activities between the two universities. Similar to

their IBDP alumni peers in University B, IBDP alumni in University C seemed to be slightly more involved in sports than non-IB peers at their university. Also, similar to their peers in University B, IBDP alumni in University C tended to participate slightly more in ECA activities where their language proficiency and skill can be maximised; $t(60.7) = 2.49$, p= .016.

However, the average scores (i.e., ranging 1.2 to 1.4) suggest that IBDP alumni in both Universities B and C rarely participated in internships and/or international activities since starting university, which was similar to non-IB alumni in both universities. Despite their limited participation in internships and/or international activities, in the case that they participated in those activities, IBDP alumni in University C were more likely than their peers in the university to be involved in internship and international activities. Specifically, there were statistically significant differences in the following activities: $t(86.2)=2.06$, p=.042 in short-term internship, $t(73.2)=2.86$, p. =.006 in international volunteering, $t(61)=2.50$, $p=.015$. These were patterns in contrast to IBDP alumni in University B in Asia. Unlike their IB peers in University B, IBDP alumni in University C appeared to participate more in career related ECA activities.

Table 3.9. Participation in ECA (University C)

	IBDP alumni n = 62	**Non-IBDP alumni n = 27**
	Mean	Mean
Participation in local student-based activities:		
Organised sport activities	2.5	2.2
Organised music activities	1.8	2.2
Organised arts activities	2.0	1.9
Language proficiency	2.7	1.9
Local volunteering	2.8	3.0
Political organisations	1.5	1.6
Student governance	2.5	2.2
Student societies	2.9	2.9
Full-time work	1.6	1.4
Part-time work	4.0	3.8
Average across all activities	*2.1*	*2.0*
Participation in internships and overseas activities:		
Short-term internship	1.7	1.3
Long-term internship	1.6	1.4
International volunteering	1.4	1.0
Exchange with overseas university	1.3	1.3
International work	1.2	1.0
Average across all activities	*1.4*	*1.2*

Note: N = 89

3.4. PERCEPTION OF SENIOR SECONDARY SCHOOL EDUCATION

The survey asked respondents to give their views on how well their secondary school programme had equipped them for their university studies, using a five-point Likert scale with the categories Strongly disagree', 'Disagree' 'Neither agree nor disagree' 'agree' and 'Strongly Agree'. Respondents were also asked to indicate the extent to which they agreed or disagreed with statements about how effective their secondary education programme was in equipping them with 21st century skills, termed 'soft skills' in the survey. (see also the question items presented in this section).

The tables below compare the perceptions of IBDP and non-IBDP alumni in University B in Asia and University C in Australia, respectively. The survey showed a perception that the IBDP prepared students well for their transition to university, both in terms of assessments and the development of academic knowledge, as well as 'soft' skills. Most prominently, IBDP alumni were more likely than non-IB alumni to perceive that the programme prepared them well for university (4.4 compared with 3.4) and that they were better prepared than alumni of other programmes. In sum, across all these fields IBDP alumni averaged 4.0, compared with an average of 3.3 for non-IB alumni.

Table 3.10. Preparation for University Studies (University B)

	IBDP alumni	**Non-IBDP alumni**
	Mean	Mean
I am confident that [my senior secondary education programme] prepared me well for my university studies	4.4	3.4
I am confident that [my senior secondary education programme] prepared me well for my university exams and assessments	3.9	3.3
I think [my senior secondary education programme] graduates are better prepared for university compared to other secondary school graduates	4.2	3.2
I think [my senior secondary education programme] graduates have better knowledge of academic content compared to other secondary school graduates	3.8	3.2
I think [my senior secondary education programme] graduates are better at university assessments compared to other secondary school graduates	3.8	3.2

Note: N = 734

Table 3.11. Preparation for University Studies (University C)

	IBDP alumni	**Non-IBDP alumni**
	Mean	Mean
I am confident that [my senior secondary education programme] prepared me well for my university studies	4.5	3.9
I am confident that [my senior secondary education programme] prepared me well for my university exams and assessments	4.4	3.9
I think [my senior secondary education programme] graduates are better prepared for university compared to other secondary school graduates	4.5	3.0
I think [my senior secondary education programme] graduates have better knowledge of academic content compared to other secondary school graduates	4.2	2.8
I think [my senior secondary education programme] graduates are better at university assessments compared to other secondary school graduates	4.0	2.9

Note: N = 89

Interestingly, IBDP alumni in both University B and C showed consistently higher levels of ratings on all five questions about university preparation, compared to their non-IB peers. In other words, IBDP alumni perceived that their IB experiences prepared them for university studies better than their non-IB peers' preparation. To further investigate the group difference (IB vs. non-IB), we merged the two university datasets, given the remarkably similar pattern in the responses from the two universities (n = 823). First, descriptive statistics showed clear group differences between the two groups: IB (mean = 4.31, SD = .83) vs. non-IB (mean = 3.44, SD = 1.13). Second, we used principal component analysis (PCA). Although we are aware that PCA has some limitations in addressing measurement errors, we used PCA for this exploratory analysis because PCA provides a succinct factor structure. PCA suggested one factor structure with solid factor loadings (higher than .7), which explained 53.1% of the total variance (see Table 3.12.). The alpha was .819. Based on the factor-analytic scores, a comparison of students' perception of university preparedness between 125 IB and 685 non-IB alumni was statistically significant: $t(217.9) = 10.69$, $p = .000$. In other words, IBDP alumni were more likely to be confident about the role of their secondary education programme in preparing them for university studies, compared to non-IB alumni.

The online survey questionnaire also asked about perception of whether secondary education programme had provided the students with more learning opportunities for

soft skills (or 21st century skills). Very similar to response about university preparation, IBDP alumni in both University B and C indicated consistently higher levels of ratings on the two questions about soft-skills (see below), compared to their non-IB peers. Once again, IBDP alumni were more likely to perceive that their IB experiences prepared them for soft skills better compared to their non-IB peers (averages 4.33 vs. 3.42). A statistical test using the merged data (n = 823) also reinforced this conclusion: $t(262.1) = 11.25$, $p = 000$.

Table 3.12. Preparation for University Studies (Universities B and C)

Items	**Factor Loadings**
I am confident that [my senior secondary education programme] prepared me well for my university studies	.729
I am confident that [my senior secondary education programme] prepared me well for my university exams and assessments	.719
I think [my senior secondary education programme] graduates are better prepared for university compared to other secondary school graduates	.835
I think [my senior secondary education programme] graduates have better knowledge of academic content compared to other secondary school graduates	.845
I think [my senior secondary education programme] graduates are better at university assessments compared to other secondary school graduates	.772

Note: N = 823

Table 3.13. Perceived Soft Skills Through Secondary Education Programme (Uni. B)

	IBDP alumni	**Non-IBDP alumni**
I think [my senior secondary education programme] graduates have better "soft skills" compared to other secondary school graduates	4.3	3.1
I have learnt "soft skills" alongside subject matter when undertaking [my secondary education programme] at my school	4.5	3.4

Table 3.14. Perceived Soft Skills Through Secondary Education Programme (Uni. C)

	IBDP alumni	**Non-IBDP alumni**
I think [my senior secondary education programme] graduates have better "soft skills" compared to other secondary school graduates	4.2	3.2
I have learnt "soft skills" alongside subject matter when undertaking [my secondary education programme] at my school	4.4	3.8

The remaining question is why IBDP alumni were more confident and positive about their experiences of secondary education programme (i.e., IBDP), compared to non-IB students who went through a different secondary education curriculum. We discuss this finding in the following chapter.

4. QUALITATIVE ANALYSIS

4.1. INTRODUCTION

To expand and deepen the findings of our quantitative data analysis, we conducted in-depth interviews with IBDP alumni at three leading universities in Asia Pacific. This multi-site case study approaches included a pilot study of one university in East Asia (University A), followed by the main study of one university in East Asia (University B) and one university in Australia (University C). Our aim was to examine perceptions of how the IBDP helped students develop 21st century skills and prepared them for success at university in different contexts.

We collected data from interviews with 54 IBDP alumni in total. The interview protocol was based on our literature review and also was designed to expand and elaborate the quantitative results from the survey data. The interview protocol focused on identifying 1) self-perceptions of IBDP alumni about 21st century skills and 2) experiences regarding the contribution of the IBDP to university studies. The questions were slightly revised based on findings from an initial study at University A (see Appendix 3 for details about the protocol). As we conducted similar interview procedures with the standardised protocol at University B and University C, this iterative process of data collection functioned as a constant comparative method (Corbin & Strauss, 1998), which helps us to explore cross-case analysis, while the semi-structured design also enabled participants to elaborate on their thoughts or to highlight issues not thought of by the research team (see Lee et al., 2014). In other words, the interviews followed common lines of questioning with some leeway to allow participants to add comments and different perspectives to their answers.

After completing interviews with IBDP alumni at University A (i.e., the initial study), we started looking for codes and themes related to our research. When all interview data had been collected from University B and University C, we developed a coding scheme based on patterns emerging from the interviews. This procedure was also guided by the results from our initial findings from the survey data (see Appendix 4 for details about the coding scheme of University C as an example). That is, we conducted pattern codings by reducing large amounts of our interview data into a smaller number of analytical units based on similar themes (Miles & Huberman, 1994). In addition, we made a series of efforts to ensure validity and reliability issues in our qualitative data analysis. The project leader compared the data coding scheme from two interviewers who coded the data independently – one researcher coded the data of Universities A and B, and another researcher coded the data of University C – and checked the consistency and the coherence of data coding.

4.2. THE CASE OF UNIVERSITY A

4.2.1. EMERGING THEMES FROM PILOT INTERVIEWS

In this section, we report the major findings from the pilot study at a leading university

in East Asia (i.e. University A). Using the interview protocol, the research team gathered initial semi-structured interview data from 22 IBDP alumni. Approximately, 20 hours of interview data were transcribed to identify emerging themes. Below is the summary of the findings, which served as a platform for subsequent interviews at Universities B and C. All the initial study participants were in the penultimate year of a four-year degree programme and were studying Science, Technology Engineering, and Mathematics (STEM) (12), Business-related (8), and Social Science and Humanities (2) majors. A vast majority (19) of the participants attended an international school, while 3 attended a local school in the host society. The self-reported nationalities included Hong Kong (10), India (4), South Korea (4), United Kingdom (2), Mainland China (1), and the Netherlands (1), although many of the participants had hybrid socio-culturally identities.

4.2.2. STRENGHTS AND ADVANTAGES OF THE IBDP

In terms of the strengths of the IBDP, a majority of the IBDP alumni interviewed from University A characterised the IBDP as a highly rigorous program. Specifically, 16 of the 22 students highlighted the breadth embedded in the IBDP as a core aspect, including the coverage of six subject areas, with at least three subjects in depth, spreading all subjects over two years with a range of internal and external assessments. The breadth of knowledge was perceived to be beneficial by enabling students to gain a foundation in diverse fields of study and to keep options open for what major to pursue at university:

> You get to study different areas where you learn about different things like Economics, you study about how society runs, how to appreciate literature, and also you study the maths and science subjects (3rd Year, Biochemistry and Cell Biology).

> I like that IB has six subjects as that gave me variety. I could take Geography, Economics, and Physics, all the things that I really liked to do. I wasn't sure at the time what I wanted to study at university. It was between engineering and economics and taking Higher Level Physics and Economics allowed me to choose as I had backgrounds in both (3rd Year, Electronic Engineering).

Most of the IBDP alumni mentioned the benefits from the IBDP's unique components, including Extended Essay, Theory of Knowledge (TOK), and Creativity, Action, Service (CAS). The interview participants placed significant emphasis on how the three components provide them with not just practical, specific skills (e.g., writing skills) but also holistic perspectives about learning and life:

> In the IB the Extended Essay is very important. [At university] You can definitely see that IB student essays are different from the essays by local students, they flow a lot better and they are more organised. It is because you are really trained to write essays with a proper introduction and a proper

conclusion (3rd Year, Business Administration).

I really liked TOK and I think this is a very unique component of the IB program. My teacher really showed us how we can evaluate knowledge using different theories, perspectives, and methodologies. That helped me a lot in my writing, especially with more argumentative essays (3rd Year, Global China Studies).

I think CAS was really beneficial. It helped me realise that certain societies, like in some neighboring countries, need much more help from the more developed countries. So, it gives you new ideas and new perspectives about how people live in other parts of the world and their needs (3rd Year, Biochemistry and Cell Biology).

Another major converging perception among a majority of the interviewees (i.e., 20 of the 22) was that soft skills developed from the IBDP were viewed as important for university studies. This perception resonates with our conceptualisation of 21st century skills in this study:

Soft skills are definitely really, really important and yeah I'm glad I took the IB. That's part of the reason I was saying the IB was one of the best things I have done. I think it was quite valuable for me in university in helping me differentiate and distinguish [from other students] (3rd Year, Electronic Engineering).

These skills included communication, time management, creative and critical thinking, leadership, and global mindedness, to name a few:

Communication definitely because we've had lots of practice presenting in class. And where other students may tend to struggle in terms of expressing themselves clearly or precisely, IB students have an edge. Whenever we have do presentations, we're able to do it efficiently and quickly (3rd Year, Mechanical Engineering).

Generally, I listen to more creative ideas from IB students and then more common ways of thinking from non-IB students. I think the IB students can come up with newer ideas (3rd Year, Marketing).

The IB student has the advantage of having an international way of thinking compared to things like A levels which I feel can be a bit too within the UK side, and Gaokao which is maybe a bit too much the Chinese way of thinking. I think IB can actually encompass both of these ways of seeing things (3rd Year, Physics).

There was agreement that these skills provide advantages in their university studies. The IBDP alumni were also highly confident about their abilities and they tended to regard themselves as being better prepared for university studies relative to graduates of other programmes. This included greater confidence in delivering presentations and taking leadership roles in group projects:

> In the IB we would even have in-class presentations all the time. Overall, you're a lot better at communicating and you know kind of what to say, you know what people expect, and you know how to act in presentation situations. I feel like so far the IB people I have worked with are much better at presentations than other students, they have the general people skills everyone should have (3rd Year, Industrial Engineering).

> I have noticed that IB students are more confident and more willing to speak up, we tend to be pro-active in contributing group projects and assuming leadership roles (3rd Year, Management).

Finally, many of the IBDP alumni in University A believed that they were more inclined to engage in extra-curricular activities than non-IB alumni:

> IB students over here join different societies and we go to these different events but the local students spend most of the time in the library just studying for the next exam, quiz, and doing their homework (3rd Year, Electrical Engineering).

