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Conceptions of quality in learning, teaching and assessment in a Singapore polytechnic

Loh Gin Hin

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God, thank you for your unfailing love;

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My colleagues and friends, thank you for your encouragement.

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ABSTRACT

This is an insider and mixed methods research study that focuses on the beliefs, perspectives, and values of senior management, teaching staff, students and alumni to illuminate key conceptions of quality in teaching, learning and assessment within a Singapore polytechnic. The study identifies five key conceptions of quality: what is important (to the polytechnic); preparing students for work; understanding concepts and deepening skills; setting standards and standardizing practice; and transforming students.

The research uncovers ten contextual factors, which are either internal or external to the polytechnic. The study explores the influence of these environmental and organizational conditions on conceptions of quality in the polytechnic, within a wider context of the performative culture within the polytechnic and the economistic perspective and market practices of education in Singapore. The succession of key school/ polytechnic leadership was a key contextual factor that influenced the revamp of a relatively stable Balanced Score Card in year 2019. This highlights the crucial role of school leadership along the journey of school or polytechnic improvement.

The study finds the two dominant conceptions of quality to be: what is important (to the polytechnic) and preparing students for work. These conceptions of quality are interrelated in terms of an emphasis of graduate employability. This finding is consistent with the economistic perspective of education in the polytechnic. The polytechnic tracks its graduate employability through the Balanced Score Card.

The study recommends that the polytechnic broadens its understanding of education and conceptions of quality beyond employability. The research recommends the polytechnic to look beyond the employability narrative and address social, personal and learning needs of students as lifelong learners. The conception of quality as transforming students has untapped and promising potential to facilitate this. Since the Government and employers are key stakeholders, strengthening the shared values between the polytechnic and its community (staff, students and parents) for sustainable quality improvement in the polytechnic is another possibility.

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ABBREVIATIONS

- BSC — Balanced Score Card
- CET — Continuous Education and Training
- DSP — Desired Student Profile
- EFA — Education for All Movement
- EQMS — Educational Quality Management System
- EU Commission — European Commission
- GCE 'O' — Singapore-Cambridge General Certificate of Education Ordinary Level
- HCT — Human Capital Theory
- ISO — International Organization for Standardization
- ITE — Institute of Technical Education
- KPI — Key Performance Indicator
- MOE — Ministry of Education
- OECD — Organization for Economic Co-operation and Development
- OnSET — Online Student Evaluation of Teaching Effectiveness
- PCEO — Principal & Chief Executive Officer
- PET — Pre-employment Training
- PIRLS — Progress in International Reading Literacy Study
- PISA — Programme for International Student Assessment
- Poly — Polytechnic
- PQAF — Polytechnic Quality Assurance Framework
- QS — Quacquarelli Symonds World University Rankings
- RQ_1; RQ_2; RQ_3 — Research Question 1; Research Question 2; Research Question 3
- SDL — Self-directed Learning
- SIP — Student Internship Programme
- SQC — Singapore Quality Class
- TIMMS — Third International Mathematics and Science Study
- UK — United Kingdom
- UNESCO — United Nations Educational, Scientific, Cultural Organization
- US — United States

DECLARATION

I, Loh Gin Hin, confirm that the Thesis is my own work. I am aware of the University's Guidance on the Use of Unfair Means (www.sheffield.ac.uk/ssid/unfair-means). This work has not been previously been presented for an award at this, or any other, university.

INTRODUCTION

This study seeks to illuminate the conceptions of quality in teaching, learning and assessment within a Singapore polytechnic. As recommended by Bloomberg and Volpe (2008), I begin by framing the study with an overview of the context and background. Next, I offer a statement of purpose and present the research questions. Following this, I discuss the research approach, my positionality and assumptions. I conclude by highlighting the significance of this research study.

1. Background and Context

Singapore has a dominant economistic understanding of education together with embedded market practices (Ho, 2003). Since Singapore's independence as a country in 1965, the island republic with little or no natural resources has a long-standing national narrative to develop its human capital into a competitive and productive workforce (Lee, 2019). Within this wider context, the narrative holds that education as national investment needs to yield economic returns (Schultz, 1960). There is accountability for the returns on educational investment in the form of audits and performance indicators, which allude to an underlying conception of quality (Harvey and Green, 1993) that runs deep within Singapore's education system.

In the Singapore education system, the polytechnics prepare post-secondary school leavers (typically with ten years of education) for the workforce with diploma qualifications, the vocational institutes prepare the workforce with technical certificates and the junior colleges prepare school leavers for university education (Ministry of Education, 2016). However, in the last ten years, more diploma graduates have not joined the workforce immediately upon graduation and have gone on to pursue university education (Loh, 2016). If quality is conceived as fulfilling organizational purpose (Harvey and Green, 1993), then the phenomenon of partial fulfilment of the Government's purpose for polytechnics to supply the future workforce for targeted industry casts doubt upon the quality of polytechnic education.

It is complex to define quality in polytechnic education. Besides the Government, there are other stakeholders, namely employers, parents, staff members and students; all of them having views on what quality in polytechnic education should be (Tam, 2001). That said, humanistic understandings of education would contend that the purpose of education is broader, developing fuller potentials of students for work and life in general (Barrett *et al.*, 2006; Dewey, 1916). Chung (2010) sums up quality as a multi-faceted conception. It will be interesting to illuminate key conceptions of quality in the polytechnic.

My research setting is a Singapore polytechnic that employs a performance management tool known as the Balanced Score Card [BSC] (Kaplan, 2009). The polytechnic uses performance or quality metrics of the BSC to monitor or drive what it considers as important for its education or operation. The BSC 2019 metrics contain seventeen key performance indicators (Appendix BSC). The beliefs, perspectives and values of the polytechnic, as seen from what it considers as important, will reinforce the conceptions of quality (Leong, 2014).

In addition to wider context, other environmental and organizational conditions (Hallinger and Heck, 2010) probably influence the conceptions of quality and related practices in the polytechnic. Dimmock and Tan (2013) attribute the success of Singapore schools in international educational benchmarking exercises to macro, organizational and family factors. From the lens of school improvement, Murphy (2013) elaborates on building materials for sustainable school improvement, which is relevant to quality education of the polytechnic.

2. Statement of Purpose and Research Questions

The purpose of this study is to uncover the conceptions of quality and contextual factors that influence quality practices in the polytechnic. To shed light on key areas of my study, my research questions are:

- What key conceptions and practices influence quality in teaching, learning and assessment within a polytechnic? (RQ1)
- How do contextual factors influence the selection of quality indicators in the Balanced Score Card 2019? (RQ2)
- How adequate is student preparation for lifelong learning and skills mastery? (RQ3)

Mid way through the study, I refocused RQ2 to explore key contextual factors surrounding the revamp of the Balanced Score Card (BSC) in 2019. I anticipate that the knowledge and insights generated from this inquiry will inform practices within the polytechnic.

3. Research Approach

I opted for a mixed methods research approach and employed both quantitative and qualitative research methods, namely survey (questionnaires, interviews), document analysis and thematic analysis to address the research questions. Questionnaires and interviews were the primary research methods of data collection. Three sets of questionnaires were deployed – one each for staff, students and alumni. I piloted and revised the survey instruments before their deployment. The methods generated complementary quantitative and qualitative data that addressed key areas of the research. Through thematic analysis of the datasets, I generated key themes and sub themes to explain key areas of my research questions.

Next, I employed purposive sampling method to identify and recruit research participants. I selected members of teaching staff, students and alumni from schools (A to E) in the polytechnic for questionnaire surveys and group interviews. In addition, senior management representatives from different schools and departments were selected for individual interviews.

Since RQ2 was refocused, only initial document analysis of the BSC records, over a 10-year period (AY2008/2009 to AY2017/2018), was carried out to understand the reasons for changes in performance indicators. These changes, particularly in 2019, pointed to a likely shift of contextual factors in the polytechnic.

4. Positionality

My pragmatic worldview has probably influenced the choice of a mixed methods research approach for this study. Since I do not believe in an either/ or approach, a thoughtful mix of qualitative and

quantitative research methods was chosen to generate data to address the research questions. Besides, for my research to be more persuasive to influence practices in the polytechnic, it is better to substantiate key research findings with quantitative data collected from the questionnaire surveys and qualitative data generated from interviews and thematic analysis.

During the research, I was a manager of a school within the polytechnic, and one of work duties included quality development. I am also a sponsored EdD candidate of my polytechnic. Besides my primary postgraduate training in biological sciences, I have also completed a Master in Education. Thus, I bring to the inquiry process practical experience as a working professional in quality practices, having both knowledge and understanding of the environmental context of the polytechnic. While I acknowledge that my insider experience is valuable to provide insight, the same experience may also create bias on the choices I made during the research process. As a sponsored candidate, I may also not report on sensitive topics. However, I seek to be transparent with my choices of research approach, research methods, sampling approach, data analysis and interpretation.

5. Assumptions

Based on my insider knowledge as manager in the polytechnic, I made the following primary assumptions related to key areas of this study: firstly, beliefs, perspectives and values of senior management representatives will illuminate key conceptions of quality of the polytechnic. The conceptions of quality will likely influence teaching, learning and assessment practices in the polytechnic. Secondly, views and experiences of members of teaching staff, students and alumni on quality practices in the polytechnic will likely find their ways to influence the conceptions of quality of the polytechnic through feedback channels. Thirdly, research participants will inform the research on key contextual or environmental factors that influenced conceptions of quality and practices in the polytechnic. Fourthly, the chosen sampling approach will identify and recruit 450 research participants (staff, students and alumni) from schools A to E for the questionnaire surveys and group interviews. Fifthly, there are six senior management representatives from various schools and departments who are willing and open to me as a researcher to participate in this insider research.

6. Rationale and Significance

The rationale for this study emanates from my desire to enhance quality education in the polytechnic: firstly, the increased understanding of contextual factors that reinforce certain conceptions of quality and practices will inform the polytechnic of its future approach in quality development of the polytechnic. Certain conceptions of quality may need tweaking to harness their fuller potentials to impact quality education in the polytechnic. Secondly, the study will lead to a better understanding as to how best to prepare students for lifelong learning in the polytechnic. The Singapore Government promoted both lifelong learning and skills mastery for continued employability of Singapore workforce. To prepare students for employability is the Government's mandate for all polytechnics in Singapore. Thirdly, this study will contribute towards filling the knowledge gap about the conceptions of quality in the polytechnic. Although there are conceptions of quality reported for higher education (overseas) and primary and secondary schools (Singapore), there is no known published research about the conceptions of quality related to teaching, learning and assessment in Singapore polytechnics.

7. Definitions of Key Terminology Used in This Study

- Quality refers to a multi-faceted conception of what is valued by an individual, organization, society and country.
- Conception of quality refers to what is perceived as quality and one's beliefs, perspectives and values influencing the perception.
- Teaching, learning and assessment practices refer the actual applications or use of methods for teaching, learning and assessment in the polytechnic.
- Contextual factors refer to environmental conditions, inside and outside of the polytechnic, that influence conceptions and practices.

CHAPTER 1: LITERATURE REVIEW

This chapter offers a review of the literature relating to conceptions of quality, performance indicators in education, contextual or environmental factors for school improvement and lifelong learning. The chapter helps to contextualise my research within a market model of education and a national narrative of continued employability in Singapore. The key aim of the chapter is to draw upon ideas and issues highlighted in certain segments of the literature related to key areas of my research. In each section, I will relate the ideas and issues to my research context, which is located in a Singapore polytechnic.

1. CONCEPTIONS OF QUALITY IN EDUCATION

1.1 Conceptions of Quality in Higher Education

The work of Harvey and Green (1993) is widely cited in quality related literature in higher education. They argue that quality in education can be defined from several different perspectives: quality seen as "exceptional", "perfection (or consistency)", "fitness for purpose", "value for money", or "transformative" (p.11). Different stakeholders of higher education may value one or more of the conceptions of quality (ibid, 1993), and quality is known to be stakeholders relevant (Tam, 2001). Chung (2010) reiterates the relevance of 'fitness for purpose' amongst post-secondary institutions in Hong Kong, and he reminds us that quality is a multi-faceted and contested conception.

One slice of this contestation is seen through Harvey's (2002) assertion that transformation ought to be the main conception of quality for universities in UK as they meet the increasing demand of university education for employability by political forces and society:

> ...in an era of mass higher education, value-added transformation ought to become the central element of any concept of quality rather than excellence, fitness for purpose or value for money (p. 20).

By transformation, Harvey (2002) sees quality as a process of change that adds value to students' progress in knowledge, skills and abilities. The transformation also empowers students to gain confidence to assess and develop knowledge from themselves (Harvey and Knight, 1996). In support of the conceptions of this transformation, the notion of education gains (Gibbs, 2010) premises on the increased performance on a particular measure (knowledge, skills and abilities) at the start and the end of student's studies in the institution.

To me, the conception of quality as transformation is about enriching students' learning experiences and their continued growth as learners. There is tremendous potential in using this conception to inform existing school's practices to prepare students for lifelong learning and skills mastery, which are aspects of the SkillsFuture. The SkillsFuture is a national level movement that encourages the society to support and embrace on-going learning for continued employment (Lee, 2013).

1.2 Quality Education in Singapore Schools

While there are quality-related publications primarily for primary and secondary education, the literature search seems to suggest a gap in the report of conceptions of quality education amongst polytechnics in Singapore. To learn from primary and secondary education sectors, I have selected

two of these publications on the 3-phase development of quality assurance in Singapore (Ng, 2008) and perceptions of school leaders on quality education (Ng, 2015). I suspect the development of quality assurance in the primary and secondary sectors will have a bearing on the quality assurance in the post-secondary sector where polytechnics reside. The perspective of school leaders may be a good way to acquaint myself with various conceptions of quality, and some of these conceptions may resonate with Senior Management in my polytechnic.

Ng (2008) provides a historical perspective on a 3-phase development of a quality assurance system in primary and secondary education sector as Singapore responds to global economic conditions and influences. From mid-1960s to mid-1980s, phase 1 emphasizes "standardisation" through prescribed performance standards and school appraisals (p.114). From mid-1980s to mid-1990s, phase 2 offers more autonomy to a few high achieving schools from central control while seeking to maintain "local accountability" of all schools through school ranking (p.115). From mid 1990s onwards, phase 3 extends more autonomy to all schools in terms of "diversity and innovation" of school curriculum from central control while maintaining strategic control through schools' self-appraisal of key academic and non-academic performance indicators outlined in the School Excellence Model (SEM), and external validation (p.116).

To the Ministry of Education (MOE), the SEM is Singapore's version of an excellent school where school leaders lead staff team to achieve targets of desired academic and non-academic results through clear strategies, effective resource deployment and well-defined student focused processes (Ng, 2003). While Ng (2003) affirms that the SEM is a step forward for the quality journey amongst schools, he cautions that schools should not implement the SEM in a manner that "distract[s] teachers from their fundamental business of teaching" (p.37). He adds that an over emphasis on weaknesses to improve the SEM scores can blind school leaders from building on identified strengths of their school for further innovation.

Some colleagues and I in the polytechnic serve as external validation members of the SEM teams to schools. The exposure to the SEM informs us of the criteria, self-assessment and external validation processes and the efforts taken by the MOE and schools in their quality journey. While there is no direct reference to the SEM criteria on quality management within the polytechnic, the exposure of the SEM in MOE schools will likely influence conception of quality and the development of quality indicators in the polytechnic.

Ng (2008) alludes to "government's effort (in phase 3) that is much more accurately described as a paradoxical form of centralised decentralisation" where effort to decentralise is seen from building of self-monitoring capacity of quality at local schools and effort to centralise as seen from strengthening schools' accountability to the government concurrently (p.122). Watkins (1993) used the term "centralised decentralisation" to describe the whole picture of reform in higher education institutions which neither centralization nor decentralization can adequately explain.

It seems to me that a similar centralised decentralisation approach has been extended to the polytechnic sector by the MOE, and a quality journey has yet to be shared. While the Government has given the polytechnic sector more autonomy from central control than primary and secondary schools in areas such as curriculum decisions, student admissions, staff recruitment, it exerts control

through other channels such as quality assurance system for polytechnics known as Polytechnic Quality Assurance Framework (PQAF)[1] and government funding.

Next, I concur with Ng (2015) that what practitioners such as Heads of Departments (HODs) understand as 'quality education' will influence implementation on the ground. In Singapore, the HODs are middle leaders who assist principals or head teachers of schools. Ng (2015) surmises various conceptions of 'quality education' of HODs in primary and secondary education to include:

> emphasises holistic development, equips students with the knowledge and skills for the future, inculcates students with good values, imbues students with a positive learning attitude… is delivered by good teachers, enabled by good teaching and learning processes [and] facilitated by a conducive learning environment (p.311-312).

Likewise, I will like to illuminate the conceptions of quality related to teaching, learning and assessment amongst senior management representatives in my polytechnic (a post-secondary institution), and to my knowledge, there is no published research in this regard.

1.3 Research Implications

In my research, I propose to illuminate key conceptions of quality amongst senior management, who will select and formulate quality indicators for the polytechnics. As an insider, I hear terms, namely 'fitness for purpose', 'value for money' and 'consistency' during conversations and meetings in the polytechnic. I will explore meanings of these terms in my research, which aims to uncover key conceptions of quality in the polytechnic.

Leong (2014) suggests that researching into teachers' conceptions should include understanding of their beliefs, perspectives and values. Leong's (2014) research supports his assertion that conceptions of teachers about assessment and their assessment practices in the classroom reinforced each other. In Singapore schools, teachers' assessment practices in their classroom are influenced by multiple factors, which include political forces in the school, social norms, conceptual understanding of key assessment practices, research findings and what is pragmatic for them to implement in the classroom (ibid, 2014).

Given that one's beliefs, perspectives and values influence one's conception (Leong, 2014) and that quality is stakeholders relative (Tam, 2001), it follows that different conceptions of quality in teaching, learning and assessment are likely to exist among key stakeholders of a Singapore polytechnic. It will be interesting to understand the extent of influence of these key stakeholders such as the Government; employers to the conceptions of quality in the polytechnic. I seek to understand from senior management representatives their beliefs, perspectives and values about quality in teaching, learning and assessment. I will also like to uncover what staff, students and alumni research participants consider as key quality practices in my polytechnic.

[1] The Ministry of Education has instituted the PQAF since 2004. The MOE withheld the PQAF details for external circulation.

I have adapted Leong's (2014) conceptual framework to guide my research question 1 (RQ1) as illustrated below. In the figure below, I use two opposite directional arrows to suggest that conceptions of quality and practices are likely to influence each other within a Singapore polytechnic.

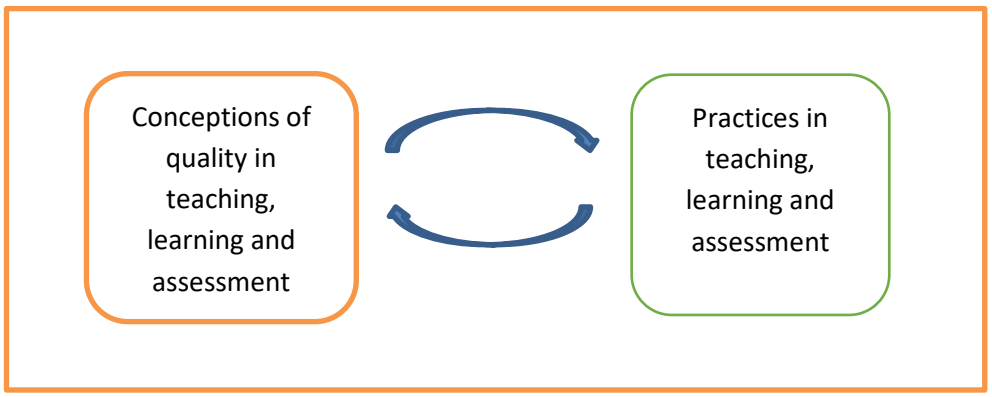


Figure 1 What key conceptions and practices influence quality in teaching, learning and assessment within a polytechnic? (RQ1)

2. CONTEXTUAL FACTORS

In this section, I will discuss contextual or environmental factors that can advance or hinder 'quality education' of the polytechnic.

2.1 Political, Social and Economic Forces

Murphy (2013) asserts that contexts such as political, social and economic forces influence the meaning and extent of school improvement. Changes in these forces lead to changes in the external environment of the schools, requiring a reorientation of what school improvement means during that period (Tushman and Romanelli, 1985). Dimmock and Tan (2013) refer to these forces as macro level factors that influence Singapore schools. In support, Leong (2014) argues that contextual factors such as the expectations of society and political forces can influence practice on the ground to reinforce a particular conception.

Murphy (2013) describes key features of a new economy, which include:

> ... the globalization of economic activity, the demise of the mass-production economy, a privileging of information technology, an increase in the skills required to be successful, and an emphasis on the service dimensions of the marketplace (p.254).

The features of the new economy (ibid, 2013) are also relevant to Singapore's economy, as seen from the Government's SkillsFuture movement and related skills frameworks to guide Singapore workforce to upskill and reskill themselves for continued employment via lifelong learning (SkillsFuture, 2020). Since 1997, the Ministry of Education, Singapore (MOE) has progressively upgraded the IT infrastructure and IT education for MOE schools through successive cycles of IT masterplans (Ministry of Education, 2020). Likewise, the polytechnic has progressively emphasized its BYOD (bring your own device) programme where staff and students can access electronic services and teaching materials online through their own electronic devices for work and classes, as part of the Public Service 21 vision of service excellence.

Next, Murphy (2013) alludes to a shift of socio-political ideology towards social market theory with features such as "reduced role for government, greater consumer control, and a belief in efficiency and individuality over equity and community" (Bauman 1996, p.627). Unlike Murphy's and Bauman's contexts, the Singapore Government continues to exert strong governance influence over the nation and MOE schools (Dimmock and Tan, 2013) through an excellent civil service and a predominantly one-party political system (Ho, 2003). The Singapore Government's strong influence in the polytechnic sector is also evident from the Government's mandate for the polytechnics to prepare skilled workers (with diploma qualifications) for the industry (Ministry of Education, 2016). Besides, Singapore is a closely-knit society (Ho, 2003) with strong Confucian values (Dimmock and Tan, 2013); its emphasis in the collective good is still strong although there is rising individualism in the society.

2.2 Organizational Level and Family Level Factors

In addition to macro level factors, Dimmock and Tan (2013) assert that there are organizational level (school and classrooms) and family level factors that influence educational achievements of Singapore schools in international benchmarking exercises. The organizational level factors that influence student learning are highly dependent on quality of school leaders (ibid, 2013). In addition, there are family level factors as seen from strong family or parental supports in Singapore for their children to do well in schools in general (ibid, 2013).

Likewise, the organizational level and family level factors (Dimmock and Tan, 2013) are featured in Murphy's (2013, p.258-259) school improvement model as key building materials of school improvement. The first six key building materials are organization level contextual factors while the sixth and seventh key building materials include family level factors:

(1) "Quality instruction" through effective teaching staff and pedagogy;

(2) "Curriculum" that has academic rigour and relevance to learners and society;

(3) "Personalized learning environment for students" that provides students with many opportunities to participate and connect with peers and teachers;

(4) "Professional learning environment for educators" that supports a work culture for staff teams to collaborate and lead;

(5) "Learning-centered leadership" that nurtures and supports school's culture for scholarship in academic works;

(6) "Monitoring of progress and performance accountability" through setting specific performance goals, gathering of performance-related data systematically, and sharing of accountability amongst school community; and

(7) "Learning-centered linkages to the school community", which include parents of students, civic or government agencies and organizations.

Aside from having the best building materials, Murphy (2013) cautions that many school improvement efforts have not been successful because they violated three key principles during their journeys. The first principle, "structure does not predict performance" alludes to underlying factors that make an external structure such as block teaching work elsewhere and not just transferring an

external structure to the school (p.259). The second principle, "context always matters" (p.260) reminds schools to adjust school improvement efforts to fit their school contexts such as student profile, school community, school experience and the level of schooling. The third principle, "cohesion and alignment are essential" focuses on schools having support of their staff teams during the journey of school improvement (p.260). I am also interested in Murphy's (2013) building materials and second principle of school improvement because some of these may be key contextual factors that influence quality education in the polytechnic.

2.3 Research Implications

Environmental or contextual factors will influence the conceptions of quality and practices in the polytechnic (RQ1). The contextual factors in the adapted Leong's (2014) conceptual framework to guide my research will include macro level factors (Dimmock and Tan, 2013) such as political, social and economic forces (Leong, 2014; Murphy, 2013). It also includes the organizational and family level factors (Dimmock and Tan, 2013) or the building materials of school improvement (Murphy, 2013).

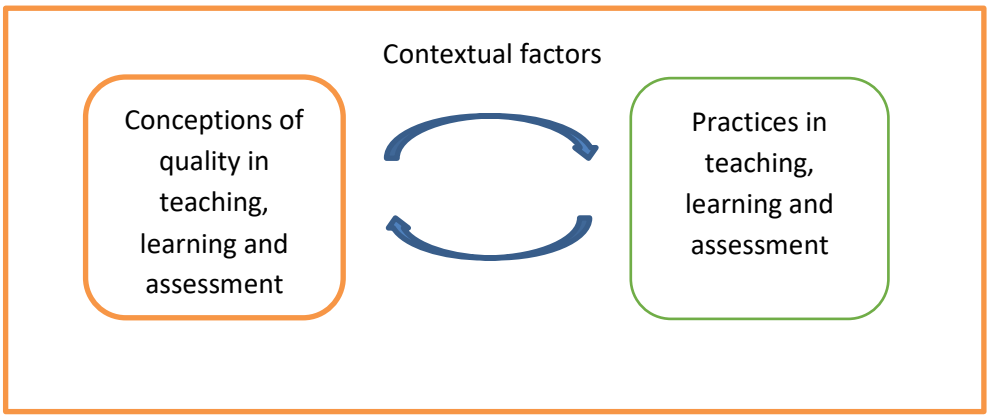


Figure 2 What contextual factors influence conceptions of quality and practices quality in teaching, learning and assessment within a polytechnic? (RQ2)

3. PERFORMANCE INDICATORS AND SCORECARDS

In this section, I will focus on types of quality indicators and the use of Balanced Score Card as a performance management tool in the polytechnic.

3.1 Types of Quality Indicators

Within the conception of quality as value for money (Harvey and Green, 1993), universities commonly employ performance indicators to track measurable performances in key areas for efficiency and effectiveness. However, I will like to underscore that there is on-going debate surrounding the use of performance indicators in education due to differences in perspectives of purposes of education. Academics like Ball (2009), Blackmore (2010) and others who express concerns about the institutionalisation of market-led models of practice, control and regulation in the redesigned public service provision. To these authors, the new management order in higher education is primarily an ideologically motivated approach to manage public services and universities. The other source of contestation arises from opposing perspectives of education – humanistic and economistic perspectives, which I will discuss later. A third source is from the qualitative/ quantitative

debate. It is definitely possible to refine quantitative indicators with qualitative aspects (Barrett, 2011), which is an interesting point for me to explore further because the polytechnic uses primarily quantitative indicators for performance management.

There are different ways to categorize quality indicators in literature. For example, Fitzpatrick *et al.* (2004) classify quality indicators four categories, namely input, process, output, and outcome indicators. The input indicators focus on the resources required to implement an education program, which include facilities, equipment, materials and personnel. The process indicators track key activities in the program such as teaching, learning and assessment activities. The output indicators emphasize on direct effects of program activities, and the outcome indicators allude to immediate or long-term goals of the program. The Human Development Network (2011) alludes to the World Bank using outcome indicators to monitor progress of joint efforts between partner countries and impact indicators to monitor the ultimate goals of the education strategy. Martin and Sauvageot (2011) point to UNESCO using different indicators to differentiate the outcome (results) of a programme from the impact of the programme:

> [Result indicator] is an immediate measure of education, and [impact indicator] a measure of the consequences of education for the situation of an individual, a group, or the society to which they belong. (p.30)

Next, economists like Mankiw (2007) categorize indicators of performance into coincident, lagging, and leading indicators. Leading indicators are fairly reliable measures that predict the future health of the economy, for example prices of common stock and business inventories (ibid, 2007). Investopedia (2020) elaborates that coincident indicators move in step with overall economic activity or stock market, for example high personal income rates will coincide with a strong economy. While lagging indicators trail behind overall economic activity, it is important because the indicator confirms that pattern is occurring or about to occur, for example rising unemployment rate indicates that the economy has been doing poorly (ibid, 2020).

Although performance indicators are well established in the business, management and finance fields, the concept and use of performance indicators are relatively new and contested in the field of education. Supovitz *et al.* (2012) argue that using leading indicators in policy decision has led to educational improvement amongst four school districts in US. To the authors, these leading indicators are conceptually distinct from correlates, predictors and risk factors because they "always represent an actionable concept, whereas predicators and risk factors may convey immutable qualities of individuals or groups" (p.6). For example, Supovitz *et al.* (2012) assert that data shows that over-aged students with lower than expected course credits tend to have higher risk of dropping out of high school. By paying attention to leading indicators of student dropout rates such as student age and course credits, the school districts have been able to identify and provide additional support to these students systematically, and their efforts have led to the reduction of student dropout rates in these school districts.

While my interest is in performance indicators of teaching, learning and assessment, it suffices to mention that there are other key performance indicators in finance and research where school or university accountability of government funding is required. For example, New Zealand's Ministry of

Education (2014b) reports that about 94% of their schools had met required key financial performance indicators – schools having enough current assets to cover their short-term debts and close to half operated in surplus in each of the last three years. Examples of these key financial indicators are operating surplus (i.e. schools having more total revenue than total expenditure), working capital (i.e. school's ability to meet short-term financial obligations) and public equity (i.e. schools having more total assets than total liabilities).

The choice of indicators seems to suggest conception of quality as "value for money" (Harvey and Green, 1993, p.11) is probably important in the polytechnic, but there are probably other operating conceptions of quality and contextual factors. Until recently, the polytechnic employs mainly lagging indicators for the Balanced Score Card (BSC), for example, percentage of pre-employment training or "PET student satisfaction rating" and percentage of continuous education training or "CET course satisfaction rating" obtained from post-implementation surveys (Appendix BSC, p.8).

Since year 2019, the polytechnic has started to use more leading indicators in its BSC. For example, the percentage of "PET overall graduate employment rate" is listed as a leading indicator in the BSC (Appendix BSC, p.6), communicating the polytechnic's intent to use this indicator to drive and improve the graduate employment rate. To the polytechnic, improving and meeting this leading indicator means that it is fulfilling its mission to produce workforce for the industry. In addition, it is also a key outcome indicator (Fitzpatrick *et al.,* 2004) for the polytechnic.

3.2 The Balanced Score Card

The Balanced Score Card (BSC) is the key performance management tool in the polytechnic. In attempt to anchor the BSC to its shared values, the BSC (2019) states that the polytechnic's shared values are:

> Responsibility for the continued growth and success of [the polytechnic]; respect for the dignity of the individual; integrity of the highest order; student-centeredness; future-orientation (Appendix BSC, p.2)

The term "shared values" originates from business management gurus Porter and Kramer, who first coined this term in 2006 in an attempt to reconcile the interests of companies and society (Porter and Kramer, 2011, p.7). Shared values of companies serve to concurrently enhance companies' competitiveness and advance the economic and social conditions of the communities in which the companies operate (ibid, 2011). In practice, Dembek *et al.* (2016) remind us that one needs to understand the outcomes of shared values in terms of what, how and whose needs are met. To me, it makes sense for the polytechnic to align its shared values to its BSC to build trust with the communities it serves. It will be interesting to explore the extent to which the polytechnic has met and reconciled its interests and that of the communities in practice.

The BSC has been the long-standing performance management tool in the polytechnic. Kaplan and Norton conceptualize the BSC in 1992 as a business management tool to integrate both financial and non-financial metrics (Kaplan, 2009). In addition to financial perspective, the BSC measures intangible assets from three perspectives: enhanced "customer satisfaction", improved "internal business process" and increased ability to improve through "learning and growth" of staff (Kaplan,

2009, p.4). Aside from financial metrics, there are non-financial metrics to help top executives, line managers, and employees to relate their work and contribution to the overall business strategy and performance. The intent of the Balance Score Card is to encourage managers to achieve a proper balance between short and long-range objectives.

Kaplan and Norton allude to the importance for a company to describe its strategic objectives for the four BSC perspectives, and relate them in a strategic map to "create economic, environmental and social value, and to balance and manage the tensions among them" (Kaplan, 2009, p.17). However, Jensen (2001) argues that senior business executives will only pay attention to financial performance metrics for short-term gains. This is understandable if work performance is based on primarily on financial metrics. Kaplan and Norton recognize that the learning and growth perspective is probably the weakest in a Balanced Scorecard because this perspective will probably use non-financial metrics for performance management (Kaplan, 2009). In support, my insider experience in the polytechnic tells me that staff training also tends to take a backseat because urgent matters tend to grip much of management's attention.

I concur with Kaplan and Norton that the BSC should include both financial and non-financial indicators in the outcome metrics to signal to employees that the company adopts both short-term and long-term strategies to yield its expected results (Kaplan, 2009). Focusing solely on incentives alone will not be sustainable for long-term capacity building of company unless there is clear communication, and alignment of company strategy, control system and task management (ibid, 2009). Likewise, the polytechnic and its schools need to adopt longer-term strategy to pursue and monitor the progress of their strategic objectives, namely enhancing staff relevance; enhancing polytechnic transformation; and enhancing student employability (Appendix BSC).

The polytechnic may need to monitor the pressure on its staff to achieve the short-term targets set in the BSC's metrics such as ramping up CET or continuous education training activities (Appendix BSC). Otherwise, it may be difficult for management staff to balance and manage different short-term and longer-term priorities in BSC. Meeting the number of CET offerings does not necessarily mean that the polytechnic offers quality education to adult learners. In my thesis, I hope to uncover more about stakeholders' priorities of the polytechnic and how the polytechnic (re)balances these priorities as seen through the BSC. Literature has reminded us that conceptions of quality tend to be stakeholder-relative (Tam, 2001; Harvey and Green 1993).

Next, the BSC can help non-profit organizations (including the polytechnic) to select a coherent use of non-financial measures to assess their performance in relation to their "social impact and mission" (Kaplan, 2009; p.23). The Singapore Government's mission for the polytechnic is to train school-leavers and working adults for the industry (Ministry of Education, 2016). The polytechnic's strategic map consists of three BSC perspectives: customer perspective; business process perspective; and learning and growth perspective (Appendix BSC).

To end, it is also good to consider scorecards used by other organizations for my wider understanding. For example, Martin and Sauvageot (2011) report that the UNESCO distinguishes different ways of representing scorecards according to their purposes. Firstly, a common way to represent scorecard emphasizes "analysis of operations" (p.30) by classifying indicators in terms of

resources (funding, staff), activities, and results as well as supplementary descriptions of the social and cultural environment, as seen from the scorecards of State of Higher Education and Research (France) and Education at a Glance (OECD). Secondly, the scorecard that highlights the multi-faceted nature of an organization by categorising indicators by theme such as institutions, students, professors and costs, is used in The State of Higher Education and Research in France for a cross-sectional analysis of indicators. Thirdly, the scorecard alludes to the measurement of efficacy or efficiency of major outcomes of a programme and group indicators according to outcomes such as student knowledge, preparation for work, preparation for citizenship. Fourthly, the scorecard can relate each education policy objective with respective monitoring indicators.

I believe the choice of BSC as the performance management tool of the polytechnic suggests that the polytechnic hopes to balance all its valued priorities, both shorter-term and longer-term ones. At the same time, the polytechnic is probably cognizant of underlying tension experienced by school managements to balance all these priorities. From my insider's knowledge, there is a work culture for schools to meet or exceed targets set in the BSC metrics. It concurs with Harvey and Knight (1996) that meeting performance indicators is important to schools (and probably to the polytechnic as well) to account to the Government and other funding agencies of their efficiency and effectiveness.

3.3 Research Implications

In my research, I propose to uncover how contextual factors influence the selection of quality indicators in the Balanced Score Card (BSC) 2019 (Appendix BSC). The polytechnic revamped its BSC metrics in year 2019. The illustration will be a useful guide to this part of my research.

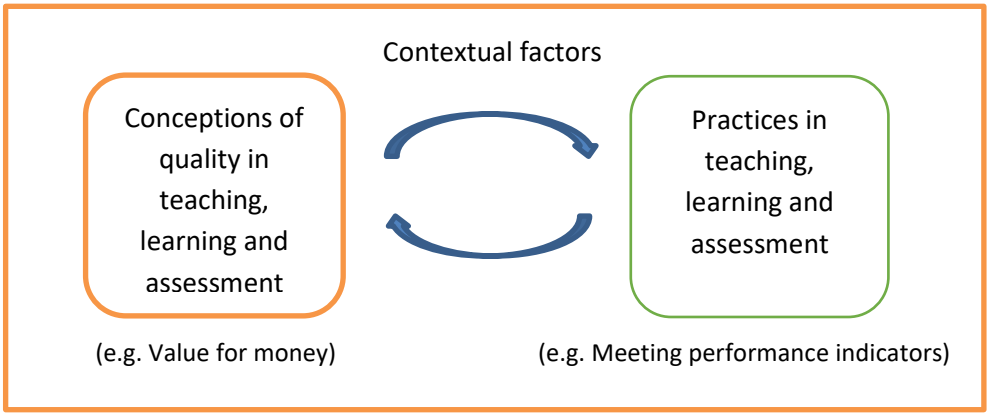


Figure 3 How do contextual factors influence the selection of quality indicators in the Balanced Score Card 2019? (RQ2)

I am not exploring the BSC as a contextual factor in the polytechnic because the use of performance indicators is consistent with the conception of quality as "value for money" (Harvey and Green, 1993, p. 11). Within the polytechnic, practices are considered of quality when they meet or exceed performance indicators. Instead, I hope to uncover what aspects are valued by the polytechnic as key outcomes through the BSC metrics, and hence clarify the underlying conceptions of quality.

4. LIFELONG LEARNING

In this section, I will mainly focus on key insights and issues related to lifelong learning. Preparing students for lifelong learning has gained much emphasis since the launch of the SkillsFuture movement in Singapore since year 2014. The SkillsFuture movement is a long-term national policy that incentivizes lifelong learning and skills mastery among Singapore workforce (Ministry of Education, 2014a; Lee, 2013). It seems likely that the SkillsFuture is one of the macro level factors (Dimmock and Tan, 2013) that promotes lifelong learning practices in the polytechnic.

4.1 Key Insights and Issues of Lifelong Learning

Lifelong learning holds slightly different meanings to different international organizations like UNESCO, OECD, EU Commission and World Bank and countries (Schuetze, 2006), and I will not be too concerned about having a definition of lifelong learning here. That said, there are two key features of lifelong learning, a term popularized by UNESCO in 1970s: firstly, learning continues beyond one's youth and secondly, learning can take place beyond educational institutions – at home, workplaces and community (Schuetze, 2006). While there are criticisms to lifelong learning because it is seen as part of control regime by the Government (Olssen, 2006), this thread of discourse on lifelong learning is not the focus of my thesis, but the nature and adequacy of student preparation for lifelong learning.

I believe that education should serve both economic and humanistic purposes. As such, I am drawn to Aspin and Chapman's (2000) perspective that frames lifelong learning as addressing economic needs of the country to stay competitive; society needs for richer provision of learning activities; and personal needs for rewards and satisfaction. Aside from equipping the workforce to meet the economic needs of the country, I agree with Aspin and Chapman (2000) that there is potential for lifelong learning as a means to increase opportunities for self-development and personal improvement of all citizens, which is a feature of an inclusive society.

Like many OECD countries, the Singapore Government sees lifelong learning and skills mastery as means to enhance the employability of its workforce (Lee, 2013), and the SkillsFuture is the vehicle to bring about this transformation within the nation (SkillsFuture, 2015a). This view is consistent with Power and Maclean's (2011) report that there is direct correlation of lifelong learning to employability and income of workers.

However, Aspin and Chapman (2000) caution that it will be challenging for the Government to promote lifelong learning to its populace: one, making adequate provision for formal and informal learning opportunities for all its citizens; and two, reorienting its society and individuals to value the opportunities to access learning throughout life. In addition, OECD recognizes that is financial costly for the Government to operationalize lifelong learning for all in different phases of life, as such some countries focus more on segment of its population during the working phase of their lives (Schuetze, 2006). Likewise, I suspect that polytechnic will find it challenging to prepare its students for lifelong learning since lifelong learning is fairly new to Singapore as a whole.

What does preparation of lifelong learning entail? I concur with Schuetze (2006) that four particular OECD policy features are important to operationalize lifelong learning:

> (1) the centrality of the learner and learner needs, (2) the emphasis on self-directed learning of which motivation to learn and learning to learn were seen as essential foundations, (3) the recognition that learning takes place in many settings, not just formal educational ones, and (4) a long term view that takes the whole life course. (p.301)

Schuetze (2006) informs where and what the polytechnic needs to focus more to prepare students as lifelong learners. Billet (2010) clarifies that lifelong learning is a "social-personal process" (p.401), which is not addressed by having access to a richer provision of courses. Billet underscores the place of social dimension of learning where learners are supported family members, friends, colleagues and teachers, and the personal dimension of learning where there is personal effort, self-monitoring and can be "individually transformative" on the part of the learners (p.402).

I find that the notion of individual transformation is likely to inform the student preparation for lifelong learning in the polytechnic. Christie *et al.* (2015) assert that individual transformation is more likely to take place when individuals value and believe that a particular change is necessary. The researchers apply Mezirow's theory in the conduct of case studies about female adult learners who have to challenge their beliefs and gender roles as they go back to schools. According to Mezirow (1997), for individual transformation to happen, there is a need to challenge students' assumptions, provide opportunities for discourse with others and subsequent actions.

4.2 Research Implications

In my research, I propose to clarify the adequacy of student preparation for lifelong learning (including skills mastery) in the polytechnic (RQ3). Besides clarifying related quality practices for lifelong learning, I will like to uncover conceptions of quality and contextual factors that influence these quality practices.

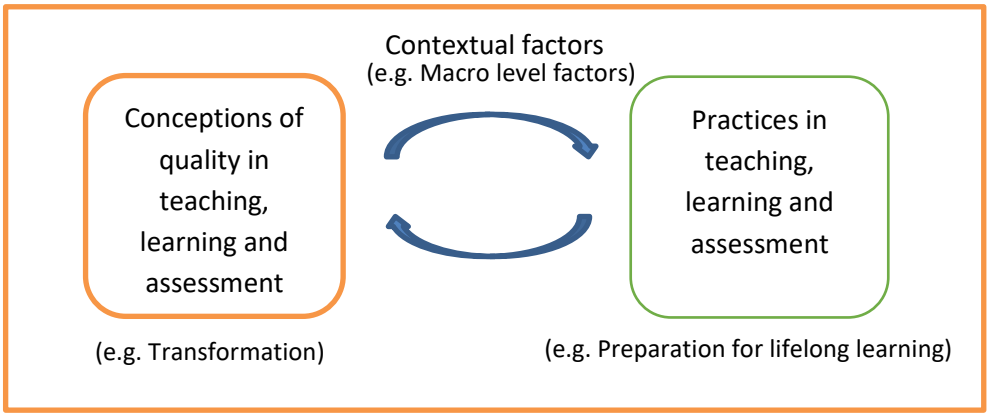


Figure 4 How adequate is student preparation for lifelong learning? (RQ3)

To take a step back, I will like to consider other wider contexts to frame my research within market practices in education and perspectives of education in the next two sections. These contexts are macro level factors (Dimock and Tan, 2013) or the political, social and economic forces (Murphy, 2013) that are more global in nature.

5. MARKET PRACTICES IN EDUCATION

From where does Singapore learn about the use of performance indicators such as those represented in the SEM and PQAF for self-monitoring and external accountability of quality in education? These ideas are initially associated with Thatcher (UK) and Reagan (US) governments but have since dominated the economic, political and cultural worlds through globalisation (Weiner, 2004). Mortimore (2014) surmises that UK has adopted a "market model of schooling" since 1988 (p.155). He elaborates that the UK government has implemented a series of education policies to systematically remodel the UK's education system into a market economy that is based on the ideas of "individualism, competition, choice, privatisation, decentralisation, deregulation and the use of the market in all public services" (ibid, p.155).

5.1 Performativity

The new governance in education is in forms such as contracting, financial disciplines, cost cutting, audits and performance management (Ball, 2009). This governance approach has led to performativity in universities and schools in UK. Ball (2003) defines performativity as:

> A technology, a culture and a mode of regulation that employs judgements, comparisons and displays as means of incentive, control, attrition and change – based on rewards and sanctions (both material and symbolic) (p.216)

Within this performative culture, it is a common practice for managers and peers in universities to compare and differentiate to increase outputs (Ball, 2003). It makes teachers insecure of themselves and their contributions (ibid, 2003). Staff members also fear that others misconstrue them for not performing in their job roles (Ball and Olmedo, 2013).

While performativity has increased staff and institutional output, there are negative connotations associated with performative culture in universities and schools. One of the negative connotations is 'fabrications', which are defined as:

> … versions of an organization (or person) which does not exist – they are not 'outside the truth' but neither do they render simply true or direct accounts – they are produced purposefully in order 'to be accountable' (Ball, 2003, p.224)

Due to pressure to perform well in an OfSTED inspection, Perryman (2009) elaborates forms of fabrication in schools such as staging coherent documents and sending problematic students away for external learning trips during part of its preparation for an upcoming visit by the inspectors. The other negative connotation of performativity is that universities and schools keep "raising the bar of performance expectations" to increase staff productivity (Kenny, 2017, p.911). Kenny (ibid) warns us of undesirable consequences of increased job stress on academic staff, which will reduce job satisfaction and staff welfare. This is not a sustainable practice unless staff members are motivated to do so (Ball and Olmedo, 2013).