4.2.3. WEAKNESSES AND DISADVANTAGES OF THE IBDP

The interviews, however, also revealed certain perceived weaknesses and disadvantages of the IBDP with their studies at University A. The weaknesses and disadvantages mostly stemmed from different learning experiences between the IBDP and university. Specifically, a majority of the interviewees (15 of the 22 students) agreed that they lack a certain set of "hard skills" related to scope of academic content knowledge, especially in Mathematics:

> Sometimes you just don't have the content knowledge to match up to the local students. If you're taking certain courses here where you need to be really knowledgeable you're going to suffer for sure. They are simply just a lot better in terms of their basics and their knowledge of content (3rd Year, Electronic Engineering).

> I would say that IB students lack the hard skills. What I mean is that we lack the numerical and quantitative skills. We were not really taught those skills well in the IB. That's one of the skills which we are lacking, the hard-core

mathematical skills (3rd year, Mechanical Engineering).

In addition to their deficit perspective on certain types of skills or knowledge, a number of the participants reported certain disadvantages with assessment at university, due to their IBDP experiences. Some of the IBDP alumni viewed University A located in East Asia as implementing assessment in quite conventional or traditional ways, including multiple choice questions (MCQs) and short answers (10 participants), an emphasis on memorisation (12 participants), a focus on content knowledge (9 participants), and a general exam orientation (9 participants). These assessment formats and styles were perceived to give more advantages to students schooled in the local education system, rather than IBDP alumni:

> The exams here are very different from what the IB exams trained us to do. The IB exams are more essay type questions but here there are more MCQs and questions that only have space for short answers, like just three or four sentences. The IB trained me to push out a long essay and here I cannot really kind of use that ability in the examination (3rd Year, Management).

> What tends to happen is that the local students are able to cram a lot more information into finals up here so they're able to get all the revision done in the one week of study break, memorise everything, and they do really well in the finals. But then IB doesn't teach you to memorise as much (Year 3, Electronic Engineering).

> I'm actually not so sure if [University A] really wants us to be all-rounded and to explore different things. I'm not sure that they want to really promote that…Here, it's really just about studying, learning the content, and doing well in the assessments (3rd Year, Management).

The following interview excerpt suggests that the different style of learning in general (and particularly in assessments) between the IBDP and University A's curriculum was perceived to be the main reason for IBDP alumni struggling in certain disciplines. In other words, greater content knowledge and traditional approaches of learning may be required to succeed in assessments:

> The IB focuses more on interactive learning, like with TOK. The classes here are sort of one way communication, what the professor say is like objective knowledge. There's not much scope for questioning. It's one way communication as compared to the IB classrooms. That's a major discrepancy so it was kind of a shock to the system (3rd Year, Electronic and Computer Engineering).

4.3. THE CASE OF UNIVERSITY B

4.3.1. EMERGING THEMES FROM INTERVIEWS

In this section, we discuss the main findings that emerged from 20 in-depth semi-structured interviews with IBDP alumni studying at another leading university in East Asia (University B). Among the 12 local students, 9 participants had attended an international school in the host society and 3 attended a public-sector school. There were 8 international students, including 6 who attended an international school and 2 who attended a public-sector school. Self-reported nationalities included Hong Kong (11), South Korea (2), Indonesia (2), Costa Rica (1), Japan (1), Mainland China (1), Poland (1), and Sweden (1). The participants represented all years of study and were drawn from STEM (6), Business-related (6), Social Science and Humanities (6), and other majors (2). While the participants were a diverse group they reported a range of common issues when asked to reflect on how the IBDP prepared them for their experiences of university. This included perceptions about the strengths and advantages of the IBDP, weaknesses and disadvantages of the IBDP, participation in extra-curricular activities, teaching and learning at university, and IBDP and university assessments.

4.3.2. STRENGHTS AND ADVANTAGES OF THE IBDP

The IBDP alumni at University B were positive about the IB and how the IBDP prepared them to succeed in university. Indeed, university preparation – as well as programme recognition by universities abroad, an English medium of instruction, and no alternative at their school – was reported as the main reason why they (or their parents) chose the IBDP. In discussing the perceived strengths of IBDP alumni, the participants placed considerable emphasis on how the IBDP facilitated the development of skills, rather than only learning of core academic content. As one participant put it: "How the IB is taught is very skills-based. So, in classes they do not just give you the content, they teach you how to learn" (4th Year, Law). As will be demonstrated, the IBDP alumni reported relative strength in skills that are commonly referred to in the 21st century skills literature; including communication, critical and creative thinking, and global mindedness and cultural sensitivity, as well as writing skills.

Communication

A first finding was that the IBDP alumni self-perceived having superior communication skills compared non-IB alumni at University B. As an example, it was noted that IBDP alumni tend to be much more active in asking questions and engaging in class discussions. In the context of an East Asian university, this was believed to partly be explained by IBDP alumni being more experienced, confident, and proficient in communicating in English. Yet, other participants explained how IB teaching styles were conducive to developing communication skills by providing spaces in the classroom: "To express our opinions without thinking that we could be wrong" (3rd Year, Music). Given this background, it was reported that IBDP alumni were more willing to communicate ideas and perspectives at university compared to students from the local education system:

> The IB made me a very outspoken person. The local students don't like to speak a lot, so when the lecturers ask a question they tend to stay quiet. But IB alumni always question the professor and raise a lot of questions. I was really shocked when I came to university here as I was like 'why isn't anyone saying anything!' (2nd Year, Economics).

Critical and Creative Thinking

The IBDP alumni were confident in their ability to think critically and creatively. The majority of participants noted that the IB encourages students to: "Go beyond the textbook" (1st Year, Economics and Finance). This included teaching and assessments styles that encourage students to come up with novel ideas and to refer to examples gleaned from independent research or personal experiences. Critical thinking and creativity were deemed to be reinforced by the Theory of Knowledge (TOK) course that offered opportunities to discuss epistemological issues around: "Ways of knowing, how you arrive at truth, how you obtain knowledge" (4th Year, Actuarial Science). Further, a wide range of IB assessments – including essays, presentations, and group projects – were described as creating space to deeply reflect on assignments, which is often not possible under time-constrained examination formats. Such approaches to learning were perceived to stand contrast to what they viewed as a narrower focus on memorisation of standardised content in local educational contexts in the region such as in South Korea, Mainland China, and Hong Kong:

> The IB is not just regurgitating what you memorised or the facts you have learnt. It is more of an active way of processing information. It mirrors quite closely that of what I think of as university-level studies in that you are meant to show your own thinking process and personal ideas, rather than just the facts (2nd Year, Journalism).

Global Mindedness and Cultural Sensitivity

The IBDP alumni at University B reported a strong sense of global mindedness and cultural sensitivity. The participants described that IBDP alumni often have a greater capacity to "debate issues from all over the world and try to see things from different perspectives" (1st Year, Quantitative Finance), while other students tend to focus only on localised issues. They also described having greater awareness of global current affairs ranging from political debates in the U.S. to concerns over social justice in Brazilian Favelas, as examples cited by participants. For some, this stemmed more from experiences at an international school with an internationally diverse student body and more experiences of living or travelling in other parts of the world, rather than unique aspects of the IBDP. Others – including IBDP alumni from schools in local education systems – described how the IBDP facilitated global perspectives and cultural sensitivity among students through: "An emphasis on knowing more than you are directly exposed to" (2nd Year, International Business and Management). For instance, the IBDP curriculum was commonly argued to accommodate students from diverse socio-cultural

backgrounds by using case studies and learning about issues effecting diverse contexts. As is illustrated below, this was believed to foster a globalised rather than nationalised world outlook:

> If you take IB history, you are forced to study every continent. That really gets rid of bias as you do not only study the world from the perspective of your own country (1st Year, Economics and Finance).

Research and Writing Skills

The IBDP alumni also reported strength in their writings skills. This was viewed as important in enabling them to express 21st century skills – such as critical thinking, creativity, global mindedness, and cultural sensitivity – in written work. In general, the IBDP was in characterised as being "writing heavy" (3rd Year, Psychology) with extended written work a major part of assessments in most IBDP courses including essays, lab reports, and examinations. More specifically, the experience of the Extended Essay was noted as being highly beneficial for improving writing skills. The process was described as a "mini research paper" (2nd Year, Dentistry) where students could gain experience of identifying a topic, conducting research, writing a 4,000 word essay, and constructing a bibliography under the supervision of a teacher. After completing the Extended Essay, essay-based assignments at university were often described as "not so daunting" (1st Year, Accounting) and an area where IBDP alumni had an advantage over other students:

> Even from the first year, I could clearly see that having experience of an extended research project really helped with assignments at university. Judging by what I have seen of written work from my classmates, they didn't have this experience of a longer piece of academic writing in high school (3rd Year, Economics and Finance).

4.3.3. WEAKNESSES AND DISADVANTAGES OF THE IBDP

The participants were also asked to reflect on self-perceived weaknesses and potential disadvantages in how the IBDP prepared them for university. The questions explored whether the IBDP alumni believed they lacked any skills or needed to "catch-up" with local students at university. It was notable that the IBDP alumni were much more able and willing to discuss their relative strengths over other students rather than weaknesses, which was illustrative of high levels of self-confidence among the participants. Despite this, some common themes emerged with regards to knowledge of core academic content, mathematical knowledge, and localised knowledge.

Knowledge of Core Academic Content

There was a strong perception that the IBDP provided the participants with a breadth of knowledge. The IBDP requirement to complete courses in six subject groups and three

the Core Requirements (i.e., Extended Essay, CAS, and TOK) was reported to install foundational knowledge across a broad range of fields of study. The reported advantages of breadth were that students could keep their options open about what to study at university and develop a wider variety of skills. The breadth of the IBDP was not, however, viewed by all participants as providing a clear-cut advantage transitioning to university level content over their peers who graduated from other secondary education programmes. For some participants, the academic content covered in university courses was a step-up in difficultly and sophistication for all students notwithstanding their educational backgrounds. However, it was also commonly reported that by allowing students to specialise in high school other educational programmes – including the local secondary education program, GCE A Level, Gaokao in Mainland China – provided students with a deeper knowledge of academic content for university courses. As is illustrated below, this was noted as a potential disadvantage of the IBDP:

> Doing IB doesn't mean that you are ahead of everyone else in what you know about the subject. My teachers would tell me that the IB is like your first year of college so when you arrive it will be so much easier. But I don't think that is true. I do know a lot of students who didn't do the IB who know a lot more than me (2nd Year, Economics).

Mathematical Knowledge

As a course requirement, all of the participants had studied Standard Level or Higher Level mathematics during the IBDP. In this respect, all IBDP alumni reported having a solid foundation in mathematical knowledge. Nonetheless, it was also reported that the standard of mathematical knowledge was often higher among students schooled in local education systems in the host society and other East Asian contexts. As one participant explained, this corresponded with an expectation of advanced mathematical knowledge in courses at University B: "It's a whole different world here. Even if we are taking courses that you wouldn't expect to have much of a mathematical component, it is still much more advanced" (3rd Year, Economics and Finance). A mathematical knowledge-gap was most frequently noted as a concern by IBDP alumni who took IB Standard Level Mathematics but were studying a quantitative-based major. For instance, one participant admitted to struggling more than other students due to being "streets behind when it comes to maths knowledge" (Year 1, Economics and Finance). However, even IBDP alumni who took Higher Level Mathematics also reported that they struggled to compete with other students:

> I really realised that when I took maths here in the first semester, I was struggling actually. Even though I took Higher Level Math, it was not enough. Many Gaokao graduates and some local students think it is really simple and some had already covered the content in high school (4th Year, Actuarial Science).

Localised Knowledge

As previously mentioned, the participants noted how the IBDP promoted a sense of global-mindedness and cultural sensitivity. Yet, in contrast, they also reported a relative weakness and disadvantage in understanding and engaging with localised current affairs, culture, and language. Significantly, such a disconnection with "the local" was reported by those educated at international and local schools in the host society, including some students with the same ethic heritage as the local population. First, the participants were exposed to global perspectives and cases studies, but they rarely focused on core issues affecting the local context. Second, service activities that students engaged in as part of the CAS component often took place abroad such as teaching English or helping to build a school in a developing country, rather than providing opportunities to interact with local communities. Third, the experience of English medium of instruction schooling meant that few of participants developed the proficiency to interact with the local population in the host language. As a result, many of the IBDP alumni reported a disadvantage when discussing localised issues at university:

> I [student with the same ethnic heritage as the local population] am not as informed about the local scene and I am not as interested in local politics as the other students. In lectures when the professors would talk about the local political scene, I would have no idea what he was talking about. Although I am from [the host society], I just don't know much about it. I just know about the global scene, but not so much about [local issues] (1st Year, Architecture).[11]

4.3.4. PARTICIPATION IN EXTRA-CURRICULAR ACTIVITIES

The participants discussed how extra-curricular activities provide opportunities for to develop 21st century skills beyond the confines of academic studies. The majority of the IBDP alumni reported being involved with at least one or two extra-curricular activities at University B. There was a strong interest in: "Learning something outside the classroom" (2nd Year, Food and Nutritional Science), although most participants were less active at university compared to their experience of the IBDP. The types of extra-curricular activities were often internationally oriented. For example, numerous participants reported being involved in AIESEC, which is a youth-run non-profit organisation that provides cross-cultural internship and volunteering opportunities for students. The global structure of AIESEC – covering 127 countries[12] – was described as being well-aligned with the IBDP. As one participant described: "I feel like it is somewhere I belong because the people are like IB students, they are very open-minded" (2nd Year, Food and Nutritional Science). In addition, some of the participants reported being involved with IB-related extra-curricular activities. For example,

[11] In this interview excerpt, some wordings have changed to make the identity of the local society obscure.

[12] http://aiesec.org/students/. The organisation is known worldwide as "*AIESEC". This was originally an acronym for Association internationale des étudiants en sciences économiques et commerciales.*

numerous students mentioned being volunteer "student ambassadors" to promote their university to prospective students by visiting IB schools and offering campus tours. Other participants discussed being involved in a variety of sports, music, and arts-based extra-curricular activities.

There were contrasting views about the extent to which experiences of the IB made the participants more inclined to participate in extra-curricular activities. It was commonly expressed that: "I would have done it anyway" (1st Year, Architecture), as participants were pursuing interests independent of the IB or were motivated by other factors such as viewing extra-curriculars as a means to enhance post-graduation employment prospects. Moreover, around one-half of the participants at University B received credit transfers for up to one-year of courses from the IBDP to their university programme. These IBDP alumni often had more free time available outside of their academic studies to participate in additional activities. Nonetheless, it was also reported that engagement with the Creativity, Action, Service (CAS) course did encourage the participants to pursue extra-curricular activities while at university. Some mentioned continuing with extra-curricular activities they were introduced to during CAS, while others described how experience of leading activities in CAS gave them the confidence to take leadership roles in extra-curricular activities at university. More generally, there was a perception that the IBDP encouraged students to get involved with activities outside of classroom-based learning:

> CAS helped me with going beyond studying to see if there is anything I can get involved in. It also installs this kind of idea in your mind to search for new opportunities like in student societies or volunteering. The IB helps you get out of the cycle of studying and to go out into the world to do something else (3rd Year, Economics and Finance).

The context of University B in East Asia was reported as creating some barriers to engagement in extra-curricular activities. First, the participants often described being discouraged from engaging in activities by the student society culture. The student societies were characterised as having: "A lot of procedure" (1st Year, Medicine) and being: "Too hierarchical" (1st Year, Quantitative Finance), which contrasted with experiences of more informal activities during the IBDP. A second barrier was that student society activities were reported as being predominantly conducted in the local language. Although, University B is an English medium of instruction institution, it was argued that: "You can force students to sit exams in English, but you cannot force them to speak in English outside of the class" (University B, 4th Year, Biology). This was a source of frustration as, although participants had developed a strong interest in extra-curricular activities during the IBDP, many felt excluded from such activities at university. As was described with reference to the students' union choir:

> During rehearsals, the instructor would speak in [the local language] and then ask someone next to me to translate it into English. I was like this is ridiculous as I was the only non-[local language] speaker. I just started to feel really bad for the person who had to translate for me and it was not very fun after that. They could speak in English but I could see that they didn't really want to, they weren't comfortable. So I just quit after the first semester (3rd Year, Music).

4.3.5. TEACHING AND LEARNING AT UNIVERSITY

The participants discussed a need to adapt to a new teaching and learning environment at University B. Many of the adaptation challenges could be considered as expected as part of a normal transition from a high school to a university level education. As one participant put it: "Every student needs to adapt when they come to university" (3rd Year, Education). The most commonly reported issues included adapting to large scale lectures with fewer opportunities to ask questions, an emphasis on independent studying with limited supervision, more impersonal relations with course instructors, and a less closely knit student community. Nonetheless, the participants also discussed more substantive differences that were perceived to reflect misalignment between the IB and approaches to teaching and learning at University B.

Teaching styles in the IB were characterised as being "student-centered". Most participants described an interactive school culture whereby students were expected to be active and engaged in their learning: "Back in the IB, they [teachers] really did encourage you to ask questions, discuss, and give presentations" (2nd Year, Journalism). This often contrasted with experiences of teaching approaches experienced at university. While approaches to teaching varied according to course instructor and field of study, there was a perception of some common differences. Lectures and tutorials were often described as "teacher-centered", especially for course taught by instructors who had gained their doctorate or only worked in an East Asian higher education context. In particular, teaching was described as being "content heavy" and based on providing students with knowledge of content: "At least for my programme, they just spoon-feed us the content in a lecture and then you just have to memorise all of it." (Year 1, Medicine). In such cases, the approach was deemed to leave limited opportunities for students to interact with classmates and course instructors. As was expressed by one participant:

> The lecturer will just go through the questions and how we should answer them, so there is not much interaction among students and teachers. In the IB, you are empowered to interact…but here it is more like the tutor transfers knowledge to us by showing us the answers (2nd Year, International Business and Global Management).

The participants commented on differences in student approaches to learning between IBDP alumni and those of other educational programmes. In other words, teaching

approaches were only one side of the coin in explaining a perceived lack of student interaction. In tutorials, local students were described as being reluctant to engage in discussions about the topic or issue being studied. As one participant observed: "There is barely any student input, unless participation counts as a grade. If the tutor asks a question, it is quiet most of the time" (4th Year, Law). For some participants, this environment created a space for IBDP alumni to demonstrate their self-perceived superior communication skills and interest in course content by leading classroom discussions. Other participants described feeling "awkward" if they were the only student to ask a question or noted they were adopting the learning culture of the university: "People just sit in complete silence, even when most of the class knows the answer… It sort of brushes onto you as well. Even I know the answer I will now find myself sort of being silent. (1st Year, Economics and Finance). Overall, the lack of student discussion was not believed to be conducive to student learning:

> If you are in a small tutorial and have ideas firing around the room you can really learn a lot. But if the tutor asks a question and it turns out to be a rhetorical question, you just don't learn in the same way (4th Year, Law).

4.3.6. THE IBDP AND UNIVERSITY ASSESSMENTS

The participants reported that assessment at University B differed from their experiences during the IBDP. It is noteworthy that there was considerable variance in assessments both within university courses and across field of study. The participants therefore discussed both advantages and disadvantages relative to other students in their preparedness for assessments. Nonetheless, there was a general perception that assessment formats and styles at university were more aligned with the local education system rather than the IBDP. While the majority reported having an advantage in essays, oral presentations, and group work, university assessments were frequently described as "examination heavy" with emphasis on multiple choice questions (MCQs) and short answers.

The majority of participants reported that they were more accustomed to non-examination based assessments compared to other university students. The experience of a wide range of assessments combined with a self-perceived strength in 21st century skills meant that the participants perceived being well prepared for essay, presentation, and group work based assessments, rather than high-stakes final examinations. First, the majority described an advantage in essay writing and examination questions with a long answer format. It was noted that an emphasis in IBDP assessments on analysis and elaboration, meant that IBDP alumni were comfortable in writing detailed responses to questions. In particular, essay based assessments in the IBDP – including the Extended Essay and Internal Assessments – were described as providing important experiences of university-type essay assessments.

Second, the participants perceived an advantage in group work assessments. The interactive style of IB "student-centered" teaching was believed to be conducive to an ability to share ideas and take leadership in group work projects. As one participant put it: "IB graduates are more likely to actively participate rather than passively participating. They take the initiative, take the opportunity to be a leader" (1st Year, Psychology).

A third perceived advantage was in oral presentation based assessments. While this advantage was in part attributed to higher English language proficiency, it was also noted that IBDP alumni benefitted from experience of oral presentations in the Theory of Knowledge course and Individual Oral Presentations. As a result, the participants reported having a higher ability in assessed oral presentations:

> I am familiar with how a presentation looks good and how to present it well to other people. When I saw other students, their style was only about presenting facts, they didn't try to make it entertaining or engaging at all. They just read their notes and were done (1st Year, Monocular Biology).

Participants at University B reported that university assessments differed in significant ways to the IBDP and were more aligned with local educational systems in East Asia. There was a general perception that IBDP alumni often faced greater challenges in adapting to university assessments compared to students from other educational programmes in the region. The participants did describe being assessed by essays, group work, and presentations at university. Nevertheless, it was reported by most participants that considerably greater weight was given to examination based assessments when compared to the IBDP, especially for students in science and business related fields of study.

The format and style of university examinations were also reported to differ to the IBDP. A first reported contrast was that university examinations have more multiple choice questions (MCQs) and short answers, rather than long answers that provide space for in-depth discussion. As is illustrated below:

> If we were given more long written essays in the examinations, I think I would have done better. Usually IB examinations are essay based and gave you a lot of space for analysis and elaboration. But here they use a lot more short answer and multiple choice questions (1st Year, Accounting and Finance).

Second, the assessment styles at University B were deemed to contrast with the IBDP. It was often described that IBDP assessment styles emphasise the capacity of students to employ 21st century skills such as critical and creative thinking. For university assessments, there was concern that such skills gained during the IB: "Help with you learning, but it does not always translate into the grades you want" (4th Year, Law) in

university examinations. Instead, there was perception that success in examinations could be achieved through memorisation of standardised course content:

> It is more about how much you can remember from the lecture notes. That is very different to the IB. I remember when I was sitting IB exams and writing my coursework, I found that the focus was on what you think or what your opinion is. But there is less of that here. They just ask what we covered in the lectures (4th Year, Biology).

4.4. THE CASE OF UNIVERSITY C

4.4.1. EMERGING THEMES FROM INTERVIEWS

In this section, we identify the main themes from semi-structured interviews with 12 IBDP alumni at a leading university in Australia (University C). Participants had undertaken the IBDP at a school in the same city of the host university (2), other parts of Australia (5), or in other parts of Asia (5). All but one of the local students attended a private school. The international students attended IBDP schools in Hong Kong, Mainland China, Singapore, Sri Lanka, and Thailand. The fields of study covered the Social Science and Humanities (4), STEM (science, technology, engineering, mathematics), (6), Business-related (1), and Arts (1). The time participants had spent at university varied in length from 2 to 4+ years (3 participants were undertaking postgraduate study). In alignment with the reported findings for University B, common themes were identified that related to perceived strengths and advantages of the IBDP, weaknesses and disadvantages of the IBDP, participation in extra-curricular activities, teaching and learning at university, and IBDP and university assessments.

4.4.2. STRENGHTS AND ADVANTAGES OF THE IBDP

One of the major finding was that almost all participants agreed that IBDP had prepared them very well to succeed at university, although most participants from local and international private fee-paying schools also recognised the role of high-quality secondary education provisions and resources. As one participant described: “I think the [IB] curriculum really did prepare me for what I was signing up for at university” (4th Year, Engineering and Economics). Participants recognised the value of the IB as a means of both gaining entry and preparing for university. For example, one participant (1st year Postgraduate, Science) commented that admission to university was “taken as given” for students after completing the IBDP. The broad-based and well-rounded nature of the IBDP was mainly seen to be strength, distinguishing the programme as being ‘skills-based’ rather than promoting the rote learning of facts. There were also perceived advantages in that it exposed students to a wide range of fields of study, and enabled them to develop interests in more areas than other programmes. One participant summarised the positive value of the IBDP as: “Teaching students how to think” (4th Year, Visual Arts). Another participant expressed a similar view in the following words:

> It was when I started trying to picture big things, big concepts and trying to display them in a way – does that make sense? …Having the ability to learn is actually more important than what you learn (2nd Year, Environmental Studies).

The participants reflected on the benefits of CAS, Extended Essay, and TOK for at university by fostering 21st century skills. This suggests that participants were aware of and benefitted from the embedded nature of skills in the IBDP. However, as will be described, it was also noted that these components were not always successfully implemented at schools.

Communication and Leadership

Most participants were positive about all three CAS components. They considered that CAS gave them ample opportunities to develop 21st century skills while incorporating a fair degree of choice in what could be undertaken. Several participants also commented that this set the IBDP apart from other programmes in Australia and internationally because the latter were overly focused on academic skills to the exclusion of other aspects. For example, one participant stated that a usual pattern in the last two years of school might be to drop out of volunteering and sports activities and have a sole focus on academic studies, but the IBDP maintained participants, which was noted as a positive feature (4th Year, Psychology). In particular, engagement in CAS was described as helpful in developing communication skills as they need to interact closely with others to complete tasks. Other participants noted how CAS provided opportunities to develop leadership skills, even if they lacked prior confidence or did not "like to be in the spotlight" (4th Year, Engineering and Economics). Related to this, participants were positive about how CAS gave them the opportunity to give back to the community rather than being inwardly focused on themselves. It provided structured opportunities to participate in activities that they would not usually have participated in. As one participant stated:

> I thought that was really cool, that they put the emphasis on the community and giving back…It gives you kind of a little nudge to go out there and try things…Definitely it's a really good thing that schools should be doing (3rd Year, Science).

Nonetheless, where schools were inexperienced in the IBDP, or were not set up to allow students to undertake extra-curricular activities, CAS was not always prioritised by students and/or teachers relative to other parts of the IBDP curriculum. For example, one participant commented that the school was not successful at implementing the recent change in CAS from an hours-based completion requirement to a greater focus on writing reflections, which she regarded as confusing and difficult (5th year, Arts and Law). A perception of disorganisation by schools in implementing the IBDP appeared to be relatively common among University C participants from both Australian and overseas schools, with 7 out of 12 participants commenting that at least one component

of the IBDP was not prioritised by the school due to inexperience or inattentiveness in implementing the programme.

Critical Thinking

The IBDP was described as creating space for students to develop critical and creative thinking skills. Several participants stated that TOK was one of the best features of the IBDP in this regard. They considered it especially important in taking them out of their comfort zone, assisting greatly in learning how to think critically, and teaching them to question rather than accept information as given. They also noted how TOK encouraged students to consider alternative sources and theoretical perspectives, which were perceived to be not encouraged by other programmes to the same extent (3rd year, Science). As one participant explained:

> What I do remember is that you make a claim, and then you make a counter-claim, and then you make a counter-claim to your counter-claim…it was really good to get you in that mindset of finding loopholes in what you were saying and being able to debate well, and criticise your own thoughts which was really good in research at uni (4th Year, Psychology).

However, it was also the component which seemed most subject to variation in the approach schools could take in delivery and content. Particularly if the school had only introduced the IBDP in the last few years, or the IBDP students formed a small minority of the total students in their year, the coordination of this component tended to be more piecemeal. Related to this, participants were polarised in their views on the value of TOK, with views ranging from it being: "A safe space to say what you thought" (4th year, Engineering and Economics), an "Interesting side project" (3rd Year, Science) to "A waste of time" (1st Year Postgraduate, Biology). One participant suggested that TOK in his school could have been more useful if it were integrated throughout a range of subjects, rather than being a separate course with a limited amount of time per week (3rd Year, Science).

Global Mindedness and Cultural Sensitivity

The IBDP was perceived to provide links to university study in other parts of the world. This was most clearly evident by the fact that nearly half of the 12 participants had themselves completed the IBDP in a non-Australian school. Moreover, several participants commented on the usefulness of the IBDP in providing a more globally oriented education. For example, in the Australian context, due to its distance from other parts of the world, the focus on language learning and knowledge of global issues were seen to fostering a sense of global mindedness and cultural sensitivity. This was commonly noted as offering the participants avenues to overseas travel and later employment (2nd Year, Economics and Finance). However, locally educated participants rarely mentioned that their interest in the globalised nature of the IBDP stemmed from the recognition it afforded to admission to universities in other parts of the world. This

may have been because Australian participants were generally satisfied with the quality of Australian higher education institutions and therefore did not plan to pursue higher education abroad. It may also reflect that global-mindedness was not emphasised in Australian IBDP schools. For example, one participant reported that the idea of focusing on world issues through the IBDP was a positive aspect of the programme, but then stated:

> I don't think it was done very well at my school and I think it could probably be implemented more as a whole… I don't think I got any of it really, which I think could have been done better because that would have been really valuable… critical thinking, and being empathetic and well-rounded is just an understanding of different cultures... but I think I was just in this bubble of you know, the private school (5th Year, Arts and Law).