To end, there is performativity on global scale. Soudien (2011) alludes to international benchmarking exercises such as the Progress in International Reading Literacy Study (PIRLS), the Programme for International Student Assessment (PISA), the Third International Mathematics and Science Study (TIMMS) that hold countries accountable for their commitment made to operationalize

the Education for All (EFA) Movement. The whole works of constant comparisons and judgements of performances (Ball, 2003) through these international benchmarking exercises will have a profound influence on performativity in Singapore education system as a whole. Singapore schools (primary, secondary) are known for their educational successes in the TIMMS and PISA (Dimmock and Tan, 2013). Singapore universities also ranked highly in the Quacquarelli Symonds (QS) World University Rankings by Subject (Davie, 2019). My insider knowledge tells me that the polytechnic benchmarks itself against other polytechnics in Singapore in terms of key indicators such as graduate employment rates, first choice applicants, last aggregate score (based of GCE 'O' results) of admitted applicants at the Joint Admissions Exercise.

5.2 Privatization of Education

Next, writers such as Weiner (2004) in US and Ball (2009) in UK cite examples of the privatization as seen from private-public collaborations in respective countries and globally where education businesses offer services to schools in areas such as management coaching, school improvement, school inspections, programme delivery and education research. Weiner (2004) writes about the "privately administered" national initiative such as the whole-school reforms in New Jersey (p.16) where private businesses such as BNN Corporation develop a whole-school reform model, *Co-nect* for a middle school and offers capacity building programmes to schools. Ball (2009) writes about how Cambridge Education offers "School Review" training to counterparts in US, China and elsewhere in Asia based on inspection model for UK schools (p.94).

The nature of private-public collaboration in Singapore differs from the US and UK experiences, as described above. As discussed earlier, the Singapore Government adopts a centralised decentralisation approach (Ng, 2008) to prepare schools for the implementation of national education policies. In Singapore, private businesses or private sector do not established school reviews and reforms for schools. The Ministry of Education, Singapore (MOE) develops and manages these models, mechanisms and personnel training to implement school reviews or reforms centrally. Schools can customise these reforms to suit their contexts within the overall MOE's framework. The MOE gives more autonomy to the polytechnic sector than the school sector in preparing for school reforms but has since required more accountability from polytechnics through the Polytechnic Quality Assurance Framework.

5.3 On-going Contestation

The market practices in education is contested in UK, US and elsewhere in the world. I find the summary of Rosa *et al*. (2007) about the on-going tension about market practices in education in academia succinct and helpful to frame my research:

> In the contemporary era, the university thus sits oddly amid two narratives; [first] that prizes academic freedom, independence of thought and expression, heterodoxy and exploration to create new knowledge frontiers, [second], an increasingly intrusive series of regulatory regimes that seek to manage, steer and control the sector in ways that serve the interests of the state and the economy by applying specific ideational motifs about efficiency, value, performance, and thus the economic worth of the university to the economy (p. 1).

The second narrative articulated by Rosa *et al.* (2007) is probably more common in my research context, a polytechnic in Singapore. The MOE's mandate has always been for polytechnics to educate a future workforce to meet the industry needs since the creation of the first polytechnic in Singapore in 1954 (Ministry of Education, 2016). Related to the second narrative is also seen from the MOE requiring all polytechnics in Singapore to be audited using the Polytechnic Quality Assurance Framework (PQAF) to improve the polytechnic's alignment to their missions since 2004.

It is interesting to note that there is no overt discourse amongst polytechnic staff about the PQAF limiting their academic freedom, which is the narrative one proposed by Rosa *et al.* (2007). Staff members in the polytechnic seem to accept check and balance as part of the work culture. That said, it is also known that staff members tend to internalize or suppress their thoughts to align with corporate objectives in corporate/ neoliberal/ marketized schools and universities because of the pressure, fear and insecurity associated with performativity (Perryman, 2009; Ball, 2003). To add, Kalfa and Taksa (2017) explain that some academic staff members do not resist managerial pressures and align to corporate objectives because they believe that their responses will help them to progress in their careers; yet others simply comply with the corporate objectives to remain employed in their universities.

In marketized universities in many countries, staff productivity is encouraged, rewarded and recognized through performance-related pay (Ball, 2015). Mortimore (2014) asserts that the underlying belief here is that only financial rewards can motivate staff performance, and this practice promotes an unhealthy view that people (and teachers as being implied) are "mercenary" (p.155). Likewise, the polytechnic sector in Singapore has institutionalized market practices in terms of contractual work arrangements, using a range of performance indicators for self-monitoring and accountability to the government ever since I joined the polytechnic sector twenty-five years ago.

To me, it is interesting to reflect upon the extent of money-orientation has influenced my own conceptions of quality and practice in a marketized polytechnic. For now, it seems foreign to me because my school has always dissuaded potential staff candidates from joining us as teaching staff if they are motivated by money or compensation package primarily. I agree with Mortimore (2014) that other forms of non-financial rewards need to be explored.

Weiner (2004) cautions that marketized universities tend to emphasize "economic efficiency" (p.21) over personal/ individual needs of staff. The emphasis in individualism or "individual accountability" is hostile to collective "social responsibility" (ibid, p.18). In support, Lynch (2014) elaborates an undesirable consequence of economic efficiency in marketized universities and schools where they emphasize instrumental values such as "efficiency and effectiveness" over "moral and social values related to care, autonomy, tolerance, respect, trust and equality" to the detriment of relationships amongst school leaders, teachers and students (p.5). This may be a timely reminder for the polytechnic because of its emphasis in increasing staff productivity in the last five years. The productivity call will likely have a profound influence on performative culture in the polytechnic, which mediates a basket of contextual factors that influence conceptions of quality and quality practices within the polytechnic.

6. PERSPECTIVES OF EDUCATION

Another possible source that fuels the contestation of market model of education arises from the on-going debates on different perspectives of education. I have chosen to highlight contrasting perspectives of education of two supranational organizations, namely World Bank and UNESCO because Singapore's education system has benefitted from the Education for All (EFA) movement. The EFA movement was launched by these supranational organizations, namely UNESCO, United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA) and the World Bank met in Jomtien in year 1990 and renewed in Dakar in year 2000 (Soudian, 2011).

The EFA movement has garnered commitment from international community to make provision of primary education for all children, reduce illiteracy and develop numeracy and life skills in their respective countries (Soudian, 2011). The World Bank's Human Capital Project seeks to engage participating countries to invest in people for greater equity and economic growth (World Bank, 2018). Today, there is compulsory primary school education for all children and high literacy amongst adults in Singapore. The World Bank (2018) reports that Singapore tops the list of countries for its human capital index in terms of "the productivity of the next generation of workers relative to the benchmark of complete education and full health" (p.32).

6.1 Economistic Perspective of Education

Human Capital Theory: Education as Investment

I have chosen to highlight human capital theory because it has been emphasized in the Singapore Government's long-standing narrative that Singapore, being a small island republic with no natural resources like its surrounding countries, needs to invest in the education and training of its people. In a recent iteration of this narrative, the country continues to invest in its people, as evident from the Prime Minister's Speech during the National Day Rally (Lee, 2019):

> Our education system gives young Singaporeans a headstart when they enter the job market. But our support does not end there. As people progress in their careers, SkillsFuture will help to keep their knowledge and skills up to date. We need to do this, because jobs and skills are turning over faster than ever.

The human capital theory (HCT) underpins the view of education as investment (Schultz, 1960), which is congruent with Singapore's dominant economic perspective of education (Ho, 2003). Since 1960s, the HCT has gained political prominence and explanatory power for Governments to prepare their countries to meet the needs of the global knowledge economy, which requires more workers with advanced knowledgeable or intellectual abilities (Gillies, 2015).

I will focus on two key aspects of the HCT that are more relevant to the polytechnic. One aspect of the HCT sees "education as an investment" that yields returns in the forms of remuneration for individuals, employment for workforce and economic growth for countries (Gillies, 2011, p.226). The HCT traced back to Schultz's (1960) earlier research where he showed that workers with college education yielded higher financial returns or remuneration than those without college education. Schultz's early research remains relevant to Singapore because starting (average) monthly salary of a

university graduate is $1,000 higher than a polytechnic graduate (Ministry of Manpower, 2018; Davie, 2013). Thus, I can understand why many families and individuals in Singapore society see educational undertaking like higher education as a form of investment, which will yield return later in the form of higher remuneration.

The second aspect of the HCT sees education and training as the most important ways to enhance the quality of the workforce, justifying the higher remuneration. In addition to knowledge and skills, Becker (2002) asserts that besides the education system, families play crucial roles in fostering attitudes of the quality of future workforce such as "reliability, honesty, self-reliance, and individual responsibility" (p. 6). His assertion is consistent with the view of Dimmock and Tan (2013) that family level factor contributes to educational commitment in Singapore.

Measuring and Justifying Educational 'Investment'

The World Bank (2018) clarifies that:

> Human capital consists of the knowledge, skills, and health that people accumulate over their lives, enabling them to realize their potential as productive members of society. It has large payoffs for individuals, societies, and countries. (p.14)

To monitor gaps in human capital development, Barrett *et al.* (2006) reports that the World Bank uses measurable educational outputs or quality indicators such as "enrolment ratios and retention rates, rates of return on investment in education in terms of earnings and cognitive achievement as measured in national or international tests" (p.2) and the human capital index (World Bank, 2018). The conception of quality as "value for money" (Harvey and Green, 1993, p.11) is evident from the World Bank's approach to justify public financial returns and direct impact on human development at reasonable cost (ibid, 2006).

The economistic perspective continues to dominate World Bank till today, as seen from the following quote in the World Bank's 2020 strategy for education (Human Development Network, 2011) that relates international student assessments to economic growth rates and annual gross domestic product (GDP) per capita growth of countries:

> At the societal level, recent research shows that the level of skills in a workforce—as measured by performance on international student assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS)—predicts economic growth rates far better than do average schooling levels. For example, an increase of one standard deviation in student reading and math scores (roughly equivalent to improving a country's performance ranking from the median to the top 15 percent) is associated with a very large increase of 2 percentage points in annual GDP per capita growth (p.3).

According to the World Bank Education Strategy 2020 published by the Bank's Human Development Network (2011), it assures that the Bank tracks the effectiveness of its own education strategy through three types of indicators (p.10) – firstly, the performance indicators that strengthen country education systems, which the Bank has direct control, for example, "% of education projects or programs that have learning- or skills-related key performance indicators"; secondly, the outcome

indicators where progress requires joint efforts of partner countries and the Bank such as "% of countries that have applied learning or skills (national or international) assessments"; and lastly, the impact indicators that monitor the ultimate goals of the education strategy such as "% of countries with gains in the skills level of their labor forces since 2010".

The World Bank continues to see quality education investments in terms of "learning gains" that should be measured and evaluated although the focus of its education strategy has evolved with time: "Quality Education for All" (the 2000 strategy) to "Education for all and education for the knowledge economy" (the 2005 update) and "Learning for All" (the 2020 strategy). The 2020 strategy broadens the definition of learning opportunities to include informal learning opportunities alongside schooling as provided by the country or society for all children (Human Development Network, 2011, p.4).

Academics like Hursh (2001) criticize the World Bank and the International Monetary Fund for requiring national governments to develop economic policies that emphasize economic growth and property rights over social welfare and personal rights as part of the loan agreement to these government or countries. Barrett *et al.* (2006) echo the criticism that the World Bank's investments in primary education has overly focused on measuring quality of programmes based on:

> [I]nputs (infrastructure, textbooks etc) and outputs (e.g. number of teachers trained) and not giving enough emphasis to learning outcomes (measurable improvements in learners' cognitive achievement) (p.6).

There are criticisms of the HCT. One of the criticisms is that the "human" in the HCT is an impoverished version of the "human" (Gillies, 2011) where:

> There is a risk of education being narrowed to economic goals, of the broader aims and purposes of education being submerged, and of the person being reduced merely to 'human capital', not as a life to be lived, but as mere economic potential to be exploited. (p.223).

The other criticism is that the HCT has not addressed the, "significant role for education, therefore, to explore its age-old concerns with the more abundant life, with democracy, society, citizenship, happiness, and fulfilment." (ibid, p.236)

6.2 Progressive or Humanistic Perspective of Education

In contrast to the economistic purpose of education and HCT, the progressive or humanistic perspective of education supports and develops a wider range of human potentials.

John Dewey's Progressive Education

John Dewey is one of the key philosophers associated with the progressive or humanistic perspective of education. I have chosen to highlight John Dewey because his emphases in terms of developing social aims of education and his experiential approach to teaching resonate with me. Dewey's pragmatism also appeals to me, and I will revisit this point in the Methodology chapter later.

Dewey (1916) defines education as "reconstruction or reorganization of experience which adds to the meaning of experience, and which increases ability to direct the course of subsequent experience" (p.76). In a progressive society, education goes beyond reproducing existing habits and provides the

environment to enable younger learners to form better habits so that they can improve their future society (ibid, 1916). To Dewey (1916), the aim of progressive education for continued growth of learners is compatible with the social environment provided by a democratic society:

> For it assumed that the aim of education is to enable individuals to continue their education-or that the object and reward of learning is continued capacity for growth. Now this idea cannot be applied to all the members of a society except where intercourse of man with man is mutual, and except where there is adequate provision for the reconstruction of social habits and institutions by means of wide stimulation arising from equitably distributed interests. And this means a democratic society. (p.100)

To Dewey (1916), education and democracy intertwine to impact social change. Like democracy, a progressive education will promote voluntary choice of individual, mutual interests and open interactions as elaborated by Dewey (1937):

> Democracy also means voluntary choice, based on an intelligence that is the outcome of free association and communication with others. It means a way of living together in which mutual and free consultation rule instead of force, and in which cooperation instead of brutal competition is the law of life; a social order in which all the forces that make for friendship, beauty, and knowledge are cherished in order that each individual may become what he, and he alone, is capable of becoming. (p.474)

UNESCO's Humanistic Education

Barrett *et al.* (2006) cite UNESCO as a key supranational organization that is associated with the progressive or humanistic perspective. The UNESCO emphasizes educational processes such as school governance, learner-centred pedagogies, acquisition of attitude and cultural values alongside cognitive and knowledge development of learners. Instead of using indicators to measure quality, UNESCO's "judgements of quality are based on what happens in the school and classroom" (p.2) that impact the whole child or human development and social change.

The purpose of humanistic education goes beyond economic efficiency or economic productivity considerations. In the EFA global monitoring report 2015 (UNESCO, 2015), it calls to attention important factors that influence the provision of quality education at basic level. I will highlight the four factors (ibid, 2015) that are more relevant to the polytechnic. Firstly, UNESCO reiterates the call to enable the EFA movement by enhancing policies and practices in areas such as teacher recruitment and retention, teacher training and development, rewards and recognition of good teachers. Secondly, UNESCO challenges countries to make improved learning materials available to all learners. Thirdly, UNESCO emphasizes the importance of providing adequate school time for teacher-pupil engagement in learning activities and ensure that the actual available time for instruction is well spent. Lastly, UNESCO asks for inclusive and relevant school curricula and cites the ideas of Barrett *et al.* (2006) that curriculum relevance as seen from the perspectives of individuals, communities and societies.

In research by Barrett *et al. (*2006), the team members adopt a mixed economistic and humanistic perspective, proposing five components of quality education programmes (and curriculum implied)

for low-income countries to emphasize "effectiveness, efficiency, equality, relevance and sustainability" (p.13). While there is no space here to unpack each of Barrett's components, "effectiveness" and "efficiency" are associated with the economistic perspective and "equality" is associated with the humanistic perspective. The remaining components, "relevance" as briefly stated above and "sustainability" have mixed economistic-humanistic perspective.

The UNESCO report (2015) concludes that:

> The challenge is greater still in the case of quality, as consensus remains elusive on what aspects of quality in education can be translated from research to widespread implementation. How can quality be improved? How do classroom processes and learning environments help children, youth and adults learn? (p.298).

An example of this challenge is the different views on what is considered 'quality' in that education. While Soudian (2011) acknowledges the progress of the EFA movement by the UNESCO and World Bank to improve literacy, he questions the use of one set of international standards to measure quality education for all participating countries. Instead, Soudian (2011) asserts that the starting point of human development should begin with consensus building discussions on what each country values for their populace. For example, gearing education towards employability has provided students with more opportunities to develop skills for employment, however, it has also taken away opportunities for students to build stronger disciplinary knowledge (ibid, 2011). Potentially, the progressive or humanistic education can help learners to appreciate a diversity of interests within in a society to develop other democratic social values such as "tolerance, altruism, trust, respect for persons, empathy, fairness, justice and open mindedness", which are crucial for social change (Soltis, 1991, p.90).

To summarise, differences in the purposes of education, albeit from the economistic or humanistic perspectives will value different aspects of human potential. The Singapore Government has a dominant perspective of education to support economic development of the country since it became an independent country in 1965 (Ho, 2003). The market practices such as using performance or quality indicators for performance monitoring are common and pervasive in Singapore's education landscape, as seen from the Ministry of Education's quality assurance frameworks – SEM (for schools) and PQAF (for polytechnics). The World Bank's notion of human capital is relevant to the polytechnic sector because it is set up to prepare the next generation of workers. The polytechnic's Balanced Score Card 2019 tracks the graduate employment rate as one of the key performance indicators.

Applying Leong's framework (2014), the wider contexts, namely the market practices underpinned by perspectives or purposes of education will foster particular conceptions of quality and practices in the polytechnic. My gut feel is that conceptions of quality as "value for money" and "fitness for purpose" (Harvey and Green, p.11 and p.16) will likely be more dominant in the polytechnic. Quality practices related to lifelong learning (including skills mastery) will probably be valued by the polytechnic because they prepare students for employability.

My perspective of education leans closer to Becker's (2002) position, and it includes both humanistic and economistic perspectives to develop the potentials of polytechnic students:

> Social, cultural, ethical values are at least as an important part of life as the economic side. On the other hand, you cannot live well if your economic circumstances are very bad, either, so there is a need for both. (p.3)

I agree that a purely economistic perspective of education is probably too narrow in focus and has reduced the person to a "human capital" or "economic potential" (Gillies, 2015, p.2). From my insider knowledge, there are attempts to develop social values and characters of students through a few subjects in the polytechnic. Probably, there is room for the polytechnic to do more here.

7. CONCLUSION

To end, the literature suggests that quality is multifaceted (Chung, 2010) and stakeholders relevant (Tam, 2001). It will be interesting to illuminate the beliefs, perspectives and values held by stakeholders towards 'quality' education offered by the polytechnic. The macro, organizational and family level contextual factors will likely influence the conceptions and practices within the polytechnic (Dimmock and Tan, 2013). To delve further, my research questions are:

- What key conceptions and practices influence quality in teaching, learning and assessment within a polytechnic? (RQ1)
- How do contextual factors influence the selection of quality indicators in the Balanced Score Card 2019? (RQ2)
- How adequate is student preparation for lifelong learning and skills mastery? (RQ3)

CHAPTER 2: METHODOLOGY

The research process is neither neutral nor value-free (May, 2001). One's choice of research approach and methods is influenced by social norms, personal and professional interests, contextual factors such as physical constraints and, in my case, political pressures framing my research (Sikes, 2004). A four-level hierarchical framework proposed by McGrath and Coles (2013) is used here as a guide to the organization of my research study design. In the top level of the framework, I locate my pragmatic worldview. In the second level, my choice of the mixed methods research design and how my pragmatic worldview influenced this choice is discussed. Next, the third and bottom levels are discussed together, focusing more on how the research work was organised mainly by survey and my choice of research methods, namely survey (questionnaire, group interview), document analysis and thematic analysis. Moving from one level to another, I aim to demonstrate the alignment and coherence of the research design and methods to the research questions of my thesis.

1. TOP LEVEL: RESEARCHER'S PHILOSOPHICAL STANCE

There are two basic contrasting ontologies (or worldviews) and related epistemologies (or the nature of knowledge). Realism/ positivism makes the human assumption that a researcher is neutral to the research process, favours a normative research methodology that justifies the use of quantitative methods such as surveys and large-scale studies, and focuses on generalizable results (Cohen *et al.* 2000; Wellington, 2000). Positivism asserts "all genuine knowledge is based on sense experience and can only be advanced by means of observation and experiment." (Cohen *et al.* 2011, p.7). This is because a realist ontology sees social reality as being objective, facts being external and independent of the observer. It then follows that a positivist epistemology sees the nature of systematically gathered knowledge as being objective, value-free, and generalizable (ibid, 2011). The positivist researcher tends to conduct his/ her research "from a distance" (Johnson and Christensen, 2017, p.36).

In contrast, interpretivism/ anti-positivism assumes that a researcher's values will influence the research as the researcher initiates action and makes choices during the research process, favours a more interpretive research methodology that justifies the use of qualitative methods, which focus on individuals or small groups, and understanding personal constructs (Carson *et al.* 2001; Wellington, 2000). An interpretivist ontology sees social reality as being subjective and one that interacts with the observer, others and social context (Carson *et al.,* 2001). It then follows that an anti-positivistic epistemology sees the nature of knowledge as being subjective and based on personal experience (Cohen *et al.,* 2011). The interpretivist researcher tends to get close to the research objects by "putting yourself in someone's shoes" (Johnson and Christensen, 2017, p.36).

In defence of the interpretivist worldview, Lincoln (2010) reiterates her long-standing position that the broad perspectives or worldviews are distinct and incommensurable, which means that the different worldviews cannot be measured by one common standard. There was a time until early 1980s when interpretive research was judged less credible than large-scale studies (Johnson and Christensen, 2017). That said, Lincoln (2010) is not against utilising a variety of research methods within a worldview:

> With respect to the postures assumed by adherents of these two paradigms…, complementarity is not only possible but desirable. There is no reason why both camps should not exploit both quantitative and qualitative techniques, should not be concerned with both relevance and rigor, should not be open to empirically grounded theory …should not be interested in both verification and discovery (Guba and Lincoln, 1981, p. 77).

I took heed of Lincoln's advice (2010) to examine my "ontology or epistemology or axiological position" (p.7) because these positions influence my choice of research methods and participants. I hold neither a realist nor nominalist worldview. Instead, a third worldview, pragmatism appeals to me. I have chosen to highlight John Dewey because he is one of the pioneers associated with pragmatism in education and his emphasis in hands-on learning is relevant to the polytechnic. Dewey (1931/2003) defines pragmatism as "the doctrine that reality possesses practical character" (p. 128). There is no dualism between theory and practice – "[w]e are at root practical beings, beings engaged in exercise. This practice constitutes at first both self and the world of reality. There is no distinction." (Dewey, 1953/2003, p. 155).

The pragmatic knowledge inquiry is through experiences, experimentations and actions (Ormerod, 2006). Dewey (1903/2003) structures social environment to facilitate learners to gain "first-hand experience[s]" (p.236). New knowledge updates or replaces existing knowledge through an inquiry or educational process that supports "continual reorganizing, reconstructing, transforming" of the knowledge (Dewey, 1916, p.50). This inquiry process resonates with me as a STEM educator in the polytechnic. In a pragmatic worldview, the social reality is constantly changing and known to human through interaction with each other (Taatila and Raij, 2012). There is also an appreciation of both objective and subjective realities (Johnson and Christensen, 2017). A pragmatic epistemology values "what solves our problems and what works" in certain situations, in my case, using a mix of quantitative and qualitative research methods that are likely to address key areas of my research (Johnson and Christensen, 2017, p.32).