Research and Writing Skills

The IBDP alumni were confident in their research and writing skills. While sometimes only in hindsight, virtually all participants agreed that the Extended Essay provided key skills in the research and writing process. Specifically, they saw that a broad range of possible topics motivated them to be independent and take initiative with writing tasks. One participant characterised the Extended Essay as a "mini-thesis" (4th Year, Engineering and Economics) which encapsulated the perceptions of most participants about the Extended Essay in terms of its self-directed nature and the lengthy writing challenge. The process of research and writing for the Extended Essay was described enabling IBDP alumni to be less stressed when encountering similar tasks at university. The positive experience of the Extended Essay was summed up by one participant in the following way:

> I really enjoyed doing my Extended Essay because I had my own project that I was really interested in and it was really fun to work through it and solve my own problems. I had an idea for something that I wanted to work with…doing it was fun (1st Year Postgraduate, Science and Communication).

4.4.3. WEAKNESSES AND DISADVANTAGES OF THE IBDP

The IBDP alumni were generally very positive about their preparation for university. In fact, one of the major challenges reported by the participants was that students, who had only taken the DP, rather than the Primary Years Programme (PYP) and Middle Years Programme (MYP), had fewer opportunities to develop 21st century skills. Several participants noted that the IB's holistic philosophy could be reinforced more effectively in the PYP and MYP rather than just in the last two years of the DP (3rd Year Postgraduate, Computing Science; 4th Year, Visual Arts). One participant felt that after the formative years, students had already formed who they were as individuals and learners, and the holistic nature of the IBDP was therefore more difficult to support or maintain by the school (4th year, Psychology). Furthermore, others noted that other

programmes were becoming more like the IB by adopting IBDP approaches and components. For example, one participant commented that the local NSW Higher School Certificate (HSC) is implementing an "IB style" education through by encouraging students to study in a wide range of subjects and community service (4th Year, Psychology). Nevertheless, positive views of the IBDP were not universal as the participants did highlight some perceived limitations in STEM knowledge as well as stress and anxiety associated with the rigour of the programme.

STEM Knowledge

Some participants did highlight self-perceived weaknesses and disadvantages of IBDP alumni compared to their counterparts from other programmes in foundational knowledge for their university studies, especially in STEM fields of study. For example, one participant took mathematics and physics as Standard Level subjects in the IBDP and at university. With these subjects, it was perceived that university was a "massive step up". The perceived a degree of complexity in the IBDP content but less so in regard to STEM subjects, which were their specialisations at university (3rd Year, Science). As another example, one participant commented that in the New South Wales Higher School Certificate (HSC), for instance, students could select up to three mathematics subjects. This was not possible in the IBDP, and the participant noted that they would not recommend students take the IBDP if their interests were highly specialised in STEM fields (2nd Year, Economic and Finance). However, some participants also noted that the degree to which the IBDP helped students at university depended very much on the subjects they took during the IBDP. For example, one participant had friends who had undertaken a Higher Level science subject in the IBDP and were relatively well-prepared for university. However, her own experience was that Higher Level Visual Arts was less helpful preparation for university studies:

> Because I'm doing Visual Arts, it's not something they teach you well [at school]…I think in my [IBDP] Visual Arts class it did help me think more about why I'm creating art but at university they don't really emphasise why you're doing it…they are more like: 'Make this!' and we make it (4th Year, Visual Arts).

Stress and Anxiety

Most participants perceived that the broad nature of the programme meant that the IBDP was more challenging compared to other programmes they were familiar with in Australia and overseas. It had significant ongoing workloads, including components such as CAS, but also a heavy emphasis on both assignments and examinations. This was seen by some to be a positive aspect as it: "Pushed people beyond their comfort zone" (4th Year, Engineering and Economics), which fostered academic persistence and time management skills. Nevertheless, the rigor of the IBDP was also perceived to be a weakness and disadvantage in that many IBDP alumni reported being stressed and anxious during the programme. Of the participants, 9 out of the 12 participants reported that the multiple components of the IBDP led to stress about the IBDP workload.

Participants generally felt that the attendant pressure of the IBDP was much greater than for students undertaking other programmes. One participant gave an anecdote about his experience of the Extended Essay. He had commenced one topic then, towards the end of the programme, was told that he would fail if he pursued that topic. This led to a period of depression:

> It was a bad time for me because for the first month I was depressed. I was stuck in a dilemma and I didn't know how to get out of it…and there were only two people at school who knew the extent of the problem…I came to school and I was still an OK student but I'd come home and go back to bed (1st Year Postgraduate, Biology).

Two participants (2nd Year, Environmental Studies; 3rd Year, Science) suggested that the IBDP could integrate more mental health coping mechanisms into the programme, as this would help students prepare for the considerable stress often involved. While teachers were generally supportive to IBDP students, provision to cope with stress could be further built in to the IBDP itself through additional training and framework to encourage behaviours to support mental health.

4.4.4. THE IB AND EXTRA-CURRICULAR ACTIVITIES

As an indication of the development of 21st century skills, participants were asked whether the IBDP had fostered an interest in activities and aspects above and beyond assessments at university, including extra-curricular activities such as sport, volunteering, or student governance. A few participants perceived that IBDP alumni had greater participation in extra-curricular activities than students from other education programmes. Yet, even if they were more involved in activities beyond school, they generally viewed this as developing independently of the IBDP. One participant expressed this in the following way:

> I'd probably say I don't really know…it's sort of hard for me to gauge but I think that is one where, with [our school] background, where we all play sport, it's sort of fostered externally to the IB, or prior to entering the IB (2nd Year, Economics and Finance).

There was, however, almost universal acceptance that the development of soft skills during the IB was not only useful preparation for university, but is also more generally useful in terms of a future career and the capacity to "take the next step" (3rd year Postgraduate, Computing Science). For example, one participant stated that she envisaged her future work would certainly require creativity and persistence and that the IBDP taught life skills in this regard. Again, several participants viewed the development of soft skills to have occurred largely independently of, rather than because of, the IBDP. One participant stated that she had certainly developed such skills in the later years of schooling, but she was aware this could have happened simply

through the process of finishing school and maturing as an individual (1st Year Postgraduate, Science and Communication). While some skills such as global mindedness could be directly attributed to the IBDP, participants often noted that other skills such as leadership could well have developed because the culture in Australia meant that students were often inclined to be involved in extra-curricular activities such as student governance and sporting activities. It was also acknowledged that because the IBDP was mostly offered in private fee-paying schools, with ample educational resources for extra-curricular activities, these skills were likely to have developed regardless of the IBDP:

> My school, and I'm guessing a lot of other private schools, they kind of have an emphasis on it [extra-curricular activities] already…so I think they had a bit of a head start on that, and so they did alright. It was because it was already happening in the school, not because of them trying to implement the IB programme really (3rd Year, Psychology).

4.4.5. TEARCHING AND LEARNING AT UNIVERSITY

The majority of participants described that teaching and learning approaches at University C adopted "skills-based" and "student centered" approaches. Apart from certain differences at university including the larger size of lectures, such approaches were described by the participants as being in close alignment with their experiences of the IBDP. That is to say, university instructors sought to promote student discussion and group work in a similar way to IBDP teachers. In this respect, most of the participants were very confident about their capacity to handle the transition to university approaches to teaching and learning. One participant reported that "university felt like a holiday after the IB programme". In contrast, she said a lot of graduates of the local secondary education programme "really struggled" in their first year of university (4th Year, Psychology). Another participant described how they could "sail through" early years of the degree programme:

> With a couple of first year courses I thought: I know this and that's great – I'm just reinforcing what I know instead of panicking and building from the ground up. So, it helped the transition into university because I could get used to being a bit more independent but I already had some of the knowledge so I could just sort of, you know, sail through (3rd Year Postgraduate, Computing Science).

4.4.6. IBDP AND UNIVERSITY ASSESSMENTS

Most participants saw the value of the IBDP in the underlying development of university-relevant skills, which were described as at least as important, if not more important, than knowledge of academic subject matter for university level assessments. A minority of participants reported a depth of academic knowledge prepared them to succeed in assessments. For example, one participant mentioned that Higher Level Economics in the IBDP was almost "word for word" the same as the first year of

university Economics content and meant little effort was required to get through first year (2nd Year, Economics and Finance). Despite this, the most commonly reported advantages for assessments were in the realm of skills.

The perceived advantage was most clearly demonstrated by common reports that IBDP alumni had advantages over other students in university essay based assessments. It was described that the IBDP has "very similar assessments" (3rd Year, Science) to the assessment types and formats experienced at University C. The Extended Essay, in particular, was seen to be extremely valuable. As an example, one participant described being surprised to find out that others first year university students did not know how to reference or source materials for their research and, as a consequence, could not devote the same time and effort to the actual content of what they were working on (4th Year, Psychology). Another participant (2nd year, Environmental Studies) reported that skills such as communication and critical thinking were particularly relevant to university essays, but were also transferable to other assessments given that she had learnt how to persuasively argue a point of view. It was further noted that the IBDP had prepared the participants well for report-based assignments. As one participant explained:

> Report writing was quite easy… It was an easier transition between high school and uni because you were familiar with topics, and so you had to put more effort in but it was just the same for IB but just translated over (1st Year Postgraduate, Biology).

The participants also reported being highly prepared for success when working on group projects at University C. While group projects did not always translate to a large part of assessment marks, they were still viewed as an important part of university courses. As examples, one participant stated while she had the natural tendency to work individually, the IB programme had led her to develop teamwork skills and an open-mindedness that assisted in working with others on group projects (4th year, Engineering/Economics). Another participant noted how cultural sensitivity promoted by the IBDP helped with working with others through experience of: "Working with a wide range of people with so many different abilities, especially in terms of language abilities" (2nd year, Environmental Studies). A further participant described enjoyment and saw a lot of value in group project work:

> I do enjoy working in teams – I know a lot of people who don't, they like actively avoid it….There was a group of students who were supposed to do a project together and one of them went 'I can't work in a team, I'm just going to do all of it' and things like that – but I just feel like being able to work with other people is more important than people give credit for (3rd Year Postgraduate, Computer Science).

4.5. CROSS-CASE DISCUSSION OF INTERVIEW FINDINGS

In this section, we identify the most salient themes from the interview data across the three case universities. Overall, the IBDP alumni across the three universities in East Asia and Australia were highly positive about their learning experiences during the IBDP. Participants consistently commented on the "skill-based" nature of the IBDP and the "well-roundedness" this developed in students. There was a perception that the programme was unique in supporting the development of competences that are commonly referred to in the 21st century skills literature, especially through the Core Components of CAS, Extended Essay, and TOK. The most commonly noted 21st century skills included communication (e.g. Wagner, 2008), critical thinking (e.g. Jerald, 2009), creative thinking (e.g. Robinson, 2011), cultural sensitivity (e.g. Salas et al., 2011), global mindedness (e.g. Zhao, 2012), and leadership (e.g. Trilling & Fadel, 2009). These self-perceived strengths of IBDP alumni were believed to translate into university studies through, for example, greater engagement in classroom discussions, an ability to generate more innovative ideas, a capacity for global perspectives to understanding issues, and to take leadership in group projects.

It was also perceived by some participants at the East Asian universities (University A and University B) that the IBDP – and especially experience of CAS – gave them more confidence and a greater inclination to engage in extra-curricular activities at university. These were deemed to offer important learning opportunities, including for skills referred to in the 21st century skills literature such as leadership. Notably, this perception turned out to be quite true, drawing from survey data from IB and non-IB students enrolled at both University B and University C. The IBDP alumni survey participants indicated more active involvement in slightly more areas of extra-curricular activities than their non-IB counterparts. In addition, participants in Australia perceived that the development of 21st century skills during the IBDP such as creativity would stand them in good stead for their future careers. These findings build on an emerging body of studies on the impact of the IBDP on a wide range of 21st century skills (Cole et al., 2015; Conley et al., 2014; Wright, 2015; Wright & Lee, 2014a). In contrast, the self-perceived weaknesses and disadvantages of IBDP alumni were more often described in terms of knowledge of academic content rather than 21st century skills.[13] For instance, it was noted at all three case universities that students schooled in local and other regional education systems often had deeper mathematical or STEM knowledge. Other important issues included participants in University B describing that an emphasis on global-mindedness in the IBDP can lead to a lack of knowledge of localised current affairs, culture, and language, while participants in University C described how the heavy workloads and diverse components of the IBDP can result in high levels of stress and anxiety among students.

[13] An exception was understanding and engagement with local current affairs, culture, and language reported at University B that should be viewed as important components of cultural sensitivity (Wright & Lee, 2014).

There were also some reports that IBDP alumni encountered various difficulties and barriers in adapting to university. It is notable that there was somewhat of a divide in this respect between IBDP alumni at university in East Asia and Australia. Most participants at University C in Australia reported how the IBDP had prepared them well for the teaching and learning approaches experienced at university. While some described a relative weakness in foundational knowledge, they often described being accustomed to "skill based" and "student-centered" approaches at university that rely heavily on student discussion and group work. Further, IBDP assessments were described as well-aligned with the format and styles of assessments at university. Experiences during the IBDP were noted as especially valuable for essay and report writing, while a more general emphasis on critical thinking and communication was transferable to a wider range of university assessments. The participants also described how the IBDP had prepared them well for group projects by fostering 21st century skills such as open-mindedness, teamwork, and cultural sensitivity. This contributed to a perception among some that IBDP alumni could "sail through" the early years of work at University C (3rd Year Postgraduate, Computing Science).

Less positively, IBDP alumni at the two leading East Asian universities described more challenges in the transition to university. Challenges were most commonly reported by students in STEM and Business-related majors. This was a particular concern for IBDP alumni at University A, which has a specialisation in STEM and Business fields of study. Nevertheless, challenges were also reported by students at both East Asian universities across a wide range of students according to major, nationality, and international/local student status. This finding corresponds with accounts of "academic shock" (Sovic, 2008) referred to in literature on the adaptation of international students to an unfamiliar academic environment. First, approaches to teaching and learning were described as contrasting with their experiences of the IBDP. Instead, approaches were believed to be more aligned with local education systems in East Asia that rank among the highest achievers in large-scale international assessments such as *Programme for International Student Assessment* (PISA), but have been critiqued for under-valuing 21st century skills (see Zhao, 2016). For example, teaching was frequently described as "teacher-centered" leaving limited opportunities for student interaction, while it was noted that non-IB graduates were often reluctant to actively participate in classroom discussions. Secondly, assessments at university were characterised as "examination heavy" and more often based on multiple choice questions (MCQs) and short answers, especially students in STEM and business-related majors. These forms of assessment were perceived to emphasise the memorisation of standardised content rather than enabling IBDP alumni to showcase 21st century skills through essay writing, oral presentations, and group work.