There are criticisms of pragmatism regarding the instrumental nature of this worldview: some have difficulty accepting that a useful belief is necessary true because its utility changes over time. Others do not consider that beliefs can be useful (Omerod, 2006). In addition, there are those who find placing theories as ideas for practice incomplete (ibid, 2006). To me, the pragmatic worldview helped me to appreciate a wide range of assumptions, ideas and methods depending on what may be most helpful for me to understand my world.

To end, there were numerous occasions when both quantitative numbers and qualitative comments helped my colleagues and me to understand issues related to teaching, learning and assessment in the polytechnic. In this research, I found that experiences, attitudes and judgements of research participants elicited from interviews gave greater depth of understanding than numbers and statistics from the questionnaires alone could provide. However, the numbers and statistics did point out to me where I needed to start looking.

2. SECOND LEVEL: CHOICE OF RESEARCH DESIGN

I was a sponsored candidate by my polytechnic to pursue an EdD. One of my job functions was related to quality assurance and quality enhancement of programmes within my school. While I was

free to decide my research interest, there was an implicit expectation that my research should inform the practice within the polytechnic and help me to do my work better. I described my research as an insider research that employed a mixed methods research methodology.

2.1 Insider Research

The insider research sought to illuminate the conceptions of quality in my polytechnic (Wellington, 2015). The familiarity with my research setting was both advantageous and disadvantageous to me (Wellington, 2015; McGrath and Coles, 2013). During my research, I tapped on my insider knowledge on useful information sources for my research. I know who I should call and where I should start reading. The other advantage was that being a manager within the polytechnic and a sponsored EdD candidate helped me to gain access through school gatekeepers to research participants. By school gatekeepers, I meant directors and senior managers of schools and departments.

The disadvantage as a manager within the polytechnic was that I might have internalized and accepted market practices as part of work culture. It was an uneasy journey to engage with the external perspectives and critiques on performativity and conceptions of quality in the polytechnic. My sponsor (the polytechnic) did not try to influence my actions and thinking during the research process (McGrath and Coles, 2013). However, I felt I had to be careful with my language and not to come across as overly critical of the polytechnic.

Next, I took heed of the advice of Curtis, Murphy and Shields (2014) about the impact of friendship on insider researchers. I interviewed some colleagues whom I had known for many years. I was aware of the possible problems associated with friendship and shared knowledge that could lead to overt self-censorship of issues deemed to be too sensitive to discuss openly. Colleagues, students and alumni who agreed to participate in my research were generally vocal with their views and experiences, although I could not rule out the possibility of self-censorship (Humphrey, 2013).

Lastly, in view of my management functions in my school and committee duties in the polytechnic, there might be issues related to power and professional relationships between the research participants and me. In this regard, at the start of the project, I informed all research participants openly that their participations were voluntary, and they could withdraw from the research at any point in time, and their identities were kept anonymous except to my thesis supervisor and assessors. While the effect of power relations on my research was mitigated, it was not easy to balance the power relationship between participants and me during the research process (Karnieli-Miller *et al.,* 2009).

To end, I aimed to be transparent at each stage of the research process, and discussed my views and bias related to the research findings openly and sensitively in my study (Curtis, Murphy and Shields, 2014). I took the opportunity to examine my own assumptions and underlying values, and that of the polytechnic in key areas of my research (Wellington, 2015). In doing so, I aimed to use my insider research to inform and improve my practice, and hopefully to influence practices in the polytechnic

2.2 Mixed-methods Research

A researcher's ontology and epistemology influence the researcher's choice of research methodology or approach that is based on "a set of shared assumptions, concepts, values and

practices" with others in a research community (Johnson and Christensen, 2017, p.31). I considered several research approaches before deciding on a mixed-methods research approach for my study. To give a brief overview of the research approaches, I will next discuss quantitative, qualitative and mixed methods approaches in more details.

Firstly, a quantitative research approach collects quantitative data to identify causal relationship, and confirm or refute hypotheses and theories in a research (Johnson and Christensen, 2017). The research approach tends to generalize research findings because it views social reality and human behaviour as objective and predictable (ibid, 2017). In general, this approach uses statistical analysis to help a researcher to reach a decision on whether things are the same or different or related to one another. When there is statistical significance of the research findings, it means there are low chances of getting the answer wrong and thereby strengthening a research conclusion (Newby, 2014). Broadly speaking, statistical analyses based on random samples rather than whole populations are cost and time effective to work with, otherwise many research studies will not have the means to be carried out. The inferential statistics are used to project the sample results to the populations from which the random samples are chosen.

While statistical analysis has its merits, one needs to be cognisant of assumptions employed for accurate analysis as well as the difference between notions of statistical significance and practical significance (Newby, 2014). For credible data analysis, it is important that the assumptions of an inferential statistical method such as random sample, dependent variable measured on interval scale and comparison groups with equal population variances must be met. When some of the above assumptions cannot be met, researchers such Fletcher *et al.* (2011) use less powerful non-parametric tests instead. When there is statistical significance of research data, it does not necessarily mean that it is of practical significance (Wiersma and Jurs, 2008). In my research, I employed surveys to generate descriptive statistics such as percent of favourable and unfavourable responses from students, alumni and teaching staff to complement qualitative data generated from other methods. Besides, I did not opt for random sample in my study, which I will explain later.

Secondly, a qualitative research approach is often employed to generate qualitative data to understand and explain a topic or phenomenon being explored in a research (Johnson and Christensen, 2017). Unlike quantitative research, the qualitative research approach views social reality and human behaviour as subjective and personal, it tends not to generalize research findings beyond a particular study (ibid, 2017). The qualitative research approach using methods, which include interviews and documentary analyses, allowed me to access richer data, namely participants' beliefs, values and experiences (Leong, 2014) to understand conceptions of quality in the polytechnic.

These research methods seek to generate evidences from any legitimate sources of information (not necessarily only numerical sources) that can be used to make sense of the world such as relationships, character, emotions, phenomena and all the other ways that we live our lives and express ourselves (Newby, 2014). In my research, I chose interviews as a means of engaging with participants' meaning making and perspectives since conceptions of quality are stakeholder-relevant (Tam, 2001). Through the interviews, they informed me what participants considered as 'quality' in practices. I conducted by group and individual interview sessions, which I will elaborate later.

However, there are challenges in using interviews because some participants may simply forget pertinent details while a few bad hats may intentionally lie and mislead researchers (Sikes, 2000). My main challenge was to recruit enough interviewees for each group interview. The other challenge I faced was finding time, while holding a full-time job, to interview and transcribe the audio-recorded interviews. In my research, I conducted nine interviews – six individual interviews (with members of senior management) and three group interviews (one for teaching staff, students and alumni).

Thirdly, I focus my attention on mixed methods approach, which I employed for my research. While researchers have different views on the validity or the legitimacy of mixed methods research, I agree that the triangulation of data from two or more methods (or sources, investigators and theories) from a mixed methods approach allows researcher to investigate research study from different standpoints, reduce bias and thereby increase the confidence about the findings (Denscombe, 2008).

As a pragmatist, I am in support for Pring's view (2000) regarding the "false dualism" of quantitative and qualitative research methods and he cautions that the choice of research approach should not be an either/or case for researchers (p.257). Pring justifies that qualitative research can prepare the grounds for quantitative research while quantitative research can suggest differences for further investigation in a more interpretive mode. Others have rejected the mixed methods research because it is incongruent with their ontological, epistemological and axiological positions, as discussed earlier. That said, I agree with Lincoln (2010) that researchers should not carry out a mixed-methods study as if their decisions are not influenced by their ontologies and epistemologies.

Another reason why I decided on a mixed methods approach because a solely quantitative or qualitative research approach would probably not work as well in my research context. The working culture in the polytechnic is such that policy or decision makers will consider both quantitative and qualitative data in their decision making of key policies. In my study, numerical data produced from questionnaires and rich qualitative data generated from thematic analysis of the survey data will be more persuasive to my audience. The approach helped my research to generalize and explain the proposed conceptions of quality in the polytechnic (Johnson *et al.,* 2007).

However, I must be careful not to claim that one set of results validated or confirmed the other set of results unless my research could show that there was strong alignment of data sets from different methods (Harris and Brown, 2010). They problematized the use of data from semi-structured interviews to validate the data from structured questionnaire in research works related to conceptions of assessment (ibid, 2010). In my study, I employed both semi-structured questionnaire and semi-structured interviews to generate data from teaching staff, students and alumni across schools in the polytechnic. I supported Smith's (2006) argument that my focus here was about the complementation and not validation of data sets from different research methods. By the term 'complementation', I meant that I will analyze data generated from each method, and then compare results for recurring themes to enrich the entire set of data.

To end, I agree with Cohen, Manion and Morrison (2011) that combining methods where necessary and relevant has its important place in research. The exact mixture of research methods will depend on the research questions and practical issues faced by the researchers (Johnson and Christensen, 2017). The mixed methods approach generated complementary data that addressed key areas of my

research, which I will describe later. However, the amount of data generated from different methods and subsequent data analysis was a daunting endeavour for a solo researcher like me.

3. NEXT TWO LEVELS: RESEARCH STRATEGY AND RESEARCH METHODS

I will discuss the next two levels of the four-level hierarchical framework (McGrath and Coles, 2013) together. I decided to use documentary analysis and surveys as main strategies to organise my research work because I analyzed official records and uncovered views and experiences of research participants. By the term documentary analysis, I meant the use of one or more documents such as official reports, email discussions, websites of organizations, photographs and personal diaries as sources of research data (Wellington, 2015). Borrowing the definition of McGrath and Coles (2013), surveys include the use of research methods such as questionnaires, interviews, focus groups or observations to generate understanding of the perceptions, views and demographics of a population.

Next, I will describe the research methods used in the study, namely document analysis, semi-structured questionnaire, semi-structured interview, and thematic analysis in more details.

3.1 Documentary Analysis

I found McCulloch's (2011) definition of primary and secondary documents to be useful for classification purpose: primary documents were produced from records of events or processes by witnesses or people involved in it; and secondary documents were produced from analyses of primary documents. Others researchers such as Duffy (2010) refers primary sources to mean primary documents and secondary sources to mean secondary documents.

To elaborate further, Duffy (2010) proposes two major primary sources (or documents) based on the purposes they serve: deliberate sources and inadvertent sources. Examples of deliberate sources are autobiographies and memoirs of famous or powerful individuals that were more self-serving in nature, and therefore a researcher needs to be careful in handling these documents (ibid, 2010). Examples of inadvertent sources are a school's annual report and assessment papers that were produced as part of the school's regular work processes (ibid, 2010). While primary documents are generally deemed more reliable than secondary documents, Fothergill (1974 cited in Duffy 2010) warns that the primary features of primary documents might be changed during an editing process to position an organization more favorably. I share similar view with Duffy (2010) that some schools might be motivated to produce primary documents (inadvertent sources) with a deliberate intent to impress external school inspectors.

To apply the above discussion in my research, the Balanced Score Card (BSC) records and planning guide for schools used in my study were primary documents (or an inadvertent source) generated as part of the polytechnic's annual planning exercises. It was possible that some schools edited their BSC records with a deliberate intent to impress external others such as the Quality department and PCEO (or Principal) of polytechnic. However, the existing verification processes employed by the Quality department lent support to the BSC records as a credible data source for my research.

I opted for document analysis of the BSC records to provide a sense of historical perspective of quality development (Wellington, 2015). In my research, I carried out an initial document analysis of the BSC records from the last 10 years (2008 - 2017) to trace the development of quality or

performance indicators within the polytechnic. The BSC records generated data that complemented other data from the interviews with senior management staff and teaching staff. Possibly, these datasets also served as a means to demonstrate triangulation relationship of one dataset to another (Wellington, 2015). I will further elaborate the use of triangulation to increase soundness and credibility of my research in the later segment.

In my study, I traced the development of quality indicators and underlying conceptions over the last ten years during the "Comprehensive" polytechnic (2008 – 2012) and the "SkillsFuture Ready" polytechnic (2013 – 2017). The term "Comprehensive" polytechnic was coined by the polytechnic's SkillsFuture Committee to describe a steady increase of the range of diploma course offerings in engineering, information technology, applied science, business, design and humanities since its inception in 1990 (Goh, 2016). The same committee used the term "SkillsFuture Ready" polytechnic to connote the need for a polytechnic to reposition herself for the next lap (ibid, 2016).

I obtained professional clearance to access the BSC records for my study. I chose the year 2013 as a separating marker because I believed from that year and beyond, there was a series of changes that redefined polytechnic education moving forward. The five years before 2013 were informative years of the "Comprehensive" polytechnic (Goh, 2016). I believed the data and insights generated in the two five-year periods illuminated how the conceptions of quality of teaching, learning and assessment and the development of quality indicators with the polytechnic were influenced by contextual factors.

The year 2013 was a momentous year for the polytechnic education. The Prime Minister of Singapore, Lee Hsien Loong first made mention of a major education review in 2013, namely the Applied Study in the Polytechnics and ITE Review (ASPIRE), which intended to provide graduates from polytechnics and ITE (vocational institutes) with better career and academic progression prospects (Ministry of Education, 2014a). While the ASPIRE looked at the education and training for students in the education system, the CET 2020 Masterplan reviewed the continuing education and training needs for the workforce. In this way, the Government reviewed the various education and training needs of current and future workforce in Singapore (Singapore Workforce Development Agency, 2014). The recommendations from the ASPIRE and the CET2020 Masterplan served as key sources for the formulation of the SkillsFuture, which is a long-term movement that intends to build a culture of life-long learning and skills mastery amongst the workforce (SkillsFuture, 2015b).

Influences of these national level initiatives coalesced into macro level factors (Dimmock and Tan, 2013) that redefined the nature of polytechnic education in Singapore moving forward (Table 1). While my study did not look into the details of SkillsFuture Policy per se, the documentary analysis gave me an understanding of the perspectives of senior management, teaching staff, students and alumni on the adequacy of student preparation for lifelong learning and skills mastery in "SkillsFuture Ready" polytechnic (Goh, 2016).

Applied Study in the Polytechnics and ITE Review (ASPIRE)	**Continuing Education and Training (CET) Masterplan 2020**
The ASPIRE reviewed applied education	The CET Masterplan was first proposed in

<table>
<tr><th>Applied Study in the Polytechnics and ITE Review (ASPIRE)</th><th>Continuing Education and Training (CET) Masterplan 2020</th></tr>
<tr><td>pathways to better support career and academic progression prospect of polytechnics and ITE graduates. The ASPIRE recommendations premised on:
Helping students to make more informed education and career choices;
Creating more opportunities for polytechnic and ITE students and graduates to grow and deepen skills in their chosen career;
Building more paths for polytechnic and ITE graduates to progress in their careers
(Ministry of Education, 2014a)</td><td>2008 and refreshed in 2014 to support efforts to build a career-resilient workforce through:
Building and valuing deep skills in the Singapore workforce;
Helping individuals to make informed learning and career choices;
Developing a wide range of high-quality learning opportunities.
(Singapore Workforce Development Agency, 2014 [now renamed as Workforce Singapore])</td></tr>
<tr><td colspan="2">SkillsFuture
The SkillsFuture is an on-going movement that aims to change how Singaporean and employers view skills, jobs and learning by:
Helping individuals make well-informed education, training and careers choices;
Developing an integrated high-quality system of education and training that is responsive to changing needs;
Encouraging employers to recognize skills and mastery based career development; and
Nurturing a culture for lifelong learning.
(SkillsFuture, 2015b)</td></tr>
</table>

Table 1 National level initiatives: ASPIRE, CET Masterplan and SkillsFuture

The BSC records contained quality or performance indicators used by the polytechnic and its schools as part of the polytechnic's performance management. Through the BSC records, I traced corporate performance indicators (CPIs) and operational performance indicators (OPIs) in teaching, learning and assessment that had been added, dropped or modified over the last 10 years (2008 to 2017). I believed the development of quality indicators was influenced by conceptions, contextual factors and ground practices (Leong, 2014). To challenge my familiarity with the polytechnic's BSC records, I adapted some of Wellington's (2015) questions to guide me as I analyzed the BSC records to address key areas of my research: (1) For what purpose was the BSC records written? (2) What were the contextual factors (such as social, political and cultural conditions) during the "Comprehensive"

polytechnic (2008 to 2012) and "SkillsFuture Ready" polytechnic (2013 to 2017) when the BSC records were produced? (3) What values were being conveyed through the BSC records?

For question (4), I borrowed Marwick's (2001) terms of witting and unwitting evidences to ask, "What was the witting and unwitting evidence of the BSC records?" By witting evidence, it referred to the main information that the schools intend to convey from their BSC records while the unwitting evidence refers to the remaining information found in the BSC records. This question (4) provided question (1) with key supporting evidences.

The interim documentary analysis of the BSC indicated that the performance/ quality indicators in the BSC helped me to understand priorities of the polytechnic over the ten-year period. The BSC metrics uncovered key conceptions of quality and practices during 2008 to 2017. The quality indicators were fairly stable over the 10 years except for the addition of three CET and one eLearning related indicators as common OPIs across schools in BSC2012 and BSC2015 metrics respectively.

However, the BSC was revamped in 2019, suggesting a possible shift of contextual factors, and possibly also a shift in key conceptions of quality and practices in the polytechnic as well. For example, the number of CET-related performance indicators were increased from three in the BSC 2017 to seven in the BSC 2019 (Appendix BSC). The BSC 2019 metrics were reorganized differently, emphasizing development of skills, business effectiveness and efficiency as well as work redesign and productivity. New terms, leading and lagging indicators were also introduced in the BSC 2019 and these terms alluded to the role of seventeen key performance indicators to drive or monitor the progress of key areas of the polytechnic (Supovitz *et al.*, 2012; Mankiw, 2007).

I suggest that the revamped BSC 2019 metrics could be seen as a disruption of institutional practices, making my earlier proposed documentary analysis of the BSC less important than to clarify key contextual factors that influenced the revamp of the BSC in 2019. As such, I refocused RQ2 to investigate the latter, and did not continue the documentary analysis to a greater depth. However, I referred to the BSC as a means to uncover the shift in the contextual factors of the polytechnic in the Discussion chapter.

I employed both documentary analysis and interviews for methods triangulation, which I will elaborate further in next segment. From the interview, I adapted ideas from Bell (2010) and Wellington (2015) for question (5), "What were the opinions of management staff regarding some of the key assumptions, standpoints and biases made about the BSC records?" I agreed with Bell (2010) that certain evidence, even though biased, could still be important and relevant for key areas of my research.

Next, I will discuss research methods – questionnaires and interviews used to generate data from research participants.

3.2 Surveys: Semi-structured Questionnaires (Teaching Staff, Students and Alumni)

Having considered three main questionnaire styles: structured, semi-structure and unstructured, listed by Cohen, Manion and Morrison (2011), I chose to use semi-structured questionnaires in my study. Semi-structured questionnaires allowed me to elicit initial qualitative comments from respondents on their answers to the previous questions. I used the qualitative comments to generate

themes for further investigation during interviews. I decided not to use unstructured questionnaire because respondents would need to write in a more detailed manner to the question posed in my study. Because of the high number of survey participants – 150 teaching staff, 150 students and 150 alumni involved in the study, the amount of varied data that needed to be analyzed subsequently would make it impractical for a single researcher (like me) to do so. The overall design of the semi-structured questionnaires was kept simple and user-friendly, as suggested by McGrath and Coles (2013).

Sharing Bell's view (2010), I solicited information that my research participants were likely to know. So, I designed separate questionnaires for teaching staff, students and alumni because I held a view that staff and students (or alumni) likely had different information to share on contextual factors and ground practices related to key areas of my research. I used the checklist for questionnaire design and administration as proposed by Bell (2010) to ascertain the readiness of my questionnaires for deployment. To elaborate, firstly, I obtained the professional clearance from the polytechnic and the school directors, and ethical clearance from the University of Sheffield to administer these questionnaires to the proposed groups of participants in my research. Secondly, I aligned the question items with my research questions to check that the information that I was asking for was required. Thirdly, I decided on what question types to be used in the questionnaires in order to generate the information for my research. While Cohen, Manion and Morrison (2011) and Bell (2010) summarized a longer listing of question types that could be used in a questionnaire, it sufficed that I used closed questions, range questions, ranking questions, semi-structured questions and questions with Likert scale in the questionnaires for teaching staff, student and alumni.

To end, I have included two tables to show the alignment of the proposed questionnaire items for teaching staff, students and alumni to my research questions (Appendices A1-1 and A1-2). Questionnaires alone could not provide the depth of data required to clarify the contextual factors and ground practices related to quality in teaching, learning and assessment within a polytechnic. I concurred with Bell (2010) that interviews will generate richer data, and she described the richness as "put[ting] flesh on the bones of questionnaire responses" (p.161). Next, I will discuss the interviews used in my study.

3.3 Surveys: Semi-structured Interviews (Individual and Group)

A key advantage of using interviews was that I could further clarify participants' responses while a key disadvantage was that interview required substantial time to conduct (Bell, 2010). The main reason for using interviews in my research was that I could probe the "thoughts, values, prejudices, views, feelings and perspective" of interviewees (Wellington, 2015, p.138).

I considered three main styles of interviewing in the order of increasing flexibility: structured, semi-structured and unstructured interviews, as suggested by Wellington (2015). In my study, I opted for the semi-structured interviews over the structured interviews because the former provided a broader research focus and reduced my bias by allowing participants to articulate what was important to them with regard to the research issues during data production (McGrath and Cole, 2013). In this way, the semi-structured interviews were not completely fixed in agenda and catered for more flexibility than structured interviews (Wellington, 2015).

While McGrath and Cole (2013) allude to situations where the use of structured interviews could be helpful, particularly with children or people who either could not understand or read a questionnaire. However, these situations were not applicable in my research context. I preferred not to use the unstructured interview because this style of interviewing did not have a fixed set of questions to guide the direction of the interview (Wellington, 2015), thus it might be more challenging to analyze the diverse or unrelated data subsequently. For all practical considerations, unstructured interviews would be too time-consuming for data analysis within a mixed-methods research design.

In my study, I conducted nine semi-structured interviews. Six of them were individual interviews with members of senior management to illuminate their conceptions of quality in terms of their related beliefs, values and opinions. Their opinions were sought on what and how contextual factors such as national-level and polytechnic-level policies, views of key leaders and accepted ground practices might have influenced the development of quality indicators in teaching, learning and assessment. The other three were group interviews - one for teaching staff, students and alumni from schools A to E to clarify key themes generated from the staff, student, and alumni questionnaires respectively. I will discuss my pilot interviews later.

For practical reasons, I conducted three group interviews. Data from these group interviews was not meant to be representative of the views of all staff, students and alumni surveyed earlier but provided a deeper understanding of the quantitative and qualitative data from the semi-structured questionnaires. My observation concurred with Wellington's (2015) in that all three groups of interviewees were comfortable with their peers and they helped one another to remember key experiences on the ground. I did not refer to these as focus groups because I was not seeking a collective view or common group position of the issues under consideration (Cohen, Manion and Morrison, 2011).