Major challenges to teaching and assessing 21st century skills are certainly not unique to East Asian higher education (see Ananiadou & Claro, 2009; Rotherham & Willingham, 2010). Further, "student-centered" approaches that are arguably most conducive to 21st

century skill development have likely become more challenging in the context expanding higher education participation and squeezed per-student educational resources.[14] Nevertheless, there was a perception among participants at University A and University B that the IBDP was partially misaligned with their experience of university. It was perceived that relative strengths of IBDP alumni in communication, critical thinking, creative thinking, cultural sensitivity, global mindedness, and leadership were not fully recognised in university teaching and learning or assessments. For example, some participants described major difficulties in adapting to a teaching and learning environment with limited interactions with lecturers and among students. In addition, there was concern that a strength in 21st century skills did not necessarily translate into high grades in university assessments, which could be better achieved through strategies to memorise core course content for examinations.

These findings have some important implications for the IB as the IBDP continues to expand in both international and local education systems in Asia Pacific. IBDP alumni in Australia were enthusiastic about how the programme prepared them to succeed at the leading university. This is a positive finding given that Australian universities are a major destination for IBDP alumni from international schools in East Asia (Lee et al., 2014), as well for local students. Yet, the findings also revealed some concerns about IBDP-university misalignment from participants at the two East Asian universities. As leading universities in East Asia continue to progress in quality and status, they are likely to become an increasingly popular study option for IBDP alumni in the region. For example, universities in East Asia were ranked in the top 100 by *Times Higher Education World University Rankings* (8 universities), *Academic Ranking of World Universities* (6 universities), and *QS World University Rankings* (18 universities) in 2016/2017. While the IBDP alumni participants at the two high ranked East Asian universities in our study were often enthusiastic about how the programme supported the development of 21st century skills, they also described challenges in adapting to an academic environment at university whereby such skills were perceived to be under-valued. This draws attention to the complexity of university preparation as the destinations of IBDP alumni for higher education become more diverse. The findings raise questions about how IBDP schools can best prepare their students – especially those entering sciences and business majors – to succeed in leading universities in East Asia without straying from the IB's philosophy of developing 21st century learners who are balanced, caring, communicators, inquirers, knowledgeable, open-minded, principled, reflected, risk-takers, and thinkers (IB, 2017c).

[14] Gross Tertiary Enrollment Ratios in East Asia were higher than the global average of 34.5 in 2015; including Mainland China (43.4 %), Hong Kong (68.5 %), Japan (63.4 %), South Korea (95.3 %) (World Bank, 2017).

5. CONCLUSIONS

5.1. KEY FINDINGS AND IMPLICATIONS

To conclude the report, we provide a list of key findings and implications in response to the four research goals outlined in our research proposal.

5.1.1. ACADEMIC PERFORMANCE

As detailed in Section 3.1. in Chapter 3, university in-house data of GPA suggested three major patterns. First, the only significant predictor in all of the cross-sectional and longitudinal analyses was the student entrance exam score, which was always positively associated with university GPA. This suggests that both IB scores and non-IB programme measures for university entrance were valid and reliable in predicting students' academic performance in university studies. Second, overall, there was no significant difference in academic performance between the IBDP alumni and their non-IBDP counterparts in both University B in East Asia and University C in Australia. Furthermore, the longitudinal analyses of the three cohorts in the leading Australian university showed no significant difference in the change of GPA between the two student groups over time, when we controlled for student entrance exam score and certain student characteristics (e.g., international vs. local students, whether students graduated from disadvantaged secondary schools). We found similar patterns when looking closely through the within faculty analyses. That is, at the faculty level analyses, there were only two cases where the IBDP status turned out to be a significant predictor: Faculty of Business & Economics in the 2012 cohort and Faculty of Arts and Social Sciences in the 2014 cohort.[15] In contrast to these two cases, the IBDP status was not a significant predictor. Third, despite there being no significant difference in the change of GPA between the two student groups, it appears that the trajectory of GPA over time among IBDP alumni was more dynamic (or fluctuated) than their non-IBDP counterparts.

These findings are at odds overall with earlier reports that IBDP students are better prepared for university than non-IBDP alumni. For example, Conley et al. (2014) found that IB students fared better in university mathematics courses than non-IB students, while the HESA study in 2016 reported that they were more likely to obtain first-class degrees than non-IB alumni. However, universities differ in the way in which they view the equivalency of IBDP scores and scores/grades from other curricula. If IB alumni students are performing better than other students in a university, then it could be argued that that university is setting their IBDP cut-off standards for admission too high. Where IBDP students perform at the same level as non-IBDP students, the admissions system cut-offs for the two groups are about right, as is the case for University B and University C in this study.

[15] In the former case, the IBDP alumni initially lagged behind their counterparts and caught up their non-IBDP peers at the final semester. In the latter case, the IBDP alumni initially lagged behind and started to catch up from the third semester.

5.1.2. PERCEIVED CAPACITY FOR 21ST CENTURY SKILLS

We investigated 21st century skills perceived by IBDP alumni, and compared with non-IB alumni. To this end, we conducted a validation study of the survey instrument that was designed to measure 21st century skills (see Chapter 2 for details) of university students. Using the validated survey questionnaire, we found that on average IBDP alumni reported higher than their counterparts on almost all domains of 21st century skills. In particular, the IBDP alumni seemed to be most confident in their capacity for Cultural Sensitivity, Global-mindedness, Critical Thinking, Leadership, and Time Management, to name a few.

We think that there are several reasons why IBDP alumni believe that they are well equipped with those 21st century skills. Firstly, it can be said that IBDP experiences are associated with successful skill-based learning outcomes. The IB claims that its educational philosophy prioritises a holistic educational approach and whole person development. This is clearly articulated in the IB's Learner Profile (IB, 2017c), which we think is closely aligned with the various domains of 21st century skills that are explored in this study (e.g., caring, communicators, inquirers, open-minded, reflective). Indeed, recent research has documented that IBDP students' learning outcomes such as inter-cultural understanding is enhanced when the IB's Learner Profile is embedded in regular classroom activities (Wright & Lee, 2014a) and 21st century skills, such as critical thinking, are fostered through TOK (Cole et al., 2015). Wright's (2015) case study further shows that skills gained from IBDP experiences had a long lasting impact on the lives of IBDP alumni by supporting the development of a capacity for international mindedness, critical thinking, and a broad worldview. More importantly, we found a number of narratives from our interview data that support IBDP's positive impact on gaining 21st century skills (see Chapter 4 for details) among the interview participants across the three case universities. We have also noticed that a vast majority of IBDP alumni interviewed in our study perceived 21st skills developed from the IBDP as important for university studies. That is, the IBDP alumni were highly confident about their capacities for 21st century skills and they tended to regard themselves as being better prepared for university studies relative to graduates of other programmes. This included greater confidence in delivering presentations and taking leadership roles in group projects.

Secondly, however, taking a more critical perspective of the findings, it can be also said that self-perceived strength of IBDP alumni for 21st century skills stem from their internalising IB "branding" about progressive and holistic educational approaches, which may have influenced their reflections on the programme (see Doherty, 2009). It is recognised that the views of IBDP alumni are self-perceptions and, therefore, the considerable investment that students (and their families) make when they take on the IBDP can add to the positivity in how they regard learning outcomes, including 21st century skills and preparation for university. This resonates with the term "IKEA effect" coined by Norton et al. (2012) to explain the psychology of overvaluing a product by

people who have invested much of their own time and effort.

Thirdly, taking another critical lens, it can be stated said that the development of 21st century skills may be more related to the characteristics of their schooling environment or family background, rather than unique aspects of the IBDP. For example, self-perceived strengths in global mindedness and cultural sensitivity were described by many participants in the case universities (e.g., particularly in Universities A and B) as resulting from attending schools with an internationally diverse student body and having experience of living or travelling in other parts of the world. In the case of the IBDP participants graduating from Australian schools, they tended to report that global-mindedness was not particularly emphasised through their IBDP studies. Despite this, IBDP alumni at both University B and University C reported a higher score in the domain of Global Mindedness. As narratives from the IBDP participants in Australia suggested, this may be because the development of 21st century skills such as leadership stems more from attending private fee-paying schools with ample educational resources for extra-curricular activities and a multicultural emphasis in Australia on student governance and sporting activities, rather than the IBDP.

With these cautions in mind and based on self-perceptions, we wish to note that the majority of IBDP alumni at universities in East Asia and Australia described the programme as distinct from other educational programmes by catering more for the development of 21st century skills. If this is the case, the IBDP would be of considerable interest to scholars associated with the "21st century skills movement". As some notable examples, the programme would appear to be well aligned with research into how pedagogical approaches targeting non-academic skills can enhance achievement in schooling (e.g. Borghans et al., 2015), the growing importance of 21st century skills for success in labour markets owing to the automation of jobs based on routine tasks (e.g. Autor, 2014), and how educators should recognise a great diversity of individual talents beyond a narrow capacity to memorise standardised information for examinations (e.g. Robinson, 2011). In these respects, the IBDP may serve as an educational model to counter global educational trends associated with a Global Education Reform Movement (GERM) away from 21st century skills (Sahlberg, 2016; Zhao, 2016) and to respond to an emerging "21st century skills gap" (World Economic Forum, 2015).

5.1.3. PERCEPTIONS OF THE IBDP IN RELATION TO UNIVERSITY STUDIES

We explored the perceptions of IBDP alumni about how the IBDP studies assisted their post-secondary studies and their broader experiences at each institution. Overall, the IBDP alumni across the three universities in East Asia and Australia were highly positive about their learning experiences during the IBDP as preparation for higher education.

First, the interview participants consistently commented on the "skill-based" nature of the IBDP, which was believed to translate well into university studies. Specifically, the

participants reflected on the benefits of Extended Essay for university studies. Many of the participants across the three case universities reported strength in their writing and research skills. They described their engagement in the Extended Essay as a "mini research paper" and as being "writing heavy". As such, they perceived that essay-based assignments at university were "not so daunting" or "quite easy", given their experience of the self-directed nature of the Extended Essay. In addition, the participants reported the role of TOK in improving research skills. Since TOK courses offered opportunities to discuss epistemological issues, the participants often reported that they could have 1) greater engagement in classroom discussions, 2) an ability to challenge taken for granted ideas, and 3) take leadership roles in group projects during their university studies. Notably, most of the participants who mentioned about TOK's role in their university studies also reported that TOK experiences were sources for their critical thinking skills. This finding resonates with Cole et al.'s (2015) study, reporting that critical thinking awareness and competency of IBDP alumni enrolled in Australian universities improved following the completion of TOK.

Second, the IBDP alumni were much more positive than their non-IB peers in rating their senior secondary education programme. This pattern was consistent across the case universities. Taking closely the wordings of the questions (e.g., "I think [my secondary education program] graduates are better prepared for university compared to other secondary school graduates", "I think [my senior secondary education program] graduates have better "soft skills" compared to other secondary school graduates"), it seems that there is almost a universal perception among the IBDP alumni that their preparedness for university studies through the IBDP is better than other senior secondary programmes. Indeed, this confidence about the IBDP was a frequently identified narrative from the interview data as well (e.g., IBDP as useful to "take the next step"). As mentioned earlier, this self-perceived strength (or comparative advantage) may be partly because of the participants' internalising IB "branding" about progressive and holistic educational approaches or partly because of an "IKEA effect". Nonetheless, this psychological self-confidence should not be downplayed, given that academy self-efficacy is an important factor that can shape learning outcomes (Bong & Skaalvik, 2003; Marsh, 1993)

Finally, one note of caution should be added here. In the data from universities B and C, the non-IBDP group comprised primarily students from the local examination system in that part of the world. Conclusions about the comparison of the two groups should therefore consider both systems.

5.1.4. ACADEMIC PERFORMANCE AND PERCEPTIONS OF 21ST CENTURY SKILLS

A remaining question is why there was no significant difference in academic performance between the two student groups, despite the IBDP alumni's high confidence in their 21st century skills and their positive view of IBDP experiences, which could be expected to play out in their university studies positively (see Chapter 4).

There could be several plausible explanations. For example, it may be simply because in our analysis, we controlled for the entrance exam score of students, which appears to absorb the existing effect of IBDP experiences on academic performance.

Another explanation provided above is that the admissions policies and procedures of the two universities (B and C) studied here have already taken into account any differences in university preparedness between the IBDP and non-IBDP students. In practice, the minimum cut-off standards for different groups of students will have been adjusted over the years to ensure equal performance at the tertiary level.

At the same time, however, our interview data provide other possible explanations. As described earlier (Chapter 4), a vast majority of IBDP alumni interviewed in our study viewed 21st century skills developed from the IBDP as important tools for university studies. That is, there was agreement among IBDP alumni that 21st century skills developed from the IBDP provided advantages in their university studies. Why were such skills not deemed to be transferred to academic performance?[16] We notice that many IBDP alumni interviewed in this study perceived disadvantages in their university studies in relation to their IBDP experiences. Specifically, a majority of the interviewees (15 of the 22 students) in University A in East Asia agreed that they lack a certain set of "hard skills" related to a scope of core academic content knowledge, especially in mathematics. Similar comments were identified from most of the IBDP alumni students in University B, and were also found from a few IBDP alumni in University C in Australia. The IBDP alumni often viewed themselves as lacking mathematical knowledge and quantitative skills, compared to their non-IB peers enrolled in the same program. As examples, participants from University A stated their relative struggles (as compared to non-IB peers at the university) as lacking "content knowledge to match up to the local students" (3rd Year, Electronic Engineering), and "numerical and quantitative skills" (3rd Year, Electronic Engineering). Some participants from University B felt like their mathematical skills lag behind: "I really realised that when I took maths here in the first semester, I was struggling actually. Even though I took Higher Level Math, it was not enough. Many Gaokao graduates and some local students think it is really simple and some had already covered the content in high school" (4th Year, Actuarial Science). In a similar vein, some IBDP alumni in University C in Australia highlighted self-perceived weaknesses in STEM areas, compared to their counterparts from other programmes in foundational knowledge for their university studies. For example, one participant took mathematics and physics as Standard Level subjects in the IBDP reported that university was a "massive step up" in those subjects.