While group interviews were less time-consuming to conduct than individual interviews, Bell (2010) cautions that individuals in group settings could respond differently due to group dynamics, and therefore could affect the nature of the data generated during group interviews. As such, I was mindful about building rapport with interviewees while waiting for others to arrive. I also exercised due care to minimise anyone from dominating the interviews, solicited responses from individuals and groups, and focused on meaning of key responses from participants (Wellington, 2015). From the group interviews, I observed that all three groups of interviewees were open to share their views and experiences of key practices in the polytechnic with one another and me. There were two instances when I followed up with telephone conversations with staff interviewees to enquire if they could say more about particular indicators of the Balanced Score Card. In both instances, staff interviewees understood my question but had nothing further to offer.

I agreed with Bell (2010) that interview sessions should be recorded and transcribed. I also shared Wellington's (2015) view that it will be best to record interviews, especially when interviewees gave their consent. With informed consent from the participants, I audio recorded, and transcribed all six individual and three group interviews using notations suggested by Braun & Clarke (2013). I will elaborate more about these notations later. I took reference from pilot interviews to plan for one-hour interview per session. When the interview overran, as in the case of the group interview for staff, I sought their permission to continue for another fifteen minutes.

One key issue about interview transcription was the influence of my views and interpretations during the production of transcripts (Wellington, 2015). McGrath and Coles (2013) purport that researchers should transcribe every interview recording and not just the relevant sections of the interviews in order to minimise the risk of missing important data. Sharing similar view, Bell (2010) asks for word for word transcription to mitigate the researcher's influence that may affect accuracy of the evidence. She alludes to the other role of an interview transcript as an evidence of ethical practice. However, transcribing entire interview session was time-consuming; an hour of interview could take four hours to transcribe (ibid, 2015).

As mentioned earlier, Bell (2010) and other authors expect full transcript of interview session, however, the approach will generate a lot more data or evidence than was necessary for the research (Wellington, 2015). Towards a more focused transcribing process, Woods (1986) suggests a 2-stage approach: one, researcher listens to the recording of the entire interview session and two, researcher makes initial selection of whole or parts of the interview for transcription. In my study, I followed Woods' (1986) approach and transcribed only parts of the interviews that were critical for analysis or reporting, and it helped me to keep the amount of data for analysis manageable. For credibility, the original recordings are available if required by the examiners.

To further the discussion, Wellington (2015) suggests using field notes to record important information that was usually not captured by audio recording such as researcher's general impression of the interviewee's attitude, outlook and interview setting. In this way, field notes could enrich the research evidences from transcript (parts or full) of the audio recording of interviews, however, field notes were vulnerable to researcher's bias and the accuracy was not easily verified (ibid, 2015). Nonetheless, field notes might be a less daunting alternative for interviewees who were willing to be interviewed but not comfortable with audio recording (Wellington, 2015), and for others who initially agreed to audio recording but changed their minds at the start of or during the session (Bell, 2010). In these instances, field notes could record the main facts of the interview session, and it was useful to verify the interview records by sending them to respective interviewees for checking of content accuracy and fair representation (Woods, 1986).

While Wellington (2015) reports that field notes could enhance the quality of the evidence, he summarises the disadvantages of using field notes to include the influence of researcher's bias in the production of record notes, and potential interference to the interviewing process. I presumed the interference had in part to do with the interviewer (or me) having to take notes of the interview, observe and listen to the interviewees all at the same time. Having considered the potential distraction of taking field notes during interviews, I took field notes sparingly, and only as a supplementary record to the audio recording in my study. Fortunately, all my interviewees consented to audio recording of the interview sessions.

In summary, my choice of semi-structured interviews, a mixture of individual and group interviews, and Woods' approach to interview transcription helped me to keep my workload manageable within the study period. I agreed with Bell (2010) that subjectivity and bias were pertinent issues to address as I conducted these interviews. I was also mindful and transparent about my own bias and preference as researcher (or interviewer) during the interview and transcription process. I was careful not to overly emphasize certain facts and disregard others because of my own beliefs and views.

Following Bell's advice, I also triangulated interviews with other research methods. In my study, I used both interviews and questionnaires for the purpose of triangulation.

3.4 Interview Checklists

Next, I would like to give attention to the interview checklist used in my study. It was important to design, sequence and pilot questions used in the interview, similar to the process for questionnaire development (Bell, 2010). I conducted six pilot studies, which I will elaborate later. Learning from the pilot studies, I revised the interview checklists for the main study. In particular, I incorporated separate questions on quality teaching, learning and assessment in the interview checklist for management staff to tease out their perspectives, beliefs and values in each area. The term "contextual factors" was explained using an alternative term "environmental factors". The other term "curriculum" was unclear to student interviewees and I provided examples such as scope of content coverage and sequence of topics to make the term clearer to the interviewees.

As mentioned, I differentiated the semi-structured interview checklists for: (1) senior management staff; (2) teaching staff; and (3) students and alumni. The main reason for having differentiated interview checklists was that I believed that teaching staff, students and alumni would have different knowledge and experiences to share. Besides, the purpose of the interviews was more to clarify key themes generated from the questionnaires. On the other hand, the interview checklist for senior management staff was meant to seek their opinions of conceptions of quality related to teaching, learning and assessment in view of their job roles. There were also issues related to contextual factors and constraints on the ground that could illuminate the research.

<u>The Interview Checklist for Student/ Alumni Interview</u>

Next, I checked for alignment between the interview checklists and my research questions (RQ). For clarity, I organized the questions with respect to the RQ, as exemplified by the student/ alumni checklist. The focus of the interview is to illuminate:

A) RQ1: From your experiences as a student here, what are quality practices in: (1) teaching, (2) learning, and (3) assessment in your school?

B) RQ2: The following were key recurring themes from the student questionnaire administered to 150 students/ alumni across the schools: (key theme1), (key theme 2), (key theme 3). Could you share your opinion on: (1) key theme1, (2) key theme 2 and (3) key theme 3?

C) RQ3: How adequate are these current quality practices in: (1) teaching, (2) learning, and (3) assessment for a "SkillsFuture Ready" Polytechnic? [*For current students only*]
RQ3: The polytechnic is preparing to be a "SkillsFuture Ready" polytechnic. From your experiences in the workplaces, what quality indicators are needed to drive (1) quality teaching, (2) quality learning, and (3) quality assessment in your school? [*For alumni only*]

(If necessary to prompt further, researcher may ask students/ alumni: "What other quality indicators should be considered for: (1) skills mastery and (2) lifelong learner development which are emphasized in the SkillsFuture?")

The staff, student and alumni interview checklists were updated once key recurring themes from the questionnaires were available. I conducted pilot interviews and revised the checklists for the main study (Appendices P1, P2 and P3). I will describe the pilot studies later.

3.5 Sampling Decisions

Next, I will like to justify key decisions that I made regarding the sample for my study. The first sampling decision was that I opted for non-probability sampling, having considered two main methods of sampling - probability sampling and non-probability sampling as listed by Cohen, Manion and Morrison (2011). A probability sample is commonly known as random sample whereas a non-probability sample is referred to as purposive sample (ibid, 2011). Where possible, I will use my research context to clarify key terms associated with probability sampling and non-probability (purposive) sampling in subsequent paragraphs.

According to Wellington (2015), a key advantage of probability sampling is that I might use my research findings arising from a large and random student sample in a polytechnic to generalise the findings for other polytechnics based on statistical grounds. A probable (or random) sample, for example, means every student in my polytechnic has the same chance of being included in the sample (Cohen, Manion and Morrison, 2011). While there are more sample types (ibid, 2011), it sufficed for me to consider three main ones reported by Wellington (2015) with the following sampling plans:

(1) Random sampling for example, might be to choose 300 students from the entire student population within a polytechnic using a random number generator;

(2) Systematic sampling for example, might be to hand-pick every 20th student from each class register from a school with 1400 students; and

(3) Stratified sampling for example, might be random sampling within level 1, level 2 and level 3 students.

On the other hand, a purposive sample or non-probability sample is selected based on a researcher's judgement to address a specific research need, for example, a research that sought to understand the occurrence of stress amongst senior managers of schools could select a purposive sample of senior managers and school principals (Cohen, Manion and Morrison, 2011). An advantage of using purposive sampling is to access research participants who could inform about certain issues because of their job roles, expertise or experiences (Bell, 2010). However, it is not a random sample, and therefore comments from purposive participants might not be representative (ibid, 2011).

The second sampling decision made was to employ three types of purposive sampling for my study although there is a longer list of purposive or purposeful sampling as summarised by Wellington (2015) and Cohen, Manion and Morrison (2011). Firstly, I used maximum variation sampling (Anderson and Arsenault, 1998) to select a wide range of participants such as teaching staff for varying years of teaching experience for the staff questionnaire to strengthen and enrich data for application and interpretation. Secondly, snowball sampling (Teddie and Tashakkori, 2009) was employed to recruit participants with the help of my contacts and existing participants, for example, my contacts recommended other teaching staff to participate in the staff questionnaire. Thirdly,

criterion sampling (Wellington, 2015) was applied to choose alumni participants based on the criterion of one to two years of work experience for the alumni questionnaire.

Arising from the earlier decisions, the third sampling decision made was about the composition of the student sample for my study. A maximum variation sampling of 150 students from schools A, B, C, D and E was included in the survey to access their opinions and experiences related to teaching, learning and assessment practices in general. I used selection criteria: students from first year (second semester), second or third year of the three-year diploma courses across schools A to E to form the survey sample because they experienced the polytechnic education in a more substantial way. I excluded students in the first semester of the first year from the student sample because I believed that these students, being new to the polytechnic education, might not have information I sought for the research. The other selection criterion was to have a mix of students from all three years of studies from different diploma courses across the schools within the polytechnic, where possible.

The fourth sampling decision made was about the composition of the alumni sample for my study. With the help of my contacts, I used snowball sampling to invite 150 alumni from schools A to E to participate in the alumni questionnaire. Surveying students and alumni generated rich data from the student population as a whole. As an individual group, the alumni generated interesting data and insights on ground practices that differed from current students, particularly, what practices in teaching, learning and assessment that they still considered to be important, now that they were in the workplaces.

From my experience with other graduate surveys conducted by the polytechnic, recent alumni were likely to be more responsive to online surveys. For practical reasons of time and resources available to me in my research, I used a selection criterion – recent alumni with one to two years of total work experience from schools A to E to form the bulk of alumni sample. My assumption was that the workplaces could moderate their opinions and certain experiences in school that they valued.

As expected, it was challenging to secure 150 alumni for the survey. To make up the sample size, I included a few alumni with less than one year of work experience. I was initially hesitant to include these in the sample because they might be too new to their workplaces. I was pleasantly surprised that these alumni provided rich qualitative comments. There were also a few alumni with more than two years of total work experience in the sample; all of them were recommended by personal contacts. Using the selection criterion for recent alumni for the survey, it gave me a glimpse of the opinions and experiences of this segment of alumni, besides the criterion helped me to better manage this research. I was aware that the criterion also excluded data from alumni with different years of work experience. However, my research question did not intend to explore differences of opinions and experiences of alumni of different years of work experience.

The fifth sampling decision made was on composition of the staff sample for my study. Members of the teaching staff and senior management teams were accessed for their views on key contextual factors such as policies and directions of the polytechnic and schools that might have influenced the development of quality practices in teaching, learning and assessment. By teaching staff, I meant any polytechnic staff who taught in one or more modes of instructions, which include giving a lecture,

conducting a tutorial session, demonstrating skills in a laboratory and supervising students in project works.

As mentioned, I used a maximum variation sample of 150 teaching staff across schools A to E for the staff questionnaire. Using a selection criterion based on years of teaching experience within the polytechnic, I invited three main groups of teaching staff, those with: one to two years; three to nine years; and ten years or more of total teaching experience because the polytechnic used these categories to broadly classify teaching staff into basic, intermediate and advanced practitioners respectively. With the help of my contacts in schools A to E, I used snowball sampling to invite other teaching staff to participate in the staff questionnaire. To make up the staff sample, I included a handful of teaching staff with less than one year of teaching experience.

3.6 Pilot Studies

I used six pilot studies to inform the procedure used for the conduct of questionnaires and interviews in my research. I used a list of questions proposed by Judith Bell (2010, p.151) as a guide to evaluate the readiness of my questionnaires and interview checklists for deployment:

- How long did it take you to complete?
- What did you think of the layout of the questionnaire?
- Were the instructions clear?
- Did you object to answering any of the questions? (If possible, describe what the problems were.)
- Were any of the questions difficult to interpret? (If possible, describe what the problems were.)
- Do you think any important topic or question has been left out?
- Do you have any other comments?

Based on participants' responses, I reviewed and modified procedures and the tools (interview checklists, questionnaires) for the main study. These pilot studies allowed me to remove items that did not generate usable data, identify new topics to be covered, reduce difficulties experienced by participants to complete the questionnaires and interviews and for me to conduct preliminary analysis to test out the approach of data analysis in the main study. I will describe a pilot study of an interview to demonstrate how it had informed the conduct of the interview for the main study.

<u>Pilot Study 1: Semi-structured Interview with Senior Management</u>

I approached a member of senior management (pseudo name: AL) from one of the schools for a pilot interview. Because of our good working relationship, AL readily accepted the interview. I explained to AL that I was piloting a set of interview questions for my EdD study, and I sought AL's feedback to possibly review and revise the interview questions subsequently. I offered to show the list of interview questions to AL. However, AL said that it was not necessary and preferred to be more engaged in the conversation with me during the interview process.

I also explained to AL that I would audio-record the interview using my mobile phone. (In return, AL collegially showed me the recording apps in AL's mobile phone.) I had a second audio recording device (a backup device), which I decided not to use during this pilot. I explained to AL that I would transcribe the interview and the transcript would be anonymous and accessible to my thesis supervisor and possibly examiners as well. AL accepted my explanation and I proceeded with the interview.

The interview was conducted at AL's workstation because it was quiet at the time of interview (4:30PM) and was a convenient place and time for AL. I had intended to use the list of original questions in the interview checklist as a guide, depending of the flow of the interview with AL. As mentioned earlier, I adapted Judith Bell's list of questions (2010) to review the Pilot Study 1. The interview lasted for about 11 minutes, covering the major areas as listed in part A, as shown in the revised semi-structured interview questions (Appendix P1-1). I observed that AL was at ease during the interview and understood most of interview questions except for one on contextual factor. Upon my elaboration using some examples of contextual factors, AL was able to continue with the interview, as seen from the interview transcript (Appendix P1-2).

After the interview, AL commented that the interview process was a typical one, similar to others that AL had participated before, and did not offer any other comments. I found that the questions covered in part A flowed rather naturally covering key areas of research. Because I was focusing more on the conversation with AL without referring to the list of questions in the interview checklist, I did not remember asking AL about other areas covered by interview questions listed in parts B and C of the checklist. Subsequently, I approached AL to ask about the clarity of questions listed in parts B and C. There were no perceived difficulties on the part of AL to answer these questions

On the same day after the interview and the next, I used the following notations adapted from Braun & Clarke (2013), as tabulated below, to transcribe the recorded interview.

Features	**Notation**	**Explanation of Use**
Identity of speaker	Two alphabets (eg. AT, PC) GH	Instead of assigning a numeric running number for each interview, two alphabets are randomly selected for each participant. It keeps the participant anonymous and yet gives a more personable feel to the participants during data analysis process. I assigned GH to myself.
Non-verbal utterances	(xxx)	Non-verbal utterances are recorded with the use of brackets. E.g. laughing (laughter) and frowning (frown).
Abbreviations	As spoken	Will transcribe as spoken. E.g. the term Balanced Score Card was transcribed as either BSC or Balanced Score Card as the interviewee mentions it.
Pausing	(.); (..) & (...)	(.) transcribes a short pause of one to two seconds; (..) a slightly longer pause of a few seconds when interviewee is organising his/ her thoughts; (...) a long pause where interviewee is taking some time to reflect before responding

		to the question. Only three levels of a pause are reflected in the transcript.
Word Emphasis	Underlined	Words that are emphasised by the interviewees during in the interview are underlined. E.g. my belief in education is…
Confidentiality and Anonymity	[xxx]	Where the interviewee reveals details that can be used to trace back their identity, such details will be omitted from the transcript and a more generic term used to showcase the idea in square brackets. E.g. [diploma course]; [student name]; [subject title]; [job designation] etc.
Punctuation	'.'; '-'; '?'; '!'	When the speech suggests a completed sentence, '.' is added. When ideas and thought process are flowing in speech, a '–' is used to separate such ideas or thought processes. '?' and '!' are used to indicate the tone and pitch detected in the recording.
Post transcript inclusions	<*xxx*>	All post transcript inclusions not in the audio recording will be captured with the 'less than/more than' symbols and the text would be in italic.

Table 2 Notations used to transcribe management, staff, students and alumni interviews

Subsequently, I revised the interview procedure with senior management in five different aspects. Firstly, I should refer to the list of questions during the interview regularly, otherwise I might miss out key aspects of the interview checklist. Secondly, it might be necessary to steer the interview to cover areas listed in: (1) part B of the interview checklist, uncovering why certain performance indicators were consistently met or not met by schools; and (2) part C of the interview checklist illuminating why certain performance or quality indicators in the Balanced Score Card were added, modified or excluded. Thirdly, I estimated that a 45-minute interview covering parts A, B and C of the interview checklist should be sufficient, although I catered for an hour per session. Fourthly, I aimed to transcribe the recorded interview within the same day (where possible) while the interview content was still fresh in my mind. Fifthly, I projected that I might need five hours to transcribe a one-hour interview.

Overall, the interview questions were clear to AL. They generated insight into AL's conception of quality teaching in terms of AL's views of teaching, identity as an educator, opinions of contextual factors and practices that might have influenced quality teaching, learning and assessment generally. I noted that AL responded mainly on quality teaching, and did not say much about quality learning and assessment. Thus, I revised the interview questions to elicit senior management's views on what is quality teaching, followed by quality learning and then quality assessment. According to AL, there were no perceived difficulties to answer these questions in parts A, B and C of the interview checklist.

That said, not all my pilot studies were as smooth sailing as the pilot study 1. I will describe one that was messy. In all, I conducted five other pilot studies:

- Pilot study 2: Staff questionnaire;
- Pilot study 3: Student questionnaire;
- Pilot study 4: Alumni questionnaire;

- Pilot study 5: Semi-structured interview with staff; and
- Pilot study 6: Semi-structured interview with student.

Pilot Study 2 Was Messy

The first messy part was that I had to balance difference pressures during the fieldwork. I felt pressured to deploy the revised questionnaires for the main study quickly so that more staff members and students could respond to the questionnaires before the long semester holidays. However, I needed time to address a key challenge in the staff questionnaire. The key challenge was to mitigate the difficulty experienced by some staff members in differentiating between the meanings of "teaching practice" from "learning practice" used in the questionnaire. Related to this challenge, I noted two other staff members that I chatted with over tea offered varied opinions on what constituted teaching practices and learning practices. I also wondered about the other opinions that the 150 teaching staff in the staff sample might have in the main study. Upon reflection, I provided simple statements to clarify what I meant by teaching practices and learning practices.

In my understanding, learning practices is closer to how teaching staff helps students to become better learners or better in their learning skills. To differentiate between teaching activities and learning activities (or learning skills), I chose a statement "delivers the subject knowledge and skills" to clarify teaching practices because it was familiar language to my colleagues. However, I recognized that the term "delivers" did not adequately capture the notion and practice of teaching. While students and alumni in the pilots did not surface this comment but having simple statements to clarify the teaching, learning and assessment practices should be helpful to them as well. Finally, I revised following items for all questionnaires:

- Teaching practices (i.e., how a teaching staff delivers the subject knowledge and skills
- Learning practices (i.e., how a teaching staff helps students to learn the subject knowledge and skills)
- Assessment practices (i.e. how a teaching staff checks for students' understanding/ attainment of subject knowledge and skills)

The second messy part was that I deliberated many times was about the amount of guidance to provide in questionnaire. A staff in the pilot asked for examples of skills (Section 2 of the staff questionnaire) to be included to guide staff participants in the main study. The staff went on to suggest general examples of skills such as technical skills, cognitive skills and life skills for consideration. Similarly, the staff asked for examples of "quality practices" (Section 3 of the staff questionnaire).

To consider the above issue deeper, I noted that three students and three alumni in the student and alumni pilots were able to name the one skill, deepened through key pedagogies, that was most useful to them. I believed staff participants should able to name the "one skill" as well. However, to make it easier for all research participants to respond to questionnaire items, I provided general categories of skills in the questionnaire in the main study. I believed listing general categories of skills could probably trigger various specific skills in participants' minds for their considerations. Since I asked participate to name one specific skill, they had to judge which specific skills was considered to

be most useful to students, which was the intent of Section 2. In this regard, it seemed reasonable to me to include general examples of skills in the header of Section 2 for all questionnaires.

Related to the above, was about providing examples of "quality practices" in the staff questionnaire. I noted the three students, three alumni and two staff in separate pilots could respond to the questions related to "quality practices". The issue related to this comment was about the meaning of 'quality' here. The staff went on to comment that it might be good to understand what participant understood by the term "quality practice". To that, I fully agreed that our views and beliefs of quality influenced the meaning of quality in teaching, learning and assessment practices, which is a key research question of my study. However, I had reservation about providing examples of quality practices, which were more specific in nature, and it might be leading participants in their responses when asked to name one quality practice in teaching, learning and assessment.

To deliberate further, I sought opinions of two 'safe' friends. One of them not involved in the earlier pilot felt that Section 3 of the staff questionnaire (Quality Practice) could be difficult for some. A suggestion was to provide some structure that might mitigate this demand. The other friend who was involved in the staff pilot concurred with my reservation to provide examples of quality practices. We also discussed the form of structure that might work. To me, it was reasonable to ask participants for their predominant view of quality in teaching, learning and assessment practices. The question was meant to help participants to be more aware of their own views of quality so that they could better respond to other items in Section 3, and yet not influencing their views. In addition, it would also help me to understand what participant understood by the term "quality practice", as suggested by the staff pilot. I included other details of my reflections about the pilots in Appendix P4-1. The revised questionnaires (Appendices P4-2, P4-3 and P4-4) and interview checklists (Appendices P2 and P3) for the main study were included as appendices for reference.

3.7 Thematic Analysis at Latent Level

Next, I will justify a key research method, thematic analysis used in my research. Using data from the open-ended items of the questionnaires, I analyzed the data for recurring themes and sub-themes based on the thematic analysis approach developed by Braun and Clarke (2006). Since my research questions did not intend to commit to theory development, I had not considered grounded theory approach, which might be a robust alternative, as described by Strauss and Corbin (1994). Neither did the research questions require me to delve deep into the reconstruction of detailed experiences of my research participants where phenomenological approach might be more appropriate, as described by Leong (2014).

According to Braun and Clarke (2006), a theme captures what is important to the overall research question, and frequency or number of occurrences need not necessarily determine a theme. I differed from their approach in using word counts to suggest the prevalence of key words in proposed themes and sub themes. While the word counts of key words in each theme differed across teaching staff, students and alumni datasets, I treated the three datasets as one overall data source for thematic analysis related to key areas of my research. The second overall data source was based on the six individual interviews with senior management representatives.