In relation to this, it should be recalled that while the breadth of the IBDP was regarded as a merit of taking the IBDP by a majority of the IBDP alumni, it was not, however,

[16] Of course, this might be simply because GPA seems to reflect what is being assessed whereas 21st skills are not being assessed explicitly by the university curriculum, which may result in little impact of 21st skills on GPA.

viewed by all participants as providing a clear-cut advantage transitioning to university level content over their peers who graduated from other educational programmes. This might be also related to why relatively smaller percentages of IBDP alumni were admitted to science programs such as engineering and medicine in both University B and University C. The perceived weakness in some "hard skills" seems to be one of many factors why there was no difference in academic performance between the two student groups. These findings reinforce a recent survey that showed revealed that although university admissions officers in the UK perceive that IBDP is successful in encouraging a global outlook,independent inquiry, open-mindedness, and self-management skills, the programme is less effective than A Levels with encouraging in-depth subject expertise (ACS Research, 2017).

Another perceived disadvantage, which may be another factor influencing IBDP's academic performance negatively, was related to the university's pedagogical approaches and assessment styles. A number of the IBDP alumni, particularly from Universities A and B in East Asia, reported certain disadvantages in terms of pedagogical approaches and assessment styles at their universities. The IBDP alumni students in University B commonly reported pedagogical issues, including adapting to large scale lectures with fewer opportunities to ask questions, an emphasis on independent studying with limited supervision, more impersonal relations with course instructors, and a less closely knit student community (see Chapter 4 for example narratives). The IBDP alumni students in University A also mentioned similar pedagogical issues. Within this context, the participants indicated misalignment between their IBDP learning experiences (e.g., inquiry-based and student-centered) and university's more teacher-centered approaches to teaching and learning. Furthermore, some of the IBDP alumni in both Universities A and B viewed their universities as implementing assessment in quite conventional or traditional ways, including multiple choice questions (MCQs) and short answers, emphasis of memorisation, focus on content knowledge, and general exam orientation (see also Chapter 4 for details). The IBDP alumni perceived that these assessment formats and styles gave more advantages to students schooled in the local education system, rather than IBDP alumni. In short, university's pedagogical approaches and assessment styles were perceived to play out negatively in the academic performance of the IBDP alumni in Universities A and B, because such approaches appear to give few opportunities for students to transfer 21st century skills such as leadership, critical thinking, and communication into their academic studies.

Interestingly, aforementioned issues with pedagogical approaches and assessment style were not found in University C in Australia. This seems to be because University C adopts primarily Western models and values in its pedagogical and assessment systems. Most participants at University C reported how the IBDP had prepared them well for the teaching and learning approaches experienced at university. While some described a relative weakness in foundational knowledge or academic content knowledge, they

generally described being accustomed to "skill based" and "student-centered" approaches at university that relies heavily on student discussion and group work. For example, university instructors sought to promote student discussion and group work in a similar way to IBDP teachers. In this respect, most of the participants were very confident about their capacity to handle the transition to university approaches to teaching and learning. Then, why was there no significant difference in academic performance between the two student groups in University C, given that there seemed no systematic disadvantage to the IBDP alumni in terms of pedagogical and assessment approaches? We speculate that one of the reasons may be the flipside that non-IBDP counterparts, who mostly went through local Australian curriculum that also highlights "student-centered" and "skill-based" approaches, which is well aligned with the university's pedagogical and assessment approaches. In short, the perceived benefits of the IBDP (e.g., writing skills, 21st century skills) may not be exclusively available to IBDP alumni in the case of the Australian university.

5.1.5. PARTICIPATION IN EXTRACURRICULAR ACTIVITIES

We documented IBDP alumni involvement in extra-curricular activities (ECA) with a comparison to their counterparts. Initially, we assumed that IBDP alumni may be more active in ECA than non-IB graduates, given the IBDP's highlight on well-roundedness in student development, particularly through CAS. Moreover, some participants at University B noted that engagement with the CAS course did encourage them to pursue extra-curricular activities while at university and get involved with activities outside of classroom-based learning. This seemed true for involvement in sport activities and language related activities among IBDP alumni in University B in East Asia, compared to a vast majority of non-IB graduates at the university who went through a local school curriculum, which is predominantly academic oriented and particularly exam focused.

However, our findings also provided a mixed picture. The levels of participation in most of the extra-curricular activities (e.g., local student-based activities, internships, international activities) between the IBDP and non-IBDP alumni in both of the case universities (i.e., Universities B and C) were quite similar. That is, the results showed that most IBDP alumni were involved in local student-based activities "at least once since starting university", which was similar to non-IB alumni in both universities. Another similarity was that both student groups in the case universities reported limited participation in internships and/or international activities. This is quite an unexpected finding, considering that CAS could be expected to shape the perspectives of IBDP alumni on local and/or international community involvement. Existing research suggests that CAS influenced IBDP alumni attitudes towards service, volunteering, and activism more generally (cf. Wright, 2015). This was not the case in our study. We think that there would be several plausible explanations for this discrepancy. First, our case students were still undergraduates who may be simply too busy addressing many academic matters rather than local and/or international based ECA. Second, our interview data suggests that the context of the university (i.e., University B) was

reported as creating some barriers to engagement in extra-curricular activities. On the one hand, around one-half of the interview participants at University B reported that they received credit transfers for up to one-year of courses from the IBDP to their university programme. These IBDP alumni often had more free time available outside of their academic studies to participate in additional activities. On the other hand, however, the IBDP alumni often described being discouraged from engaging in activities by the student society culture at University B as having "a lot of procedure" and being: "too hierarchical", which contrasted with experiences of more informal ECA activities during the IBDP. Another barrier was that student society activities were reported as being predominantly conducted in the local language. Although, University B is an English medium of instruction institution, it was argued that: "You can force students to sit exams in English, but you cannot force them to speak in English outside of the class" (4th Year, Biology). This was a source of frustration as many felt excluded from similar activities at university. While more research is required, we speculate that the barrier participation in ECA may be applied to university-based ECA such as student-led societies at University B, whereas IBDP alumni who sought to get involved in ECA outside of the university might have been encouraged by their CAS experiences.

5.2. FUTURE DIRECTIONS FOR RESEARCH

To contribute further to the research literature regarding the post-secondary performance of IBDP alumni, we suggest that future studies should examine the following issues. First, while we found no substantial differences in academic performance between IBDP and non-IBDP alumni at the case universities, this finding should be further examined on a larger scale (e.g., more case universities) and a longer-term analysis (e.g., career pathway after graduation).

Second, it would also be appropriate to compare the ways in which universities select students from different examination systems, and whether there are consistencies in how the universities set equivalent standards for admission across these systems.

Third, we notice that most of the IBDP students' trajectories in academic performance in University C were more dynamic (put another way, more fluctuated) than their non-IBDP peers. We do not know the reasons, which await further investigations.

Fourth, while we identified that the IBDP alumni were much more confident in their 21st century skills and preparation for university, how and in what context this perceived positivity plays out for university studies should be further explored. Psychological studies, in general, suggest that even "perceived" psychological constructs (Bong & Skaalvik, 2003; Marsh, 1993) influence individual conduct. Nonetheless, findings from our study suggest that the perceived positivity might not work in a certain organisational context—i.e., the self-perceived advantage of IBDP alumni in 21st century skills was not always deemed to help academic studies, given traditional forms of pedagogical and assessment at Universities A and B in East Asia. We therefore suggest

that it is important to investigate how and in what contexts the perceived positivity of IBDP alumni would (not) bring certain practical benefits to their academic studies and social life.

Fifth, future studies attempting to tease out unique effects of the IBDP on learning outcomes need to pay attention to our findings that some of the unique skills benefits expected from the IBDP may not be exclusive to IBDP alumni. As we noticed, skills such as leadership and communication could well have developed from other local programmes in Australia. This is partly due to the culture in Australia, meaning that students from all educational programmes are often inclined to be involved in group projects, classroom discussions, and extra-curricular activities such as student governance and sporting activities. In short, future studies need to consider contextual and/or cultural variation in the unique effect of the IBDP on post-secondary outcomes.

Finally, despite acknowledging the contextual and cultural variation in the IBDP's unique impact, we also wish to mention that some skills such as global mindedness and cultural sensitivity could be more universally attributed to the IBDP, given its strong focus on international and intercultural perspectives. It should be recalled that those inter-culture related skills were most salient attributes that the IBDP alumni articulated regardless of the university context. Therefore, we suggest that it would be worthwhile to explore the linkage of those inter-culture skills to other social conducts in order to flesh out the IBDP's unique contribution to global schooling systems.

5.3. RECOMMENDATIONS FOR THE IB

As suggestions of what the IBDP needs to improve in university preparation for students, we recommend that the IB should to pay attention to following issues. First, although the IBDP participants in our study were highly confident about their 21st century skills and mostly positive about their IBDP experiences, they also showed a deficit perspective in certain types of knowledge and skills. Specifically, across three case universities, a number of the participants tended to view themselves as lacking mathematical knowledge and quantitative skills in STEM areas, compared to their non-IB peers enrolled in the same programme. This was more saliently found in University A and University B in East Asia. We speculate that this might be one of many reasons why relatively smaller percentages of IBDP alumni were enrolled in hard sciences such as engineering and medicine in both University B and University C. For the IB, this implies that 1) some subject areas such as mathematics are not well aligned to university's curriculum level of those subject areas, and 2) possibly because of this misalignment, IBDP alumni might have been less likely to be admitted to engineering, computer sciences, and medicine, compared to the IBDP's admission rates of business, social sciences, and arts. If this may be the case, the IB needs to scrutinise curriculum alignment of certain subject areas in terms of its scope and level of difficulty while maintaining the breadth of knowledge as the distinctive merit of the IBDP.

Second, IBDP alumni particularly from international schools appear to be struggling with initial adaption to universities in East Asia. Pedagogical and assessment approaches in those universities seem quite opposed to IBDP alumni's learning experience during their IBDP studies.[17] Although this is not something that the IB can do much to resolve, the IB needs to think ahead about how to boost resiliency of IBDP alumni, given that IBDP alumni have been admitted to virtually every single world top university over the 20 years and the growing profile of universities in the East Asia region.

Third, IBDP alumni graduating from an international school who subsequently attended leading East Asian universities seem to be marginalised to some extent in extra-curricular activities beyond classroom. Even though those universities adopt English as a medium of instruction in the classroom, many local students use the local language outside of classroom. Thus, only a few of the IBDP participants developed the proficiency to interact with the local population in the host language. Many of the IBDP alumni reported a disadvantage when discussing localised issues at university. On the one hand, it is a structural constraint embedded in those East Asian universities. On the other hand, it might be an issue of individual IBDP students who may prefer to engage in international activities rather than in local communities. Lee et al. (2014) study on IBDP alumni from high-end private international schools in China shows that there is a paradoxical tendency that IBDP students' service activities as part of the CAS component often took place abroad such as teaching English or helping to build a school in other developing countries, rather providing opportunities to interact with local communities. Given that a substantial number of IBDP alumni enrolled in those two leading Asian universities are from similarly high-end international schools in different parts of Asia, we speculate that such CAS practices during their IBDP may have a lingering consequence of IBDP alumni's lack of knowledge and perhaps limited interest in local issues. For example, we notice that numerous IBDP participants in Universities A and B mentioned that they have been involved in AIESEC, which is a youth-run NGO, aiming to provide leadership development opportunities through "global" activities. Perhaps, the IBDP alumni have a relatively lopsided "global" focus in their ECA, which, unintendedly and paradoxically, appears to create a disconnection with "the local" in and outside of university life. If this may be the case, then IB schools particularly in East Asia need to pay special attention to their CAS activities with a focus on local communities.

Finally, although it was a finding based on a relatively smaller number of the IBDP participants, we think that it is worth noting for the IB. That is, some of the IBDP alumni

[17] Of course we acknowledge that this could be a generalised statement of the universities' pedagogical and assessment approaches as a monolithic entity. Also, we acknowledge that this is a totally based on the IBDP participants' views. We believe that challenges to teaching and assessing 21st century skills are certainly not unique to East Asian higher education but also most higher education institutes in other regions. (see Ananiadou & Claro, 2009; Rotherham & Willingham, 2010).

who had only taken the DP, rather than the Primary Years Programme (PYP) and Middle Years Programme (MYP), reported that they had fewer opportunities to develop 21st century skills during the IBDP. Several participants noted that the IB's holistic philosophy could be reinforced more effectively in the PYP and MYP rather than just in the last two years of the IBDP. This suggests that, on the one hand, the implementation of the DP in providing learning opportunities for 21st century skills is somewhat constrained, given that the IBDP is a school leaving certificate with an external examination. On the other hand, it also suggests that there is coherence and consistency across the IB's in providing learning opportunities for 21st century skills. In this regard, the IB's focus on the continuum of the three programmes in terms of both educational philosophy and practical modus operandi should be strengthened.

6. REFERENCES

Acemoğlu, D. & Autor, D. (2012). *What does human capital do? A review of Goldin and Katz's The race between education and technology* (No. w17820). National Bureau of Economic Research.

ACS Research (2017). *Thriving at university: University admissions officer report 2017*. Cobham: ACS International Schools.

Ananiadou, K. and M. Claro (2009). 21st Century Skills and Competences for New Millennium Learners in OECD Countries. *OECD Education Working Papers, No. 41*. Paris: OECD Publishing.

Astin, A. W., Sax, L. J., & Avalos, J. (1999). The long-term effects of volunteerism during the undergraduate years. *Review of Higher Education*, 22(2), 187–202.

Australian Bureau of Statistics (2011). *Voluntary Work*, Australia, 2010 (cat. no. 4441.0). Canberra: Commonwealth of Australia.

Autor, D. (2014). Skills, education, and the rise of earnings inequality among the "other 99 percent", *Science,* 344(6186), 843-51.

Ball, S., Bowe, R., & Gewirtz, S. (1996). School choice, social class and distinction: The realization of social advantage in education. *Journal of Educational Policy*, 11(1), 89-112.

Barber, B. L., Eccles, J. S., & Stone, M. R. (2001). Whatever happened to the jock, the brain,and the princess? Young adult pathways linked to adolescent activity involvement and social identity. Journal of Adolescent Research, 16, 429-455.

Belal, S. M. (2015). Identification of the Intended and Unintended Outcomes of Offering the International Baccalaureate Diploma Program in an International School in Egypt. Doctoral dissertation, University of Minnesota.

Bergeron, L. (2015). *Diploma Programme students' enrollment and outcomes at US postsecondary institutions 2008-2014*. Department of Educational Studies, University of Wisconsin La Crosse.

Billig, S. H. (2013). Impact of participation in CAS on students' civic-mindedness and civic engagement. Denver: RMC Research Corporation.

Bohnert, A. M., Aikins, J. W., & Edidin, J. (2007). The role of organized activities in facilitating social adaptation across the transition to college. Journal of Adolescent Research, 22(2), 189-208.

Bohnert, A., Fredricks, J., & Randall, E. (2010). Capturing unique dimensions of youth organized activity involvement: theoretical and methodological considerations. Review of Educational Research, 80, 576–610.

Bong, M. & Skaalvik, E. (2003). Academic Self-Concept and Self-Efficacy: How Different Are They Really? Educational Psychology Review, 15(1), pp 1–40.

Borghans, L., Golsteyn, B. H., Heckman, J. J., & Humphries, J. E. (2015). *What Do Grades and Achievement Tests Measure?* University of Chicago, Department of Economics.

Broh, B. A. (2002). Linking extracurricular programming to academic achievement: Who benefits and why? Sociology of Education, 75(1), 69–95.

Brooks, R. (2007). Young People's Extra-Curricular Activities: Critical Social Engagement–Or 'Something for the CV'? Journal of social policy, 36(3), 417-434.

Brown, R., & Ohsako, T. (2003). A study of inter-generational programmes for schools promoting international education in developing countries through the International Baccalaureate Diploma Programme. Journal of Research in International Education, 2(2), 151-165.

Brown-Liburd, H. L. & Porco, B. M. (2011). It's what's outside that counts: Do extracurricular experiences affect the cognitive moral development of undergraduate accounting students? Issues in Accounting Education, 26(2), 439-454.

Brunold-Conesa, C. (2010). International Education: The International Baccalaureate, Montessori and global citizenship. Journal of Research in International Education. 9 (3) 259-272.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.

Buchert, L. (2014). Learning needs and life skills for youth: An introduction. International Review of Education, 60(2), 163-176.

Bunnell, T. (2008). The global growth of the International Baccalaureate Diploma Programme over the first 40 years: a critical assessment. *Comparative Education*, 44:4, 409-424,

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin, 56, 81-105.

Chan, Y. K. (2016). Investigating the relationship among extracurricular activities, learning approach and academic outcomes: A case study. Active Learning in Higher Education, 17(3), 223-233.

Cambridge, J., & Simandiraki, A. (2006). Interactive intergenerational learning in the context of CAS in the IB diploma programme: A UK case study. Journal of research in international education, 5(3), 347-366.

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the creative achievement questionnaire. *Creativity Research Journal*, *17*(1), 37-50.

Coates, H., Rosicka, C., & MacMahon-Ball, M. (2007). Perceptions of the International Baccalaureate Diploma Programme among Australian and New Zealand universities. Camberwell: Australian Council for Educational Research.

Cole, D. R., Ullman, J., Gannon, S., & Rooney, P. (2015). Critical thinking skills in the International Baccalaureate's "Theory of Knowledge" subject: Findings from an Australian study. *Australian Journal of Education*, *59*(3), 247-264.

Conley, D., McGaughy, C., Davis-Molin, W., Farkas, R., & Fukuda, E. (2014). *International Baccalaureate Diploma Programme: Examining college readiness*. Portland: The Education Policy Improvement Center.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Culross, R. R., & Tarver, E. T. (2007). Teacher and student perceptions of the

International Baccalaureate program: A first year perspective. Journal of School Choice, 1(4), 53-62.

Darling, N., Caldwell, L. L., & Smith, R. (2005). Participation in school-based extracurricular activities and adolescent adjustment. Journal of Leisure Research, 37(1), 51.

Doherty, C. A. (2009). The appeal of the International Baccalaureate in Australia's educational market: A curriculum of choice for mobile futures. *Discourse: Studies in the Cultural Politics of Education*, 30(1), 73-89.

Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? Journal of Adolescent Research, 14, 10-43.

Facione P.A. (1990). A *Critical thinking: statement of expert consensus for purposes of educational assessment and instruction: Research findings and recommendations*. American Philosophical Association.

Fredricks, J. A., & Eccles, J. S. (2006). Extracurricular involvement and adolescent adjustment: Impact of duration, number of activities, and breadth of participation. Applied Developmental Science, 10(3), 132–146.

Fredricks, J. A., & Eccles, J. S. (2010). Breadth of extracurricular participation and adolescent adjustment among African-American and European-American youth. Journal of Research on Adolescence, 20(2), 307-333.

Fredricks, J. A. (2011). Commentary: Extracurricular activities: An essential aspect of education. Teachers College Record. http://www.tcrecord.org/Content.asp?ContentId=16414, retrieved July 2017.

Gardner, H. (2004). How education changes: Considerations of history, science and values. In M. Suarez-Orozco and D. Qin-Hilliard (Eds.), *Globalization: Culture and education in the new millennium*. Berkeley: University of California Press.

Heckman, J. J. & Kautz, T. (2012). Hard evidence on soft skills. *Labour Economics, 19*(4), 451–464.

Hayden, M. C. & Wong, C. S. D. (1997). The International Baccalaureate: international education and cultural preservation. *Educational Studies*, 23:3, 349-361.

HESA. (2016). *International Baccalaureate Students Studying at UK Higher Education Institutions: How do they Perform in Comparison with A Level Students?* Higher Education Statistics Agency. Retrieved from: http://www.ibo.org/contentassets/d74675437b4f4ab38312702599a432f1/hesa_final_report.pdf

Hill, I. (2002). The International Baccalaureate: Policy Process in Education, *Journal of Research in International Education*, 1(2), 183-211, DOI:

Heckman, J. J., & Kautz, T. (2013). Fostering and measuring skills: Interventions that improve character and cognition, IZA Discussion Paper 7750. National Bureau of Economic Research.

Higher Education Research Institute [HREC] (2000). The American freshman: National norms for fall 1999. LA: University of California at Los Angeles.

Huang Y. R., & Chang S.M. (2004). Academic and co-curricular involvement: Their

relationship and the best combinations for student growth. Journal of College Student Development, 45(4): 391–406.

Inkelas, K. K., Swan, A. K., Pretlow, J., & Jones, J. N. (2013). Exploring the benefits of the International Baccalaureate extended essay for university studies at the University of Virginia. *Center for Advanced Study of Teaching and Learning in Higher Education, University of Virginia.*

International Baccalaureate Organization (2015). International Baccalaureate Diploma Programme Subject Brief: Creativity, activity, service. http://www.ibo.org/contentassets/5895a05412144fe890312bad52b17044/cas-2016-english-1st-final-web.pdf, retrieved July 2017.

International Baccalaureate. (2017a). *Diploma Programme*/ http://www.ibo.org/programmes/diploma-programme/, retrieved July 2017.

International Baccalaureate. (2017b). *Find an IB world school*. http://www.ibo.org/en/programmes/find-an-ib-school/, retrieved July 2017.

International Baccalaureate (2017c). *IB Learner Profile*. http://www.ibo.org/benefits/learner-profile/, retrieved July 2017.

Jenkins, C. (2003). Perception of the International Baccalaureate Diploma Programme: A report of an inquiry carried out at UK universities and institutions of higher education. Cardiff: International Baccalaureate Organization.

Jerald, C. D. (2009). *Defining a 21st century education*. Alexandria, VA: Centre for Public Education.

Kautz, T., Heckman, J. J., Diris, R., Ter Weel, B., & Borghans, L. (2014). Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. Paris: OECD.

Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Englewood Cliffs, NJ: Prentice-Hall.

Kulundu, F., & Hayden, M. (2002). Creativity, action, service (CAS) activities as part of the International Baccalaureate Diploma Programme: A case study. Pastoral Care in Education, 20(1), 30.

Kyllonen, P. C. (2012). Measurement of 21st century skills within the common core state standards, *Invitational Research Symposium on Technology Enhanced Assessments.* 7-8 May, 2012.

Kyllonen, P. (2015). Tests to Measure Personal Attributes. In Lane, S., Raymond, M. R., & Haladyna, T. M. (Eds.). *Handbook of test development*. London: Routledge.

Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of development experiences across types of organized youth activities. Developmental Psychology, 42(5), 849-863.

Lee, M., Leung, L., Wright, E., Yue, T., Gan, A., & Kong, L. (2014). A *study of the International Baccalaureate Diploma in China: Program's impact on student preparation for university studies abroad*. Hong Kong: Education Policy Unit, Faculty of Education, The University of Hong Kong.

Lee M, Wright E, & Walker A (2016). The Emergence of Elite International Baccalaureate Diploma Programme Schools in China: A Skyboxification Perspective. In Koh, A. & Kenway, J. (Eds.). *Elite Schools: Multiple Geographies of Privilege*. Routledge.

Leung C. H., Ng C. W. R. and Chan P. O. E. (2011). Can co-curricular activities enhance the learning effectiveness of students? An application to the sub-degree students in Hong Kong. International Journal of Teaching and Learning in Higher Education, 23(3): 329–41.

Levine, A., & Cureton, J. (1998). When hope and fear collide: A portrait of today's college student. San Francisco: Jossey-Bass.

Lingard, B., Martino, W., Rezai-Rashti, G., & Sellar, S. (2016). *Globalizing Educational Accountabilities*. Oxon: Routledge.

Linden, M. (1995). CAS: Is it to Serve or is it to Learn? Contact: The Journal of IB Teachers, May, 18-19.

MacCann, C., Fogarty, G. J., Zeidner, M., & Roberts, R. D. (2011). Coping mediates the relationship between emotional intelligence (EI) and academic achievement. *Contemporary Educational Psychology*, *36*(1), 60-70.

Mahoney, J. L. (2000). School extracurricular activity participation as a moderator in the development of antisocial patterns. Child Development, 71, 502-516.

Marks, H. M., & Jones, S. R. (2004). Community service in the transition: Shifts and continuities in participation from high school to college. The Journal of Higher Education, 75(3), 307-339.

Marsh, H. W. (1993). Academic self-concept: Theory, measurement, and research. In: Suls, J. (ed.), *Psychological Perspectives on the Self.* Erlbaum, Hillsdale, NJ, pp. 59–98.

Marsh, H. W., & Kleitman, S. (2002). Extracurricular school activities: The good, the bad, and the nonlinear. Harvard Educational Review, 72(4), 464-511.

Meyer, H. D., & Benavot, A. (Eds.). (2013, May). PISA, power, and policy: The emergence of global educational governance. Symposium Books Ltd.

Norton, M., Mochon, D., and Ariely, D. (2012). "The IKEA Effect: When Labor Leads to Love." *Journal of Consumer Psychology,* 22 (3) (July): 453–460.

Pink, D. H. (2005). *A whole new mind: Why right-brainers will rule the future*. New York: Penguin.

Randall, E. T., & Bohnert, A. M. (2012). Understanding threshold effects of organized activity involvement in adolescents: Sex and family income as moderators. Journal of Adolescence, 35(1), 107-118.

Rizvi, F., Acquaro, D., Quay, J., Sallis, R., Savage, G., & Sobhani, N. (2014). *IB Learner Profile*. Melbourne Graduate School of Education, University of Melbourne.

Robinson, K. (2011). *Out of our minds: Learning to be creative*: Chichester: Capstone.

Rotherham, A. J. & Willingham, D. T. (2010). "21st Century" skills: Not new, but a worthy challenge. *American Educator*, *34*(1), 17–20.

Saavedra, A. R. (2016). Academic Civic Mindedness and Model Citizenship in the

International Baccalaureate Diploma Programme. The Social Studies, 107(1), 1-13.

Sahlberg, P. (2016). The Global Educational Reform Movement and Its Impact on Schooling. In K. Mundy, A. Green., B. Lingard, & A. Verger (Eds.) *Handbook of Global Education Policy* (pp. 128-144). Chichester: John Wiley & Sons.

Salas, E., Bedwell, W.L., and Fiore, S. M. (2011). *Developing the 21st century (and beyond) workforce: A review of interpersonal skills and measurement strategies*. Paper prepared for the NRC Workshop on Assessing 21st Century Skills: http://www7.nationalacademies.org/bota/21st_Century_Workshop_Salas_Fiore_Paper.pdf [Retrieved July 2017].

Seow, P. S., & Pan, G. (2014). A literature review of the impact of extracurricular activities participation on students' academic performance. Journal of Education for Business, 89(7), 361-366.

Siskin, L. S., & Weinstein, M. (2008). Supplemental survey to: Creating support structures and services for Title 1 high schools implementing the International Baccalaureate programs, NYU Wagner Research Paper No. 2011-08. New York: Institute for Education and Social Policy.

Sjogren, C., & Campbell, P. (2003). The International Baccalaureate: A diploma of quality, depth and breadth. *College and University*, 79(2), 55-58.

Suto, I. (2013). 21st century skills: Ancient, ubiquitous, enigmatic. *Research Matters: A Cambridge Assessment Publication*, 15, 2-8.

Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA*. Thomson/Brooks/Cole.

Tarc, P. (2009). *Global dreams, enduring tensions: International Baccalaureate in a changing world.* New York: Peter Lang.

Taylor, M. L., & Porath, M. (2006). Reflections on the International Baccalaureate program: Graduates' perspectives. Journal of Secondary Gifted Education, 17(3), 149-158.

Tchibozo, G. (2007). Extra-curricular activity and the transition from higher education to work: A survey of graduates in the United Kingdom. Higher Education Quarterly, 61(1), 37-56.

Thier, M. (2015). Globally speaking: Cultural intelligences and cross - cultural competencies. In Y. Zhao (Ed.), Counting what counts: Reframing educational evaluation . Bloomington, IN: Solution Tree. Pp. 113 - 132.

Torrance, E. P. (1981). Empirical validation of criterion referenced indicators of creative ability through a longitudinal study. *Creative Child and Adult Quarterly, 6*, 136-140.

Trenor, J.M. & Miller, M.K. (2011). Utilization of a Think-Aloud Protocol to Cognitively Validate a Survey Instrument Identifying Social Capital Resources of Engineering Undergraduates. Annual conference American Society for Engineering Education, 2011 https://www.asee.org/public/conferences/1/papers/925/download

Trilling, B., & Fadel, C. (2012). *21st century skills: Learning for life in our times* . San Francisco: Wiley

Tupes, E. C., & Christal, R. E. (1992). Recurrent personality factors based on trait ratings. *Journal of personality*, *60*(2), 225-251.

Van Loo, M., Goodban, J., & Hessler, J. (2004). The parent's guide to the IB Diploma: An independent guide (Implementing the IB Diploma Programme: A practical manual for principals, IB coordinators, heads of department and teachers). Retrieved February 8, 2012 from http://dp-help.com

Wager, T. (2010). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need–and what we can do about it* . New York: Basic Books.

Walker, A., Lee, M., & Bryant, D. A. (2015). Development and validation of the International Baccalaureate Learner Profile Questionnaire (IBLPQ). *Educational Psychology*, 1-23.