The thematic analysis required me to identify codes, analyze and describe the themes to reflect the content of the entire data set (Braun and Clarke, 2006). Within this method, firstly, I was consistent with the chosen thematic analysis approach where I coded the qualitative comments from the open-ended items questionnaires and interviews with respect to specific research questions. Secondly, I was consistent with the chosen level to identify themes, which was to analyze the themes at latent level from the immediate words or content of the qualitative comments from the surveys. My research question sought to elicit the opinions of selected management staff on key conceptions held by the polytechnic on teaching, learning and assessment in terms of underlying beliefs, values and perspectives. Thirdly, I was consistent with my research epistemology to develop the meaning of the identified themes to understand the contextual factors that might have influenced the individual accounts of the management staff. In my research, I generated word counts of key words and distilled the perspectives and experiences of survey participants, as subjective as they were, into initial themes across datasets. Fourthly, I fine-tuned the initial themes in six iterative phases to discover recurring patterns of meaning. I carried out thematic analysis based on the surveys with staff, students, alumni and senior management, which I will describe in the next chapter. Details of the six-phase thematic analysis (Braun and Clarke, 2006) is found in Appendix T1.

3.8 Aligning Research Questions to Research Methods

The alignment between research questions and methods is key consideration of the credibility or trustworthiness of a research. In my thesis, I employed research methods, namely online structured surveys, interviews and documentary analysis to generate both quantitative and qualitative data to address my research questions (simplified version),

- RQ1: What key conceptions and practices influence quality in teaching, learning and assessment within a polytechnic?
- RQ2: How do contextual factors influence the selection of quality indicators in the Balanced Score Card 2019?
- RQ3: How adequate is student preparation for lifelong learning and skills mastery?

The revamp of the Balanced Score Card (BSC) in 2019 was significant to my research. An initial exploration with the BSC records revealed few changes of performance or quality indicators from year 2008 to year 2017 except for the addition of indicators related to eLearning and continuous education and learning (CET). There was a review of the BSC in 2018 and several other CET indicators were included. The revamped BSC 2019 had many new key performance indicators (Appendix BSC). To me, the revamped BSC alluded to changes in contextual factors in the polytechnic. As such, I decided to refocus RQ2 to clarify these contextual factors.

Employing a mixed methods research approach, I used different research methods and data sources to address my research questions (RQ1, RQ2 and RQ3) reiterated below. The tabulated information showed the strong alignment of the research questions (detailed version), research approaches, types and sources of research data, and research methods deployed for data production.

Research Question	Mixed Methods Approach	Types and Sources of Research Data	Research Methods
RQ1: What key conceptions and practices influence quality in teaching, learning and assessment within a polytechnic?	Qualitative	Conceptions (perspectives, beliefs and values) of quality related to teaching, learning and assessment, contextual factors and ground practices involving six senior management staff	Semi-structured interviews; Thematic analysis
	Quantitative; Qualitative	Perceptions of 150 staff, 150 students and 150 alumni on contextual factors and quality practices on the ground.	Questionnaires; Semi-structured interviews; Thematic analysis
RQ2: <u>Original</u> To what extent have performance indicators been met? a) While there are Corporate Performance Indicators (CPIs) in the Balanced Score Card (a key quality management tool) decided by a polytechnic for all schools, why do some schools significantly outperform others in particular CPIs?	Qualitative; Quantitative	BSC records (2008 to 2017) contain both performance/ quality indicators and targets, as well as short notes to record changes in CPIs and OPIs.	Document analysis
b) Even though Operational Performance Indicators (OPIs) in the Balanced Score Card are decided by individual schools, why are OPIs not always met in my school? <u>Refocused</u> How contextual factors influence the selection of quality indicators in the	Qualitative; Quantitative Qualitative	BSC records (2008 to 2017) contain both performance/ quality indicators and targets, as well as short notes to record changes in CPIs and OPIs.	Document analysis

Research Question	Mixed Methods Approach	Types and Sources of Research Data	Research Methods
Balanced Score Card 2019?		Group interview with five teaching staff and six individual interviews with members of senior management	Semi-structured interviews; Thematic analysis
RQ3: How adequate is student preparation for lifelong learning and skills mastery?	Qualitative	Experiences of six Management staff	Semi-structured interviews; Thematic analysis
	Qualitative; Quantitative	Perceptions of 150 staff and 150 students on current quality indicators for skills mastery and lifelong learner development	Questionnaires; Semi-structured interviews; Thematic analysis
	Qualitative; Quantitative	Perceptions of 150 staff and 150 alumni of other/ new quality indicators for skills mastery and lifelong learner development	Questionnaires; Semi-structured interviews; Thematic analysis

Table 3 The alignment of research questions, mixed methods approach, types and sources of research data and research methods for data production

In the remaining chapter, I described research circumstances and decisions made about the actual survey period, sample selection, survey response, and student/ staff sample reduction. In this study, a total sample of 150 students, 150 alumni and 150 staff across schools A to E was earlier proposed. However, 174 students, 150 alumni and 156 staff members responded to student, alumni and staff questionnaires respectively by the time the online surveys were closed.

3.9 Survey Period

When the questionnaires were ready for deployment in February 2018, it was near to the start of final examination for October semester of the Academic Year 2017/ 2018. I deployed the online student, alumni and staff surveys up to four months from end February 2018 to end June 2018. The survey period spanned over long school holidays (March to April) between October semester of Academic Year 2017/ 2018 and April semester of Academic Year 2018/ 2019, and into the first ten weeks of April semester of Academic Year 2018/ 2019.

Although not an ideal period to conduct student survey because it was near the examination period, I decided to roll out the survey from late February 2018, having considered the importance to include views or data from graduating students. These students might still check school emails and respond to my invitation to participate in my study when they checked for examination results in March 2018 and information related to their graduation in May 2018. The first ten weeks into the April semester were necessary to remind potential students who completed year 1 and year 2 studies to respond to the student survey upon their return after the long school holidays.

By end May 2018, sampling quotas of student, alumni and staff were met for most schools, except for the sampling quota of alumni of school C. I extended the survey period by another month to end June, but no new alumni contact or respondent was generated for school C from school gatekeepers, personal contacts and snowballing technique through alumni who earlier responded to the survey. By then, 174 students, 150 alumni and 156 staff responded to student, alumni and staff surveys respectively across schools A to E. I judged the alumni sample to be a sufficient sample for my study even though school C did not meet the sampling quota of thirty. Twenty-two alumni from school C responded to the alumni questionnaire. I will revisit this issue as I discuss about alumni survey response and sample reduction in the later segment.

3.10 Enriching the Purposive Samples

As discussed earlier, I chose a sampling quota of thirty student/ alumni/ staff per school (for school A to E) since that was the minimum number by many for descriptive or summary statistics (Cohen, Manion and Morrison, 2011). To enrich the sample, I asked gatekeepers of schools (A to E) to recommend a mix of teaching staff based on years of teaching experience in the polytechnic, and a mix of alumni with 1 to 3 years of work experience since I did not have access to this information. Regarding my selection of potential students for the study, I shortlisted students from the system information based on alphabetical order of student names. A mix of students from each year of study (i.e. year 1, year 2 and year 3) was shortlisted from schools A to E. Where possible, I selected students from a wide range of diploma programmes across schools A to E.

I monitored the number of participants on regular basis to meet the sampling quotas. To enrich the survey data set, I had tracked: the number of student survey respondents based on their years of study; the number of staff survey respondents based on their years of teaching experience; and the number alumni survey respondents based on their years of work experience. Depending on where the shortfalls were, it informed me about the subsequent recruitment focus for new survey respondents. The table below shows the overall sample profiles based on 174 students, 150 alumni and 156 staff (from schools A to E) who responded to their respective surveys from end February to end June 2018.

Students		**Alumni**		**Staff**	
Year of study	**Number (%)[1]**	**Years of work experience**	**Number (%)[2]**	**Years of teaching experience in the polytechnic**	**Number (%)[3]**
Year 1	61 (36)	< 1 year/ not working since graduation	51 (35)	< 1 year/ 1 to 2 years	17 (12)
Year 2	57 (34)	1 to 2 years	47 (32)	3 to 9 years	65 (43)

Students		Alumni		Staff	
Year of study	**Number (%)[1]**	**Years of work experience**	**Number (%)[2]**	**Years of teaching experience in the polytechnic**	**Number (%)[3]**
Year 3	52 (31)	More than 2 years	51 (34)	10 or more years	68 (45)

(Note: The above figures did not include the following missing data: [1]Four students; [2]One alumnus; and [3]Six staff)

Table 4 Participant profiles of student, alumni and staff questionnaire surveys

3.11 Increasing Survey Responses

I shared similar view as Cohen, Manion, and Morrison (2011) that an introductory email about my study from school gatekeepers might improve survey response rate. Out of goodwill, school gatekeepers (assigned senior staff) sent an introductory email together with the project information to inform and encourage potential participants to participate in my staff survey. The project information sheet had gone through ethical clearance by the University of Sheffield. As part of the ethical clearance process, I had also sought the approvals of school directors to access staff, students and alumni from their schools for my study.

The main mode of contact between potential participants and myself was via email correspondence. To assure potential participants that my study had obtained professional clearance from the polytechnic, I wrote to them using my official work email from the polytechnic. In addition, I sent an introductory email about my study with the project information sheet as mentioned above. I shortlisted email addresses of potential students and staff from institutional information systems for my study. School gatekeepers recommended some students, staff and alumni to me as well. In view of the data protection policy of the polytechnic, I worked closely with the school gatekeepers to access alumni for my study. I will elaborate further when I discuss about alumni survey responses later.

To encourage survey responses, I typically sent (up to) three individual reminders via email to survey participation. Where participants agreed to share their mobile phone contacts with me, I sent text reminders instead of email reminders because of the pervasive use of mobile text messaging platform in Singapore. In this regard, I had two versions: a text message and an email message that allowed potential participants to access my survey link. Although my study did not intend to compare which version encouraged better survey response, it did inform me that mobile text messaging elicited more prompt response from potential participants as compared to email correspondence in my study. Although promptness in response might not necessarily translate into survey participation, I did notice an increase in overall survey responses whenever students, staff and alumni replied to my email message or mobile text. To elaborate, I will discuss the survey responses of alumni, students and staff in details in next few segments.

3.12 Alumni Survey Response

A total of 150 from my list of 199 alumni responded to the alumni survey. It might appear that the survey response rate of alumni was 75%. However, this high response rate was probably a very crude estimation because I had to rely heavily on snowballing to expand the original pool of alumni contacts recommended by school gatekeepers, and I had no idea how many contacts they helped me reach out to before recommending some for my study. While the survey response rate of alumni seemed high, it was most challenging for me to recruit enough alumni for survey as discussed earlier.

I spoke with school gatekeepers to ask them to recommend thirty recent alumni with one to two years of full-time or part-time work experience for my study. School gatekeepers sent a list of fifty-seven alumni collectively for my initial contact, a far cry from the alumni sampling quota of thirty each for schools A to E (or 150 alumni total). I understood from school gatekeepers that it was difficult for them to recommend more alumni for my study because some of their responsive alumni contacts were not working or had been conscripted for national service (i.e. the Singapore Army) or were studying in universities then. Schools might not have a problem recommending students who had graduated recently. The issue here was that I asked for alumni with some work experience (i.e. one to two years).

Was I also saying that views of recent alumni who were studying in university or not working or serving in the army did not matter to my study? Were these alumni not able to comment on how adequate their schools had prepared them for the SkillsFuture in terms of lifelong learning and skills mastery? In retrospect, I might have been biased towards views of alumni with one to two years work experience because I believed, being in employment, these alumni would better inform my study about the SkillsFuture and what might be considered more important for work. On reflection, perhaps I should also have included views of recent alumni since they could reveal what they considered to be more important for them. Finally, I updated my subsequent communications with the school gatekeepers that I was recruiting recent alumni who typically had less than three years of work experience. I kept the recruitment criterion of 'recent alumni' because they were more responsive to survey from the polytechnics. Using the second criterion 'less than three years of work experience', I had widened the pool of potential alumni for my study.

In my revised communication with the gatekeepers, the word 'typically' would suggest that my study could include alumni who had graduated more recently than my preferred target group for this study. The school gatekeepers sent a few more alumni contacts. The remaining alumni contacts were generated through my personal contacts, fellow colleagues and alumni who were my students previously. I applied snowballing technique to further increase the pool of potential alumni participants through some alumni who agreed to help me to forward the survey link to their contacts. Having obtained agreement from their alumni, some gatekeepers sent contact information of their alumni to me for direct contact subsequently. Other gatekeepers preferred to send my survey link to their alumni instead. Typically, I reminded alumni (up to) three times via individual email or text messages via WhatsApp. Since I tracked the alumni response of Schools A to E, I also wrote or called gatekeepers to remind their alumni, if necessary.

3.13 Student Survey Response

Next, I would reflect upon key decisions that I made during the student survey. The survey response rate was 39%, and 174 of the 449 students whom I invited to participate in my study eventually submitted the online survey. Student responses were slow initially because the student survey was deployed near to their final examination. I explained earlier my decision to do so to allow more time to reach out to graduating Year 3 students. For students who completed Year 1 (the first semester) and Year 2 studies, I sent email invitations to participate in my study together with the project information sheet as detailed in the staff and alumni surveys. I shortlisted potential students across schools A to E from the institutional information system and sent out the email invitations in batches that I could manage. The other reason for not sending mass email to all students was that I hoped to have more control over the mix of respondents.

I tracked the proportions of Year 1, Year 2 and Year 3 student respondents for a range of students across three years and monitored the total number of respondents from schools A to E. The interim data of the student respondents informed which school and student group I needed to shortlist for the next batch of email invitations. I shortlisted potential students accordingly to alphabetical order of their names. Typically, I sent (up to) three email reminders to potential student respondents via official work email to encourage survey response. The same process was repeated until the sampling quotas of schools A to E were met.

By end March 2018, the response from graduating students was still slow, probably due to the timing of survey. By then, graduating students likely checked their school emails less frequently after they had completed their diploma studies and received their examination results. To increase the survey response rate of graduating Year 3 students, I wrote to gatekeepers (diploma management staff) across schools A to E to recommend graduating students for my contacts. Out of goodwill, some of the gatekeepers responded and helped me to encourage their students to participate in my study. When diploma gatekeepers made available contact numbers or personal email addresses, I sent text or email messages with an accessible survey link to these students. Otherwise, I sent invitations to students' school emails. This approach further increased survey responses of Year 3 students.

By end June 2018, 174 students participated in my online survey, and all schools A to E met the sampling quotas. However, a few schools had exceeded the sampling quotas by then, and I pared their respondent numbers down to thirty for these schools according to a sample reduction procedure, which I will describe later.

3.14 Staff Survey Response

The staff response rate was 54%, and 156 of the 287 staff members whom I invited eventually participated in the survey. The sampling quota was thirty staff for each school A to E, and the purposive staff sample consists of a mix of staff with different years of teaching experience, which I discussed earlier. At my request for a mix of teaching staff with different years of teaching experience across diploma courses, school gatekeepers (assigned senior staff) responded with a listing of sixty-three staff collectively for my subsequent contacts. I wrote to these staff, and many of them replied positively to my email invitation to participate in my study. At the same time, I requested from the Human Resource department (HR) for indicative proportions of staff with the

following years of work experience in the polytechnic: up to 2 years; 3 to 9 years; and 10 years or more. I worked toward a staff mix that was close to the HR data because I believed that approach would give me a range of staff profiles resembling that of the polytechnic as a whole.

As staff survey responses came in, I tracked profiles of staff survey respondents in terms of their years of work experience and schools where they worked since I hoped to meet the sampling quota of each schools and the staff respondent proportions to mirror the HR data. Using the respondent profiles data generated from my online survey, I shortlisted another 224 staff across schools A to E from the Staff Directory, and sent out the email invitations in batches that I could manage. Most of time, I had to guess the years of work experience of staff members whom I shortlisted for my study since I did not have access to this personal information. Nonetheless, my guesswork seemed to be fine after all since the staff profiles in my survey and that in the HR data were close, as tabulated below.

Years of teaching experience in the polytechnic	**Staff Survey** **Percent of Staff (%)**	**HR Data** **Percent of Staff (%)**
Up to 2 years	12	9
3 to 9 years	43	39
10 or more years	45	52

Table 5 A comparison of staff profiles: survey respondents and HR data

To end, I believed the introductory email from school gatekeepers helped to pave the way for the recruitment of participants. Since this is an insider research, it could cut both ways – some staff might be happy to share with me (the insider) more while others might find me too close (or familiar) for their comfort. To summarise, staff members were generally supportive of my study. The various responses received were: "Yes" because they had sympathy for my EdD endeavour at this mature age; "Of course!" because we worked together in school or polytechnic committees; and "Ok… since you need a few more participants" after my third email reminder.

Upon my email reminder that this was an anonymous survey and that I needed a few more staff respondents from their schools, many staff who had completed the survey typically sent email replies to assure me that they had done so. Otherwise, they would usually get the survey done or explain that they did not wish to participate in my survey due to personal reasons, busy work schedules or they just joined the polytechnic. For staff who replied to my email reminder, I did not send them further reminders. There were members of the teaching staff who remained silent after the third email reminder; I interpreted their non-responses to be "No" to my invitation. I tried not to send a fourth because I believed sending three individual reminders to fellow colleagues over the three-month survey period was bordering on annoyance. Nonetheless, my survey generated 156 staff respondents across schools A to E, which I pared down to 150 (total) to meet the sampling quotas according to a sample reduction procedure, which I will describe next.

3.15 Student and Staff Sample Reduction

When the surveys closed by end June 2018, staff and student survey respondents from some of the schools had exceeded the sample quotas, as tabulated below. In the case of alumni survey respondents, while the total number of alumni respondents across schools A to E was 150 but school C did not meet the sampling quota of thirty while two other schools exceeded the sampling quotas. As discussed earlier, a school amongst schools A to E consisted of respondents from two smaller schools, which I chose not to identify here because of ethical consideration.

Since the sample quotas were thirty students, thirty staff and thirty alumni respondents for each school A to E, I used time-stamps of the online survey submissions to select the first thirty respondents from each school for subsequent analysis. In this way, I have pared down the number of respondents from some schools with more than thirty to generate student and staff samples of 150 each across schools A to E (Table 6). To be consistent, I also applied the sample reduction procedure to the alumni sample. The total number of survey respondents was consequently reduced from 150 to 142 across schools A to E.

	School	Number of survey respondents when survey closed by end June	Adjusted number of survey respondents (based on sampling quotas of 30 using survey submission time-stamps)
Student Survey	A	30	30
	B	40	30
	C	30	30
	D	31	30
	E	43	30
		174 (total)	**150 (total)**
Alumni Survey	A	32	30
	B	30	30
	C	22	22
	D	35	30
	E	31	30
		150 (total)	**142 (total)**
Staff Survey	A	31	30
	B	30	30
	C	30	30
	D	31	30
	E	34	30

	School	Number of survey respondents when survey closed by end June	Adjusted number of survey respondents (based on sampling quotas of 30 using survey submission time-stamps)
		156 (total)	**150 (total)**

Table 6 Adjusted number of student, alumni and staff questionnaire survey respondents

As mentioned earlier, I was not able to generate enough alumni contacts of School C to meet the sampling quota of thirty due to gatekeepers' issue and lack of access to the alumni. Although short of eight alumni from school C, I deemed the alumni sample to be an adequate sample for credible analysis since it had a 'reasonable' mix of alumni across schools A to E. I believed a mixed sample was important for my study to give a sense of perspectives and experiences of alumni about quality practices in teaching, learning and assessment.

Next, I found the stratified purposive sampling design (Teddie and Tashakkori, 2009) suitable for my research. In the stratified purposive sampling, the researcher identifies different strata (or subgroups) with the population, selects a limited number of cases per subgroups based on purposive sampling strategy and compares across subgroups where needed (ibid, 2009). From this description of comparability across subgroups, I understand why Teddie and Yu (2007) purport that the stratified purposive sampling as a subset of the probability sampling. By the term "purposive sampling", Teddie and Tashakkori (2009) mean that the selected sample is fit for purpose. To rephrase simply, the purpose could be serving the objectives of the research (Wellington, 2015).

However, to claim that the stratified purposive sampling design is a subset of probability sampling, I believe that this claim is contingent upon fulfilling other requirements of 'random-ness' of the sample, as discussed earlier. The purposive sample used in my study consists of staff, students and alumni from five schools (i.e. schools A to E). The purposive sample is further stratified in terms of thirty of each subgroup (or strata) of staff/ students/ alumni in each school. This interesting dimension could be explored further. For now, I used a 'higher strata' of 150 teaching staff, 150 students and 142 alumni across schools. The purposive sample comprising 442 research participants generated rich data that addressed key areas of my research.

In addition, I find a second mixed methods sampling design known as nested sampling (Onwuegbuzie and Leech, 2007) interesting because it affords another dimension to my study by allowing me to compare subgroups (two to three members each) and the whole sample. This interesting dimension could be explored in the future. For now, I carried out semi-structured interviews with four teaching staff, four students and three alumni to clarify key recurring themes generated from the questionnaires.

3.16 Contextual detail and pseudonyms of the research interview participants

As discussed, I conducted nine semi-structured interviews in my research. There were three group and six individual interviews. For the student group interview, there were four student interviewees from different schools within the polytechnic, and I taught one of them in the previous semester. The

fifth student pulled out from the interview on the day of the interview because the student was feeling unwell.

There were three alumni interviewees from different schools within the polytechnic for the alumni group interview, and I had not taught any of them before. The fourth alumnus withdrew from the interview because of unforeseen work commitments on the day of the interview. No alumnus from the fifth school responded/ agreed to my invitation to be interviewed.

For the staff group interview, there were four staff interviewees from different schools in the polytechnic. I worked with three of the four interviewees in various work contexts. They came across as warm and collegial, and therefore I felt they might be comfortable with me in general. I had not interacted with the fourth interviewee who responded to my Whatsapp text message reminder readily to attend the interview. As mentioned earlier, none of the invited staff from the fifth school were able to attend the group interview, and there was no alternate or suitable candidate.

For the senior management interviews, I worked with all six interviewees in different work contexts and our working relationships could be described as warm and professional in nature. Two of them accepted my invitation to participate in the interview readily while the rest required persuasion in view of their busy schedules.

I include a table below to share other contextual details and pseudonyms of the research interview participants.

Interview Session	**Contextual details and pseudonyms of the research interview participants**
Group interview	Student, alumni and staff interviewees were from different schools in the polytechnic.
1. Students	ZJ and NC were Year 2 students and had completed two years of their three-year diploma programmes. ZJ's diploma course had substantial online learning component in its course structure. NC was a highly motivated student leader of one of the schools. IS and DC were Year 3 students. At the point of the interview, both IS and DC had completed both student internship and major project (or final year project).
2.Alumni	Alumnus JE found employment in diploma training related industry upon graduation. The alumnus reported having one to two years of working experience. Alumnus RR was completing his two years of National Service in the army at the point of interview. Unknown to the researcher at the point of interview, the alumnus attained outstanding academic achievement as a student in the polytechnic. Alumnus ZI completed an Earn and Learn Programme (ELP) from SkillsFuture – a work-learn programme sponsored by the government agency and partnering industry upon graduation. At the point of

Interview Session	Contextual details and pseudonyms of the research interview participants
	interview, the alumnus was reading a degree programme in a local university.
3.Staff	Staff MK had postgraduate degrees in a technical discipline and education. MK had three to nine years of teaching experience. MK was actively involved in teaching and learning initiative in a school. Staff OO had postgraduate degree in a technical discipline. OO had ten or more years of teaching experience. He had rich experience working with slower progressing/ unmotivated students in a school. Staff PP had postgraduate degrees in a technical discipline and education. PP had ten or more years of teaching experience. PP was actively involved in capability development in a school. Staff II had postgraduate degrees in non-technical discipline and education. OO had ten or more years of teaching experience. II was actively involved in school level teaching and learning initiative.
Individual interview	Senior management representatives were from six different schools/ departments in the polytechnic.
1	LL was a senior management in a department, and had advanced training in curriculum, pedagogy and assessment. LL's job scope included professional development of academic staff.
2	HH was a long-standing management staff of a school, and had rich experience working with slower progressing students. HH's job scope included managing academic operations of a school.
3	MM was a quality specialist of the polytechnic, and had deep knowledge of the polytechnic's quality mechanisms. MM's job scope included working with schools and departments on quality related matters.
4	AA was a long-standing staff and Teaching & Learning Committee (Chair) of a school. AA had undergone postgraduate training in teaching and learning. AA's job scope included working with school management and diploma course teams on polytechnic's teaching, learning and assessment initiatives in a school.
5	RR was deputy director of a school, and had completed postgraduate training in teaching and learning. RR's job scope included academic development of a school.
6	SS was deputy director of a school. SS was a long-standing staff with rich industry experience. SS's job scope included academic and student development of a school.

Table 7 Key contextual detail and pseudonyms of the research interview participants.

To conclude, my pragmatic ontology and epistemology have influenced my choice to employ a mixed research approach to address key areas of my research within the polytechnic. I found the four-level hierarchical framework proposed by McGrath and Coles (2013) to be helpful in describing

my research design. The online questionnaires and semi-structured interviews (group) generated quantitative and qualitative data from a purposive sample of 442 students, alumni and staff from schools A to E within the polytechnic. The individual semi-structured interviews with six senior management representatives generated data related to conceptions of quality and contextual factors in the polytechnic. Thematic analysis generated themes and sub themes from the above survey data, which I will elaborate in the next chapter. The research question (RQ2) was refocused to uncover key contextual factors that influenced the revamp of the BSC 2019. Consequently, only initial documentary analysis was employed to generate insight from the Balanced Score Card (BSC) records from 2008 to 2017.

CHAPTER 3: FINDINGS FROM THEMATIC ANALYSIS (PHASE 6)

In this chapter, I will present key findings from the thematic analysis of my research data. The iterative six-phase thematic analysis (Braun and Clarke, 2006) generates voluminous amount of data, which can be repetitive through the phases. Thus, I will mainly present the phase 6 or final phase of the thematic analysis. Appendix T1 contains a brief description of the thematic analysis employed in my study (ibid, 2006). Appendix T2 contains details of thematic analysis of student, alumni and staff datasets of the earlier phases.

I will mainly discuss themes that inform what 'quality' education meant to the research participants, particularly those themes that clarify key areas of my research. Section one discusses key themes related to quality practices in teaching, learning and assessment and student preparation for lifelong learning and skills mastery. Section two focuses on discussion of key themes related to five conceptions of quality in the polytechnic. Section three delves into themes related to external and internal contextual factors that probably have influenced conceptions of quality and practices in the polytechnic.

1. QUALITY PRACTICES

I include a worked example of phases 1 to 5 related to quality practice from the student survey dataset. This will help clarify the iterative 6-phase thematic analysis employed in my research. Other details can be found in Appendix T2.

Phase 1

After (re)reading the student survey dataset, I had an initial idea that an example of quality teaching practice was about teaching staff helping students to understand the teaching materials.

Phase 2

Next, I proposed a code, understanding content. I searched for the code amongst qualitative comments of the student survey dataset. An example of the data extract was provided below,

> "Must focus more on allowing students understand well. If lecturers are just going to go through the slides without giving more or something extra or even explain well, then we might as well skip lectures and read on our own. More beneficial that way." (Respondent 20180509-215719.698, student survey)

Phase 3

Three related codes from the student survey dataset were proposed for a possible theme – developed students' understanding as a quality teaching practice,

- Understanding content
- Explaining content
- Not reading from the slides

Phase 4

Next, I developed a thematic map based on student survey dataset, showing Level 1 themes with word counts to indicate the prevalence of these themes in the dataset, and Level2 themes with proposed main and sub themes. For example, I proposed a Level 1 theme – developed students' understanding had 157 counts of student responses containing words "understand" or "understanding". A Level 2 theme – key teaching practices that developed students' understanding of their chosen areas of studies with two sub themes – helpful practices and unhelpful practices were also proposed.

Phase 5

I refined the Level 2 themes, and proposed the following key themes as tabulated below. I included word counts and key student quotes from the survey to substantiate the importance of these themes from the research data. In view of the survey data having the high 157 counts of student responses containing words understand or understanding, I did not explore this theme further in the student interview.

For example, under the refined level 2 theme, there was main theme 1 – key teaching practices that developed students' understanding of their chosen areas of studies. From the student survey, there were 157 counts of student responses containing words: understand or understanding. I included several student quotes from the survey to highlight key examples of practices that helped and did not helped students to understand their subject content. For example,

> "Must focus more on allowing students understand well. If lecturers are just going to go through the slides without giving more or something extra or even explain well, then we might as well skip lectures and read on our own. More beneficial that way." (Respondent 20180509-215719.698, student survey)
>
> "… Instead of just reading off from the slides, one could rephrase sentences for better understanding or even better share their personal work experience with the students." (Respondent 20180305-170105.904; student survey)
>
> "Students tend to learn better in an interactive setting where there it's more relatable to them and they'll be able to have a better memory and understanding of what's going on in class rather than just reading from the lecture notes." (Respondent 20180302-155307.745, student survey)

Arising from the above student quotes, key examples of helpful practices were to:

- Focus on students' understanding and not just going through the presentation slides
- Explain and rephrase sentences, and not just reading off the presentation slides
- Teach in an interactive manner

Phase 6

Next, I look at the refined Level 2 themes from phase 5 across student, alumni and staff datasets to further fine-tune the key themes for the final phase 6 or the final reporting phase. The first set of findings from student, alumni and staff datasets focuses on quality practices. The questionnaire datasets contain high count for words, "understand" or "understanding" in the qualitative survey

responses: 157 (students); 96 (alumni); and 71 (staff). It gives a sense of overarching importance to develop students' understanding through quality teaching, learning and assessment practices, which I discuss in next three main themes.

1.1 Main Theme 1: Teaching Practices that Develop Students' Understanding

Despite the limitation of the verb "deliver" used in my questionnaires to convey the notion of teaching practices, my thematic analysis uncovers a longer list of verbs associated with quality teaching practices: focusing; guiding; interacting; explaining; rephrasing; simplifying; demonstrating; practising; visualising; sharing experiences; encouraging and motivating (RQ1).

As seen from the table below, questionnaire respondents cited the quality practices in one or more datasets. Quality teaching practices cited by research respondents are indicated as ticks [√] (Table 8). Often, members of teaching staff will apply one or more of the teaching practices. While responses differ across staff, students and alumni participants, the table lists key examples of quality teaching practices that are associated with words, "understand" or "understanding" from these questionnaire survey participants.

Teaching practices that helped students to develop understanding of their chosen areas of studies:	**Questionnaire respondents**		
	Staff	**Students**	**Alumni**
Focusing on students' understanding of basic concepts	√	√	
Guiding student through the teaching materials			√
Interacting with students during lessons		√	√
Explaining and *rephrasing* difficult concepts in simple terms	√	√	√
Simplifying concepts and theories	√		
Demonstrating how to do certain exercises	√		
(Hands-on) *Practicing* to better understand concepts	√		
Visualising learning materials	√		
Generating students' interest about the topic	√		
Sharing personal work and life experiences		√	√
Encouraging and *motivating* students in the course of teaching	√		

Table 8 Key quality teaching practices used to categorize sub themes of main theme 1 (Teaching practices)

These key examples were surfaced from the phase 5 of the thematic analysis (Appendix T2), categorized and presented as three sub themes according to their intents here. I italicized key phrases in the quotes to support the sub themes.

Sub Theme 1: Understanding Concepts

Quality teaching practices help students to understand concepts in the teaching materials:

> IF students can *understand the basic concepts*, it will help them in their learning. Not so much to depend on memory. (Respondent 20180305-124124.858; staff survey)
>
> [The respondent uses 'IF', perhaps to underscore an emphasis here.]
>
> …*Guiding the student to understand the concepts* and to *enjoy the entire process* of taking each failure or success as a learning opportunity. (Respondent 20180306-183347.835; alumni survey)
>
> Must *focus more on allowing students understand well*. If lecturers are just going to go through the slides without giving more or something extra or even explain well, then we might as well skip lectures and read on our own. More beneficial that way. (Respondent 20180509-215719.698; student survey)

Sub Theme 2: Explaining Content

Quality teaching practices explain content to students:

> Is when teacher *explains intricate theories* in simple terms for us all to understand. (Respondent 20180510-133709.450; alumni survey)
>
> … Instead of just reading off from the slides, one could *rephrase sentences* for better understanding or even better share their personal work experience with the students. (Respondent 20180305-170105.904; student survey)
>
> *SIMPLIFY A CONCEPT*, DELIVER IN A WAY STUDENTS CAN *VISUALIZE/RELATE* TO, THUS UNDERSTAND (Respondent 20180301-091245.526; staff survey)
>
> [Respondent provided feedback to all qualitative items in uppercase. I was unsure if the respondent meant to be emphatic about it.]

Sub Theme 3: Interacting with Students

Quality teaching practices promote teacher-student interactions:

> Teaching staff that have *actual interactions with their students* & not just going through the curriculum for the sake of it. Students are able to feel when teaching staff engage with them and appreciate such genuineness. (Respondent 20180502-185609.393; alumni survey)

Although not surfaced by staff, a number of students and alumni respondents view teaching practices such as reading from presentation slides with little or no explanation to be low quality:

> Quality teaching is when lecturers ensure that all students understand what he/she is trying to say. It is also when lecturers are able to have make up lessons for the weaker students or to those who needs help. Lecturers *shouldn't teach based on just reading off the lecture notes*… (Respondent 20180419-185608.514; student survey)

> Students tend to learn better in an interactive setting where it's more relatable to them and they'll be able to have a better memory and understanding of what's going on in class *rather than just reading from the lecture notes*. (Respondent 20180302-155307.745; student survey)

During the rest of this chapter, only phase 6 is reported due to word count constraints of the thesis, however details could be found in Appendix T2.

1.2 Main Theme 2: Learning Practices that Develop Students' Understanding

I present three sub themes according to key players involved in learning practices. The sub themes clarify the nature of quality learning practices that will develop students' understanding (RQ1). The sub themes are proposed from codes or key terms commonly associated with learning practices were generated from the survey datasets and fine-tuned through the iterative phases of the thematic analysis (Appendix T2). The word counts of these key terms (within brackets) are tabulated below indicate the prevalence of these terms in the datasets. Key phrases in quotes below are italicized to highlight their relevance to the proposed sub themes.

	Survey respondents		
	Staff	**Students**	**Alumni**
Sub theme 2.1: Guidance by staff	guide or guidance (20); support (3)	guide or guidance (8); support (4)	guide or guidance (23); support (3)
Sub theme 2.2: Learning from students	peer or peers (12); interaction or interactions (6)	peers (4); interaction or interactions (4)	peer or peers (8); interaction or interactions (8)
Sub theme 2.3: Self-learning	self (37), own (34)	self (23), own (29)	self (12); own (23)

Table 9 Sub themes, codes and word counts of main theme 2 (learning practices)

<u>Sub Theme 2.1: Guidance by Staff</u>

Quality learning practices require guidance and support from staff. The first way is to organize additional classes and individual attention to support learning practices of lower attaining students:

> ...Quality learning is when lecturers are able to give *extra practices* and *going through them*. Or ask the weaker ones whether they understand. (Respondent 20180419-185608.514; student survey)

> ...Have smaller class sizes so that *more individual attention* can be given to students, especially the weaker ones. (Respondent 20180428-174910.193; staff survey)

The second way is for staff to show interest and engage students about their learning practices:

> ...But guiding the student through the semester and polytechnic life to ensure that the student *learns from their mistakes made*. Guiding the student to understand the concepts and to *enjoy*

> *the entire process of taking each failure or success as a learning opportunity*. (Respondent 20180306-183347.835; alumni survey)
>
> Develop self-confidence and knowing where and what to source for solving problems on their own is a good quality trait to have. Feedback from the guided facilitated session *provided suggestion for their improvement*. (Respondent 20180420-084742.547; staff survey)

Sub Theme 2.2: Learning from Students

Quality learning practices provide opportunities for students to learn from one another through class discussion, peer instruction and feedback. As seen in the next few quotes, class discussions expand students' perspectives and learning:

> Having more classes that open a discussion, like using a topic and allowing people to speak about their perspective on the topic. This helps *expand everyone's learning* because someone may have taught of something that another person may not. This gives more learning with one another and understand where everyone is coming from. (Respondent 20180505-165500.125; student survey)
>
> …Discussion opens room for *suggestion and improvement*, *clear understanding* of matters. This is essentially important in the working world, where you have to work with your team and cooperate with one another. (Respondent 20180331-215536.952; alumni survey)

Next, peer instruction and feedback help students to learn and build up their confidence of subject content:

> Students not only learn from lecturers, sometimes they *learnt more by teaching* their peers and it also allows them to *retain the knowledge better and build up their confidence*. (Respondent 20180504-165934.802; staff survey)
>
> It is important for students to be able to provide objective feedback (assessment) to fellow peers in a group. In the workplace, it is all about working as a team and there is a need to learn how to provide *objective and constructive feedback* to fellow group members *tactfully and truthfully*. (Respondent 20180403-135731.11; staff survey)

To end, learning from fellow students also clarifies what higher quality works looked like for students, which motivate some students to improve further:

> I came from the generation before PBL. Similarly, we have projects in [name of school]. We are not told much; we have to search for stuff to do. What motivates us is that we see others do better than us. We *work quite hard* because you see others were doing so well. You see some make nice [discipline-related product], you want to do that. You see other do nice presentation, we want to as well. It's competition. (Student DC; student interview; start time 7:00 [mins])
>
> Get to learn from peers and *improve together*. (Respondent 20180524-171043.318; alumni survey)

Sub Theme 2.3: Self-learning

Quality learning practices encourage and provide opportunities for students to engage in self-learning. The insights here will inform quality practices related to preparing students for lifelong learning and skills mastery (RQ3). The first insight is that students need to know what and how to learn in order to engage in self-learning effectively:

> When students are at school, we would like to prepare them for the future, so the ability to *find and judge information* is important so they can be a life-long learner. Another ability that is important is *self-reflect*. It is especially important to learn <the> skills because students learn better only when they know *what to learn*. (Respondent 20180306-181132.423; staff survey)

> Self-learning skill. If students know *how to learn*, they will be able to go further after poly. (Respondent 20180328-180016.415; staff survey)

The second insight is that students need to be more self-directed in order to engage in self-learning effectively:

> In their final year, we should introduce a subject that purely for SDL <or self-directed learning>. This will give them opportunity to *learn by themselves*, *take their own responsibility*. (Respondent 20180326-094231.703; staff survey)

> Self-learning. During the internship, it was required for me to complete my Major Project. It is important to be able to *learn without the help of other people* and to *take initiative with your learning*. It is also important to know what to start with. (Respondent 20180306-022434.469; student survey)

1.3 Main Theme 3: Assessment Practices that Develop Students' Understanding

I propose three sub themes according to intents of the assessment practices. The sub themes are proposed from codes or key terms commonly associated with assessment practices were generated from the survey datasets and fine-tuned through the iterative phases of the thematic analysis (Appendix T2). Word counts (in brackets) of some common words across datasets are tabulated below give a sense about the nature of quality assessment practices that will develop students' understanding (RQ1). I italicized key phrases in survey quotes to highlight their relevance to the sub themes.

	Survey respondents		
	Staff	**Students**	**Alumni**
Sub theme 3.1: Application of knowledge and skills	apply or application (95); improve (21)	apply or application (61); improve (15)	apply or application (46); improve (20)
Sub theme 3.2: Regular and useful feedback	feedback (25)	feedback (8)	feedback (9)

	Survey respondents		
	Staff	**Students**	**Alumni**
Sub theme 3.3: Appropriate check points	check (12)	check (10)	check (10)

Table 10 Sub themes, codes and word counts of main theme 3 (assessment practices)

Sub Theme 3.1: Application of Knowledge and Skills

The first intent of quality assessment practices is to encourage application of knowledge and skills. The high counts for 'apply or application' seem to suggest a prevalent view amongst survey respondents. The next three quotes also suggest quality assessment practices should have a reduced assessment focus in memorising and regurgitating of content:

> Assessment- give *open-ended questions and application questions* rather than questions that require student to *regurgitate* what they have *memorised* without being selective on what to write to answer the questions. (Respondent 20180503-101207.123; alumni survey)

> …There should be no memorization, only understanding. Because, real world problem does not include vomiting whatever a student has memorized. Plus, whatever being memorized, we don't remember is after years anyways. Questions set in *exam papers should not require much memorization, it should test students understanding*. Students often complain that the exam papers are difficult, but the thing is, if you truly understand a matter; front, back and upside down. Then a student should be able to answer any twisted question being thrown at them… (Respondent 20180311-153850.762; student survey)

> … A good assessment *should be testing on application, and not memory*. Students should never be given "practise questions" to prepare for exam, but we know that is impossible when they are trained in the "10 years series" era. That is why our workforce rely heavily on existing templates, with no innovation. (Respondent 20180420-103910.115; staff survey)

Sub Theme 3.2: Regular Feedback for Learning and Improvement

From the above table, the word counts suggest that more teaching staff value the role of feedback in quality assessment than students and alumni. Viewing the datasets as a whole for thematic analysis, the second intent of quality assessment practices is to provide opportunities for students to improve their works through regular feedback:

> Lecturers or mentors to give *constructive feedback*, which is very helping in helping the student understand *why and how certain thing works*. (Respondents 20180524-162500.450; alumni survey)

> To receive *useful feedbacks* means you have a piece of information for you to work towards it, you get *to improve and change your work* and make it much better and you will understand *where went wrong and how to correct the mistake*. (Respondent 20180329-152945.614; student survey)

> We teach students how to learn new subjects. We teach students active learning, work together and solve problems. We *feedback to students the grade and mistakes*. We teach the students *how to improve*. (Respondent 20180227-094801.702; staff survey)

Sub Theme 3.3: Checkpoints for Monitoring Students' Attainment

The third intent of quality assessment practices is having checkpoints to ascertain students' understanding and application of subject knowledge and skills:

> … assessment practices allow the teacher to *check whether the student fully understands* the subject. (Respondent 20180503-112652.29; student survey)

> …Quality in assessment practices has a little to do with learning practices as well. These go together. We *monitor and check the learning to ensure that there's understanding*. We *test to check understanding and application*. Ensuring that assessment practices are appropriate to the learning is also important. (Respondent 20180227-093516.43; staff survey)

What and where are these checkpoints? Within the polytechnic, these checkpoints are in the forms of quizzes, tests and face-to-face questions employed during lectures, tutorial sessions and project works. These checkpoints inform staff and students of students' understanding and attainment of knowledge and skills:

> Staff demonstrates and subsequently get student to participate in the exercises also *checking understanding of knowledge taught through test…* (Respondent 20180420-093520.489; staff survey)

> …Quality in assessment practices means being able *to check for students' understanding or attainment of subject knowledge and skills through project works, pop quizzes and test papers* if need be. (Respondent 20180305-081618.797; alumni survey)

> 'Quality' in assessment would refer to the educator being able *to identify appropriate checkpoints* to help note the areas the students aren't unsure in. E.g. *after every chapter/sub-chapter or during tutorials*, the educator can make *Kahoot! quizzes or face-to-face questions* to check on the students' understanding. This will help clarify the doubts of students immediately and these doubts would not be delayed till revision lectures to be clarified… (Respondent 20180425-124248.719; student survey)

1.4 Main theme 4: Student Preparation for Lifelong Learning and Skills Mastery

As an extension to the discussion on quality practices (RQ1), I propose three sub themes according to key aspects of student preparation for lifelong learning and skills mastery that are important to survey respondents (RQ3). To clarify these sub themes, I tabulated word counts (within brackets) of the following words to give a sense of their prevalence in the questionnaire datasets. I italicized key phrases in the quotes in support of these sub themes.

	Survey respondents		
	Staff	**Students**	**Alumni**
Sub theme 1.1: Future oriented students	future (18), university/ studies (15), mind (9), habit (2)	future (44), studies or further studies (18), believe (18), mind (9)	university/ studies (26), future (13), mind (9)
Sub theme 1.2: Interests of students	interest (23), curious or curiosity (2)	interest (23), curious or curiosity (8)	interest (21)
Sub theme 1.3 Staff as mentors and role models	role model/ mentor (5)		

Table 11 Sub themes, codes and word counts of main theme 4 (lifelong learning)

Sub Theme 1.1: Future Oriented Students

The first aspect is for schools to help students see the need to keep up with learning and deepen their knowledge and skills:

> …With the rapid speed at how things around us are changing, *any deepening of technical or domain skills would have to be picked up along the different stages of a learner's life*. Hence, if they have sound life skills like being self-directed learners or resilience, they would be *more aware of the need to keep abreast of times*, less fearful of uncertainties and changes and be more open to the need to be lifelong learners. (Respondent 20180328-140743.704; staff survey)
>
> More hands-on experiences and real-life scenarios that would better *prepare the students for future work matters*. (Respondent 20180430-105431.113; alumni survey)
>
> Learning doesn't end in school, as *I believe learning is a lifelong journey*. (Respondent 20180308-222925.718; student survey)

Sub Theme 1.2: Interests of Students

The second aspect is for schools and teaching staff to ignite and nurture students' interests and curiosity in their chosen fields of studies:

> The learner: *gains interest* in a particular field that provides more *sustained motivation*; gains knowledge; and gains skill. (Respondent 20180523-151033.435; staff survey)
>
> Please not only focus on the content but grow them as individuals. Influence them, *make students curious*, don't spoon-feed us with all the answers. (Respondent 20180311-153850.762; student survey)
>
> *When the lessons are interesting, students will start to explore and learn by themselves*. If not, they would start to lose interest in the subject contents and finally would not learn well. (Respondent 20180305-164923.365; staff survey)

Sub Theme 1.3: Staff as Mentors and Role Models

The third aspect is for teaching staff to be mentors and role models to students in their journey for skills mastery and lifelong learning to motivate students to do likewise:

> Teacher themselves are industry practitioners who have the know-how and life-long learning spirit - that will be a *good role model for our students*. (Respondent 20180507-155547.544; staff survey)

> *Mentor* to student procedure that is engaging. Opportunities to make mistakes and to correct them. Also, to ask questions anytime when in doubt. (Respondent 20180326-090547.547; staff survey)

> Good student engagement, *motivate self-directed learning in students*, to promote lifelong learning where they can learn, unlearn and relearn new things even after they graduate. Use our expertise to develop skills and knowledge in students and to support sustainable progress. Provide feedback to help students *build confidence*. (Respondent 20180325-223438.122; staff survey)

2 CONCEPTIONS OF QUALITY

The second set of findings is generated mainly from senior management interviews, focusing on conceptions of quality. I propose five conceptions of quality related to teaching, learning and assessment in main themes A to E.