Wood, J., Little, S., Goldring, L., & Jenkins, L. (2011). 'The confidence to do things that I know nothing about' – skills development through extracurricular inquiry activity. Journal of Learning Development in Higher Education, 3: 2–21.

World Economic Forum. (2015). *New Vision for Education: Unlocking the potential of technology*. Geneva: World Economic Forum.

Wright, E. & Lee, M. (2014a). Developing skills for youth in the 21st century: The role of elite International Baccalaureate Diploma Programme schools in China. *International Review of Education, 60 (2), 199-21.*

Wright, E. & Lee, M. (2014b). Elite International Baccalaureate Diploma Programme schools and inter-cultural understanding in China. *British Journal of Educational Studies*, 62(2), 149-168.

Zhao, Y. (2016). *Counting What Counts: Reframing Education Outcomes* (Eds). Bloomington, IN: Solution Tree Press.

Wright, K. (2015). *International Baccalaureate programmes: Longer-term outcomes*. Melbourne Graduate School of Education, University of Melbourne.

7. APPENDICES

Appendix 1. Demographic Characteristics (University B)

	IBDP alumni	**Non-IBDP alumni**	**Total**
	n=63	n=671	n=734
	%	%	%
DEMOGRAPHIC CHARACTERISTICS			
Gender			
Male	17.5	32.1	30.8
Female	82.5	67.9	69.2
Citizenship			
Hong Kong	49.2	80.4	77.7
Hong Kong dual citizenship	14.3	4.8	5.6
Other	36.5	14.8	16.7
Fathers' education			
Lower than high school diploma	3.2	23.0	21.3
High school diploma	8.1	27.8	26.1
2 year college diploma	8.1	7.4	7.5
3 or 4 year university degree	40.3	16.3	18.4
Graduate degree or higher	40.3	25.5	26.8
Mother's education			
Lower than high school diploma	6.5	22.0	20.6
High school diploma	22.6	36.2	35.0
2 year college diploma	9.7	8.2	8.4
3 or 4 year university degree	33.9	16.2	17.7
Graduate degree or higher	27.4	17.4	18.3
Annual family income (Australian dollars)			
Lower than 40,000 USD	15.5	39.4	37.5
40,000 USD to lower than 80,000 USD	27.6	32.9	32.5
80,000 USD to lower than 160,000 USD	29.3	18.6	19.4
160,000 USD to lower than 200,000 USD	17.2	6.7	7.5
200,000 USD or higher	10.3	2.5	3.1
STUDY CHARACTERISTICS			
Country last attended school			
Hong Kong	59.7	73.1	72.0
China/Taiwan	12.9	13.0	13.0
Singapore	3.2	1.8	1.9

South Korea	4.8	0.8	1.1
India/Pakistan/Sri Lanka	1.6	4.2	4.0
Other Asia/Pacific (incl Aust/NZ)	11.3	2.1	2.9
USA/Canada	1.6	1.8	1.8
UK/Europe	3.2	2.8	2.9
Other country	1.6	0.5	0.6
Whether attended international school	88.7	7.6	14.5
Whether attended private (fee-paying) school	88.9	23.4	29.1
Median year of current study	2nd year	2nd year	2nd year
Current university study programme			
Science	25.4	15.4	16.2
Arts	6.4	14.3	13.6
Law	6.4	9.8	9.5
Economics/Commerce/Business	25.4	13.6	14.6
Medicine	14.3	16.0	15.8
Social sciences	11.1	6.6	7.0
Engineering	3.2	11.0	10.4
Computing	1.6	1.3	1.4
Education	1.6	3.4	3.3
Architecture	1.6	2.1	2.0
Dentistry	1.6	1.5	1.5
Combined degree	0.0	1.8	1.6
Other degree	1.6	3.3	3.1

N = 734

Appendix 2. Demographic Characteristics (University C)

	IBDP alumni	**Non-IBDP alumni**	**Total**
	n=62	n=27	n=89
	%	%	%
DEMOGRAPHIC CHARACTERISTICS			
Gender			
Male	25.8	40.7	30.3
Female	74.2	59.3	69.7
Citizenship			
Australian	59.7	77.8	65.2
Australian joint citizenship	24.2	14.8	21.4
Other	16.1	7.4	13.5
Parents overseas-born	72.6	48.2	65.2
Fathers' education			
School - Year 11 or below	3.3	14.8	6.8
School - Year 12 or equivalent	6.6	7.4	6.8
VET certificate, advanced diploma or diploma	4.9	11.1	6.8
Bachelor degree	45.9	29.6	40.9
Postgraduate degree or higher	39.3	37	38.6
Mother's education			
School - Year 11 or below	1.6	11.1	4.6
School - Year 12 or equivalent	11.5	7.4	10.2
VET certificate, advanced diploma or diploma	21.4	33.3	19.3
Bachelor degree	39.3	18.5	33
Postgraduate degree or higher	34.4	29.6	33
Annual family income (Australian dollars)			
Lower than $55,000	8.5	4	7.1
$55,000 to lower than $110,000	13.6	40	21.4
$110,000 to lower than $160,000	18.6	16	17.9
$160,000 to lower than $270,000	35.6	20	31
$270,000 or higher	23.7	20	22.6
STUDY CHARACTERISTICS			

Country last attended school			
Australia	67.7	96.3	76.4
China/Hong Kong/Taiwan	12.9	3.7	10.1
Singapore	6.5	-	4.5
Other country	12.9	-	9
Whether attended international school	32.3	3.7	23.6
Whether attended private (fee-paying) school	85.5	63	78.7
Median year of current study	3rd year	4th year	3rd year
Current university study program			
Arts/Arts combined degree	21	25.9	22.4
Law/Law combined degree	21	11.1	18
Bachelor of Science	14.5	25.9	18
Bachelor of Economics/Commerce	8.1	7.4	7.9
Bachelor of Medical Science	4.8	7.4	5.6
Other combined degree	16.1	11.1	14.6
Postgraduate degree	8.1	-	5.6
Other	6.5	11.1	7.9

N = 89

Appendix 3. Interview Protocols

Introduction

- Could you please introduce yourself?
    - What is your course and year of study?
    - In which country did you attend high school? Was it an international school?

Reflections on the IBDP

- In your opinion what were the best and worst features of the IBDP at your school?
    - What are your thoughts on Creativity, Action, Service?
    - What are your thoughts on the Extended Essay?
    - What are your thoughts on the Theory of Knowledge course?
- Was your school successful in implementing the IB educational philosophy based on the Learner Profile and a "whole person" education?

IBDP and university studies

- In what ways do you think you, as an IBDP graduate, are different to other students of XXX?
- How did the IBDP prepare you for university studies in terms of breadth and depth of knowledge of core academic content?
    - Was the academic content of the IBDP relevant to the academic content of your course of study?
- How did the IBDP prepare you for so-called "soft skills" such as communication, critical thinking, creativity, leadership, and teamwork? Please provide examples.
    - Do you think that such "soft skills" are important for university students?
- Do you participate in extra-curricular activities?
    - If so, do you think your participation was motivated by taking the IBDP?
- What would you say are the main strengths and weaknesses of IB graduates?

IB graduates and university assessments

- What are the main types of assessments for your university studies?
- Do you think that the IBDP prepared you well the type of assessments at university?
- Do you think that university assessments are designed to measure the skill set of IB graduates, especially in terms of measuring "soft skills"?
- Compared to other students, do you think that IB graduates have a greater interest in academic studies above and beyond assessments?

Implications

- Would you recommend other students to take the IBDP? If so, why?

Appendix 4. A List of Pattern Codings and Definition of Themes (UNIVERSITY C)

	Interview 1	***Interview 2***	***Interview 3***	***Interview 4***	***Interview 5***	***Interview 6***	***Interview 7***	***Interview 8***	***Interview 9***	***Interview 10***	***Interview 11***	***Interview 12***
Australian/overseas school student	*Aust*	*Aust*	*Aust*	*OS*	*OS*	*OS*	*Aust*	*Aust*	*OS*	*OS*	*Aust*	*Aust*
Field of study at university	*4th year, Psychology*	*1st year postgrad, Science /Communication*	*4th year, Psychology*	*3rd year, Science*	*2nd year, Environmental Studies*	*4th year, Engineering/Economics*	*2nd year, Economics /Finance*	*5th year, Arts/Law*	*3rd year postgrad, Computing Science*	*4th year, Visual Arts*	*3rd year, Psychology*	*1st year postgrad, Biology*
AUSTRALIAN CONTEXT												
Australia: IBDP a minority but growing education programme in Australia												
IBDP students were most commonly between a quarter and a third of all students in their year. The PYP and MYP were not usually part of the curriculum in Australian schools.							*1*		*1*			
Australia: links to study overseas												
The IBDP is perceived to provide links to study in other parts of the world, as well as provide links to overseas travel e.g. because of its focus on language learning.							*1*				*1*	*1*
Australia: emphasis on holistic philosophy												
IBDP programme emphasis on holistic philosphy 'spills over' to other students regardless of their formal participation in the programme.	*1*						*1*	*1*				
IBDP: reinforcement in early years of programme												
IBDP programme emphasis on holistic philosophy more effective if reinforced in PYP and MYP.	*1*								*1*			
CORE COMPONENTS												
CAS: not prioritised												

Due to time rather than assessment emphasis in IBDP, CAS is often not prioritised by students/teachers relative to other parts of the IBDP curriculum.									*1*	*1*	*1*	*1*
CAS: communication/leadership/risk-taking												
CAS provides an opportunity for students to develop important non-academic skills through participation in their activities including communication, leadership, and risk taking.	*1*		*1*		*1*	*1*	*1*		*1*	*1*		
CAS: giving back to community												
CAS gives students an opportunity to give back to the community rather than just focussing on academic outcomes				*1*		*1*	*1*	*1*	*1*	*1*		
EE: essay writing skills												
The Extended Essay provides important skills in the essay writing process from devising research questions to referencing.			*1*	*1*	*1*	*1*		*1*	*1*	*1*	*1*	*1*
EE: choice and initiative in completion												
The Extended Essay gives students choice and initiative in a broad range of subject content.		*1*			*1*					*1*	*1*	
TOK: classroom use												
Students offered conflicting accounts of the extent to which TOK issues are relevant or useful for learning.			*1*		*1*		*1*	*1*	*1*		*1*	*1*
TOK: higher-order thinking												
The TOK is important in developing non-content based skills such as analytical, critical, and self-reflective thinking skills.	*1*	*1*		*1*	*1*	*1*			*1*	*1*		
21ST CENTURY SKILLS DEVELOPMENT												
21st century skills:												

development a recognised and positive aspect												
The IBDP is seen by respondents as providing valuable 'soft skills'	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*		*1*
21st century skills: develops regardless of IBDP												
Implementation of the Learner Profile philosophy happens anyway, regardless of IBDP. This is particularly the case in private schools, but also more generally through the course of normal development.	*1*					*1*	*1*	*1*	*1*	*1*	*1*	*1*
21st century skills: IBDP fosters greater interest in extra-curricular activities												
IB graduates have a greater interest in extra-curricular activities and other aspects beyond assessments, compared to other university students			*1*	*1*	*1*						*1*	
21st century skills: skills for life												
The IBDP is useful in developing skills for university, but also developing skills for a future career and skills for life.	*1*			*1*	*1*	*1*	*1*		*1*	*1*	*1*	*1*
CURRICULUM & PEDAGOGY												
Curriculum: rigorous												
The IBDP curriculum is highly demanding both in terms of academic rigor and workload.	*1*	*1*	*1*	*1*	*1*	*1*			*1*		*1*	*1*
Curriculum: holistic education												
The IBDP provides a broad and holistic education. This contrasts with the more specific content covered in other programs. Students believe that being 'well-rounded' is one of the defining characteristics of the program.		*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	
Curriculum: perception of difficulty												

Students perceive the IBDP to have a higher workload relative to other programs.	*1*	*1*		*1*	*1*	*1*					*1*	*1*
Curriculum: options kept open												
The IBDP allows students to keep their options open compared to other programs								*1*			*1*	
Pedagogy: analysis/communication/creativity												
IBDP programme aims to promote analytical, communication, and creativity skills rather than rote learning of facts.		*1*		*1*		*1*		*1*				*1*
Pedagogy: promote student engagement												
IBDP programme focuses on students' learning how to think rather than what to think.					*1*			*1*		*1*		
UNIVERSITY DESTINATIONS												
University transition: students very confident												
Students are generally very confident about their ability to handle the academic standard and work level at university.	*1*	*1*			*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
University transition: prepared for content												
Students are well prepared for their transition to university in terms of subject content. Final year IBDP subject matter is the same level as first year university studies.	*1*	*1*	*1*		*1*	*1*	*1*	*1*	*1*		*1*	*1*
University transition: study skills												
Students are well prepared for their transition to university in terms of study skills such as critical thinking, communication, and time management.	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
University entrance: taken for												

granted												
The vast majority of IBDP students expect to attend university.				*1*				*1*	*1*			*1*
OTHER												
IBDP students: stress												
The high workload alongside pressure to achieve high marks in assessments can result in students becoming stressed and anxious.	*1*		*1*	*1*	*1*	*1*			*1*	*1*	*1*	*1*
IBDP students: inter-cultural understanding												
The IBDP promotes inter-cultural understanding and an open mind.					*1*	*1*		*1*	*1*	*1*	*1*	
Student support: guidance and support												
Students benefit from ample support by teachers and coordinators to ensure they are on top of the workload and to help them to complete the IBDP successfully.			*1*		*1*	*1*		*1*	*1*	*1*	*1*	
IBDP students: socioeconomic status and circumstances												
The IBDP is usually only available to students of high socioeconomic status and circumstances. Private school provides a 'cocooned' opportunity through the IBDP.	*1*											
Student support: not prioritised												
Aspects of IBDP not prioritised by the school due to inexperience or inattentiveness in implementing the program.		*1*		*1*			*1*	*1*	*1*		*1*	*1*

About the Researcher Group for Educational Leadership and Policy (RGELP)

- The Research Group for Educational Leadership and Policy (RGELP) is a key research group in the Faculty of Education at the University of Canberra.
- Established in May 2014, the Group is under the direction of Centenary Professor Moosung Lee and is supported by a working team of research and administrative staff.
- RGELP aims to be a research hub that advances and disseminates knowledge of educational leadership and policy for school improvement in the Asia Pacific region.

RESEARCH GROUP LEADER
Moosung Lee
Centenary Professor,
Research Group for Educational Leadership & Policy
C 90 Building 6
University of Canberra
Bruce Canberra ACT Australia
Telephone: (61) 6201 2583
Email: MooSung.Lee@canberra.edu.au