2.1 Main Theme A: What Is Important?

My research proposes the first conception of quality as what is important to the polytechnic (RQ1, RQ3). I have consolidated main theme 3 (meeting expectations and targets); main theme 6 (what is important to us?); and main theme 7 (measuring what is important to us) from thematic analysis phase 5 under main theme A – what is important – because these themes set an overall tone for what is important to the polytechnic and its schools. I will next elaborate three areas that are important to the polytechnic.

The first important area is about meeting expectations of its key stakeholders. Targets related to these expectations, in the form of performance or quality indicators, are included in the BSC metrics. To give a sense of the prevalence of this conception, there are sixty counts in the interview transcripts containing words: expect/ expectation (19); stakeholder (18); meet/ meeting (11); target (9); and goal (3). To the polytechnic, it is important to meet expectations of key external stakeholders consisting of employers and the MOE (or Government). It is the MOE's mandate for the polytechnic to educate future workforce (with diploma qualifications) for industry. Meeting employers' expectations may translate into graduate employment, which is valued as an industry endorsement of the quality of learning or training provided by the polytechnic, as seen from the next quote by senior management MM:

> …In terms of quality learning, there are different ways we can have a sensing of that. In ISO 9000 before, the one we are monitoring the graduate employment survey as a pseudo indicator that our industry actually accept our graduates as having the skills because they

> employ them so that means we were able to inculcate the right work values. We imbed in them the right skills so that industry will actually hire them. (Excerpt of interview 3; start time 1:49 [min:sec])

It is also important to meet expectations of internal stakeholders consisting of management teams, students and graduates, as seen in the next two quotes. The Management teams employ student feedback to gauge the teaching effectiveness of teaching staff through the OnSET survey. The polytechnic sets a high target of "strongly agree" and "agree" student ratings to the survey question, "Overall, staff is effective in teaching." The teaching effectiveness rating has been a BSC indicator until the BSC revamp in 2019. It is important to the management that members of teaching staff attain the teaching effectiveness rating, which is also used as a quality teaching measure for the external ISO 9000 quality audit, as explained by senior management MM:

> In terms of quality teaching, you know ISO 9000 has quality objectives. And one of the quality objectives is the teaching effectiveness rating. That one is monitored as part of ISO 9000 and reported to the auditors. We are to ensure that all our staff actually are able to meet a certain target, and our target is 95%… (Excerpt of interview 3; start time 1:49 [min:sec])

Although this is not the place to discuss the adequacy of OnSET rating as a measure of quality of effective teaching, the use of OnSET rating reveals an institutional perspective to assure and monitor quality teaching. Other senior management interviewees reiterate their support for the OnSET as a form of feedback for continuous improvement of teaching practices, as seen from a quote from senior management SS:

> …We all know the difficulty with OnSET. Although it is a number, but there is also accompanying quantitative comments, which is good for formative for the staff to take note of, so that he or she to work to see how certain areas can be improved. It is good in that sense. We just hope staff can take the feedback in an open manner, it's for improvement, and not a criticism by students, although students are very critical nowadays (laugh). I think the other note to take note of, is that OnSET shouldn't be used alone in assessing staff's ability to teach well, and that their R.O. <reporting officers> must make special effort to help if help is needed, to guide when guidance when is required, and to have close working relationship with the staff… (Excerpt of interview 6; start time 34:00 [min:sec])

The second important area is about measuring polytechnic's quality education. There are 85 counts in the interview transcripts containing these words related to this conception: measure/ measuring (32); number/ numbers (23); student profile/ [D]SP (11); attribute (3); qualitative (10); and quantitative (6). Measuring enables the polytechnic to monitor and report its achievements and progress to its key stakeholders. For example, the polytechnic tracks student development in life skills and graduates' employability through measures in the Balanced Score Card, Student Satisfaction Survey and Graduate Employment Survey, as seen from the interview with senior management MM:

> …There are a lot of platforms that we were already reporting indicators. The first consideration is – are the indicators that we are reporting to those platforms actually relevant to us to make them our own or they are really just required by those other platforms? *If they are required by those platforms and they are important to us, might as well make them as part of*

> *our Balanced Score Card*. Otherwise, it is like having two different sets of indicators – external parties or other parties and our Balance Score Card… Others are like for example the *[D]SP, [name of polytechnic] Student Profile, we have a set of life skills, and we want to measure whether we have achieved or embedded those life skills in students*. But we are running the [D]SP only for the first year, do we measure immediately, after three years or when they are actually in the workforce? We have already built in *measures in the Student Satisfaction Survey and Graduate Employment Survey*. Now it's a matter of waiting, the waiting game, we will find out later whether the students feel that have embodied the life skills, *whether the graduates saying they have embodied the life skills and they are useful in the workforce*. That one is a waiting game… (Excerpt of interview 3; start time 26:26 [min:sec])

The third important area emphasizes on skills mastery and lifelong learning in polytechnic's quality education. I did not carry out word counts for "skills mastery" and "lifelong learning" because I used these terms frequently to elicit responses from interviewees. However, I discussed earlier about word counts regarding student preparation for skills mastery and lifelong learning in main theme 4. During the interview with senior management, MM clarifies the polytechnic's perspective of skills mastery in terms of domain skills, life skills and future skills:

> …When we talked about indicators, we didn't decide on the indicators, not the cart before the horse, we really went back to say what is now really important to us. Now, what is really important to us has been captured by the 3S, the 3R, the 3E. The 3S is domain skills, life skills and future skills, which I think is the one you are referring to when you say skills mastery. (Excerpt of interview session 3; start time 17:47 [min:sec])

To the polytechnic, it is important to develop students as lifelong learners, which is a polytechnic's desired student profile. Senior management interviewee LL echoes similar view:

> (.) In this case, I believe the course needs to find a balance in terms of outcomes they want for their graduates straddling between preparation for work and preparation for university. Maybe, one crucial thing is that they should develop their students to be very strong self-directed learners so that they don't need to teach their students everything. They don't have to push the content to them so much but if students can learn on their own, that is a very important quality indicator for the polytechnic… (Excerpt of interview 1B; start time 00:05 [min:sec])

Although I did not specifically ask students, alumni and staff members if lifelong learning and skills mastery were important to them, 67% or more of the questionnaire respondents concurred that quality practices in their schools prepared students in these areas (Table 12). In general, the data also suggests more staff and alumni as compared to student questionnaire respondents perceived that student preparation for lifelong learning and skills mastery through teaching, learning and assessment practices were "more than adequate" or "adequate" (RQ3). I infer that this may be due to more staff and alumni having work experiences.

Quality practices in their schools prepared them for lifelong learning:	Percent* of questionnaire respondents who gave "more than adequate" and "adequate" ratings		
	Staff	**Students**	**Alumni**
Teaching practice	77%	72%	82%
Learning practice	77%	72%	79%
Assessment practice	67%	68%	71%
Quality practices in their schools prepared them for skills mastery:			
Teaching practice	75%	68%	77%
Learning practice	74%	69%	77%
Assessment practice	71%	68%	74%

*(Note: *% based on total number of survey respondents who opted for "more than adequate" and "adequate" over total respondents and rounded up/ down to the nearest whole number. The other options in the 6-point scale were "somewhat adequate", "not quite adequate", "not adequate" and "NA". Respondents who opted for "NA" which means "I don't know" responses and missing data were excluded from this computation*.)

Table 12 A comparison of the perceptions of staff, student and alumni questionnaire respondents on student preparation for lifelong learning and skills mastery

2.2 Main Theme B: Preparing Students for Work

My research suggests a second conception of quality as preparing students for work (RQ1, RQ3). As mentioned earlier, the high counts (109) in the interview transcripts containing words: work (46) [excluding framework (14)]; industry (35); and employers (28) suggest their importance within the polytechnic. I included the next three excerpts from the interviews to highlight the prevalence of this conception as well as perspectives and values associated with it. Within this conception, students' employability is crucial.

Excerpt 1 sets the tone that it is the Government's mandate for the Polytechnic to produce graduates for specific industries:

> MM: "It's one measure <graduate employment rate> that actually tells us if we are actually fulfilling our mandate."
>
> GH: "Mandate (.)?"
>
> MM: "To produce graduates for specific industries. Polytechnics have quotas for specific industries. So, if we are not producing the numbers for specific industries, where does Singapore get the right people? We are also stopping influx of foreigners; it is also not good in the long run for foreigners to man the industries. As polytechnic, we have to be more actively

how we are fulfilling the needs of Singapore's economy."... (Excerpt of interview 3; start time 31:19 [min:sec])

Excerpt 2 contains three quotes that clarify senior management LL's perspective on important aspects to prepare students for work – helping them to be lifelong learner; developing discipline-related skills; and demonstrating their capability for employment:

> Quality teaching, it would be helping students to learn to be lifelong learners, so, the skills of lifelong learning as well as the discipline specific areas so that they are able to contribute in the work areas when they leave us... (Excerpt of interview 1A; start time 1:53 [min:sec])
>
> Yes, because the polytechnic sector, or at least TP is preparing our graduates for the world of work, and so they must be able to demonstrate their capability in whatever the discipline that they are working in, if they want a job... (Excerpt of interview 1A; start time 11:53 [min:sec])
>
> So, the question has always been, asked of the school, course managers, course coordinator, how is your course, how is your school developing graduates in the areas of skills needed for the industry they are going into. This is dictated by, in one aspect what the employers need and the other aspect is, now the SkillsFuture skills framework that is governing each sector... (Excerpt of interview 1A; start time 16:20 [min:sec])

Excerpt 3 underscores the importance of preparing students to able to apply their knowledge and skills learnt in the polytechnic in their jobs:

> AA: "It is important because at the end of the day, we want to know that students are able to apply what they learnt when they go out to work. What better [unclear] to learn in the school because these positions are part-time positions but at least, they already got started."
>
> GH: "So, quality in terms of they apply what they learnt and prepared for work?"
>
> AA: "That's right."... (Excerpt of interview 4; start time 1:25 [min:sec])

From my research, staff, alumni and students view that quality practices need to include preparing students for industry. I infer that they support the conception of quality in terms of preparing students for work. They allude to industry relevant content and industry related works that prepare students for the industry:

> There is a lot of focus on industry preparedness... they try to link industry concepts. In Year 1, multiple modules are merged, and different skills complemented <each other> in a single project... (ZJ; student interview; start time 1:57 [min:sec])
>
> The use of other real-life scenarios that we will be tested or need to use in future. (Respondent 20180325-004525.902; student survey)
>
> Learning enterprise. Students have the opportunity to apply what they have learned in a *real-life working experience*. (Respondent 20180326-090926.228, staff survey)
>
> [The polytechnic sets up learning enterprises, which are specialized facilities that simulate close-to-industry practices.]

2.3 Main Theme C: Understanding Concepts and Deepening Skills

The abovementioned excerpt 3 alludes to a third conception of quality in terms of students going beyond knowledge to understand concepts and deepen their skills through applications (RQ1, RQ3). In doing so, students are more ready to apply knowledge and skills learnt in their jobs, which I will elaborate further. From the Senior Management interviews, there are fifty-seven counts in the interview transcripts containing words: apply/ application (24); concepts (15); understanding (8); hands on (5); and by doing/ making (5). Within this conception, deepening knowledge and skills are valued. I included the next four interview excerpts to clarify this conception.

Excerpt 1 clarifies senior management HH's perspective on quality teaching that requires students to go beyond memorising of knowledge to understanding of concepts:

> HH: "Personally, the quality is that we are able to impart the necessary knowledge to students; students can go through the necessary process, the thinking process is critical, rather than memorising and looking at result per se."
>
> GH: "So, that's quality teaching: they get the knowledge, they don't just memorise."
>
> HH: "Yeah, they go through the learning process, they know the concept by thinking through and not just memorising. In a way, we want them to think through, in the way, it is also through the thinking process, also understanding the concept."
>
> GH: "As the students think, they will also learn the concept."
>
> HH: "Yeah"... (Excerpt of interview 2; start time 2:00 [min:sec])

Excerpt 2 reveals a perspective of senior management AA on students asking questions and applying knowledge and concept in daily life to deepen their understanding of subject matter:

> In my opinion, quality teaching is where tutor or lecturer is able to impart the knowledge succinctly to the students such that they are able to understand. It helps if there is use of application, the application of concepts in industry, in everyday life. This is one of the key features... As to what is quality learning, quality learning is where students are able to engage themselves in the learning, so that it is not a one-way traffic. This is where student is able to ask questions, be part of the learning plus able to apply what they learnt in everyday life... (Excerpt of interview 4; start time 1:25 [min:sec])

Excerpts 3 alludes to a view amongst management staff that deepening of skills will require students practising and refining their skills in iterations. I italicized key phrases in the next two quotes in support of the main theme:

> It is pretty holistic learning, you can really look at the student projects and the kind of rigour. It is not about generating the quantity of work, it is the quality, I always tell them. But, in the initial year, they need to generate quantity of work. *By doing again and again, refining it, they will achieve quality*. The process becomes very important, they will also document the process. We want to know how they developed. The process document becomes important, that is part of their learning... (Senior management RR; excerpt of interview 5; start time 10:12 [min:sec])

> So, *it cannot just stop within the confine of a particular subject*, and there must be concerted effort to build it into the curriculum. By the end of third year, *students would have hone the skills*, let say of critical thinking, self-direct learning. Which is why self-directed learning an initiative helmed by [name of department]. [Name of department] is telling the schools is that you must have *a minimum of one subject per semester to expose students to the framework of self-directed learning so that it keeps reminding them, honing the skills of self-directed learning*. By third year, even if lecturers don't build it in curriculum and remind them to use it, they would have imbibed the skills and apply on their own. This is what we hope to see by the time they go out to SIP… (Senior management LL; excerpt of interview 1A; start time 24:38 [min:sec])

As discussed earlier, staff, alumni and students view that quality practices include understanding concepts through application, which aligns to the conception of quality as understanding concepts, as seen from the next few quotes:

> When we are able to apply what we have learned in *theory into practical*, it helps us *understand what weaknesses and strengths are when it comes to that concept*. Hence, being able to improve on what we know less of. (Respondent 20180420-160806.658; student survey)

> *Hands on experience* overwrites memorising of theoretical knowledge. Students can 'visualise' or grasp concept better. (Respondent 20180326-075803.170; staff survey)

> Practical learning is key, as I find that most people can learn better with *hands-on experience* better than just learning the theory. (Respondent 20180325-091757.519; alumni survey)

Regarding the deepening of skills, students, alumni and staff view that developing skills for work; further studies and life in general are important. Staff and senior management interviewees allude to equipping students with basic or foundational skills to enter into workforce. The next quote exemplifies a view held by staff and senior management about the notion of deepening skills:

> With the dynamic changes in our working environment, it would be more useful and meaningful to develop life skills in our learners. Learners with strong life skill sets are likely to respond positively to changes around and ahead of them. It would suffice for us to equip our students with foundation knowledge of their selected curriculum at polytechnic level. With the rapid speed at how things around us are changing, any deepening of technical or domain skills would have to be picked up along the different stages of a learner's life… (Respondent 20180328-140743.704; staff survey)

2.4 Main theme D: Setting Standards and Standardizing Practices

My research proposes a fourth conception of quality as setting standards and standardizing practices within the polytechnic and its schools (RQ1, RQ3). From the senior management interviews, there were twenty-five counts in the interview transcripts containing words: consistent/ consistently/ consistency (13); standard (10); and standardize/ standardise (2). Within this conception, consistency of practices is valued. Several senior management interviewees allude to using learning outcomes to set the standards and standardize teaching. While one might argue that the use of learning outcomes could itself be limiting to learning, this practice reveals an institutional perspective on standardizing

teaching, learning and assessment practices on the ground. I italicized key phrases to highlight their relevance to the main theme.

Excerpt 1 suggests that one can view quality for skills mastery in terms of learning outcomes. In this case, senior management HH asserts that learning outcomes in skills-based and hands-on subjects made learning more visible or explicit:

> HH: "(..) Referring to skills mastery of students, skills-based subjects, we can *view from learning outcome if it is skills-based, it is more visible*. If it is more knowledge and theoretical, may not able to measure more obviously."
>
> GH: "If it is skills-based subjects, easier to see from learning outcome as a quality mark of the subject."
>
> HH: "Correct. For theoretical, you may need more time to see if students can apply."
>
> GH: "For theoretical subjects, must see if students can apply."
>
> HH: "When we talk about skills-based subjects, I'm not sure if my definition is correct, *are talking more about hands-on*?"
>
> GH: "Yeah, skills-based can be seen in terms of hands-on."
>
> HH: "In that sense, the *learning outcome is more visible*."... (Excerpt of interview 2; start time 25:50 [min:sec])

Excerpt 2 alludes to setting standard in quality assessment by balancing the existing learning outcomes to require more from students to apply knowledge and skills in real life contexts, as seen from the interview with senior management SS:

> SS: "...Quality assessment indicators whether they are good assessment or not, really *it's still tied to the outcomes*...To focus so much on just recall, comprehension, even if you are able to apply on paper, it's *nothing like applying it real life to a real problem, in a real application*."
>
> GH: "A possible mark of quality assessment is to (.)"
>
> SS: "*Balance*"
>
> GH: "Balance it and try to move it more *towards how it is being done in real world, the real life*."
>
> SS: "Yes"
>
> GH: "Like the soft skills being displayed in group setting for example."
>
> SS: "Yes, correct." (Excerpt of interview 6; start time 22:18 [min:sec])

Excerpt 3 supports having multiple tutors' perspectives on assessing students' works. It has been the practice in senior management RR's school to standardize assessment practices of non examination based subjects by bringing all tutors together to judge students' works across the cohort:

> RR: "We follow a slightly different approach. [Name of discipline] is very subjective, not like Mathematics where you arrived at one answer and you get full marks. [Name of discipline] has subjectivity, for all subjects, we have *more than one assesso*r to assess the work of the students. We do have the assessment rubrics based on criteria of assessment aligning with

subject syllabus. Let say, if we have four tutorial groups, there are four tutors. As part of their final presentation, *all four tutors would be looking at each of the student's presentation*, they would be sitting in and they would be assessing…"

GH: "It's very different from exam based."

RR: "I would then say that, to me that's *quality, basically bringing all the tutors* together, each of them looking at work across the cohort, they do their *benchmarking* according to what the student has performed and how the student has performed."… (Excerpt of interview 5; start time 20:52 [min:sec])

Staff members also allude to quality in terms of meeting or achieving the learning objectives and outcomes of the lessons:

> Quality is achieved when students achieve the learning objectives and are able to retain and apply knowledge learned in real work situations. (Respondent 20180428-174910.193; staff survey)
>
> The learning objective is met well. (Respondent 20180328-180016.415; staff survey)
>
> Quality means to deliver the lesson in a way that will facilitate the students understanding of the learning objectives and outcome. (Respondent 20180227-112551.559; staff survey)

Few students and alumni broached the topic of learning objective or outcomes, probably because they were not as familiar with these terminologies.

2.5 Main Theme E: Transforming Students

Lastly, my research proposes a fifth conception of quality that emphasizes on transforming students (RQ1, RQ3). There are thirty counts in interview transcripts for these words: confidence or confident (11), grow/ growth/ grown (6), transform/ change (5); related to changes in students); ask question (4); attitude (3); and mindset (1). Within this conception, developing students holistically as individuals is valued. Key phrases are italicized to highlight their relevance to the main theme.

It is my interest to explore this conception of quality, which is more transformational in nature. In this instance, senior management interviewee RR points to students growing in confidence in terms of presenting their ideas and having dialogue with their lecturers:

> RR: "I told you that they come from secondary school system and they used to exam. They are not just used to stand in front of class to present, *they are very nervous when they are in front of class*…"
>
> GH: (laugh)
>
> RR: "…*From day one, they come forward to present, they asked them to make something and share with their peers*, the lecture component is minimal, it's about learning by doing. We do have lectures; we keep it short. Whatever key knowledge areas they are picking up through the lecturer, they are applying it, they learnt by doing."
>
> GH: "Do they have difficulty in doing this when they first started?"

RR: "Of course! Some of them may have confidence, but *majority of them would take a while to open up*."

GH: (laugh)

RR: "For us as lecturer, we tell them don't worry, there is *no right or wrong answers, slowly they start to gain confidence*. By the end of the first semester in Year 1, they are ok already. That would kind of kick start *the process of transformation*, if you see *their final year work in the [name of discipline] show, you see them, they are totally transformed*."... (Excerpt of interview 5; start time 14:49 [min:sec])

In excerpt 2, senior management SS alludes to students having to change to ask more questions:

SS: "...Something of student learning – they have to question. Students seldom question even when you stopped to ask. I have very seldom come across students who asked good questions. I wonder if it is something, we need to teach students how to ask questions. Even something so simple as "Teacher, can you explain again because I don't quite get it?" Even something so simple as that, they don't ask. How to then ask a deeper question about "How do you relate this?", "How do you make this connection with this, this?", "With this chart, how do you make this sort of inference?" They cannot. I wonder where have the ability of students to ask questions gone to?"... (Excerpt of interview 6; start time 11:07 [min:sec])

To me, it is of transformational value to students that they grow in confidence, skills and mind-set as a lifelong learner. Besides igniting and nurturing students' interests (main theme 4), it is important to foster value and mind-set for learning and growth amongst students:

The school might need to encourage students to pick up new skills during their holidays to further equip themselves or at least *introduce the concept of lifelong learning*. This will prepare the students when they graduate and understand *the value of life-long learning*, even as an alumnus in the workforce... (Respondent 20180503-172211.161; alumni survey)

Positive *nurturing* consultation and feedback without hurting the feeling and without judging the students' ability limits, focus on *encouraging growth mindsets*. (Respondent 20180325-185538.200; staff survey)

3. CONTEXTUAL FACTORS

The third set of findings focuses on contextual factors that influence the conceptions and quality practices. I will draw upon all datasets to clarify key contextual factors that influence conceptions of quality and practices in the polytechnic (RQ2).

3.1 Main Theme C1: External Contextual Factors

In this main theme, I propose three external contextual factors, namely the Government; the industry and employers; and the national level skills framework (RQ2). To give a sense of their prevalence, there are 115 counts of interview transcripts containing these words: industry (35), employers (28); Government/ MOE (23); SkillsFuture/ skills framework (14); parent (11); and public (4).

Sub Theme 1.1: The Government

The Senior Management interviewees illuminate the influence of the Government on quality education in the polytechnic, as seen from the next three quotes/ excerpt. This contextual factor will probably influence quality practices and the key conception of quality as what is important to the polytechnic (main theme A). Senior management LL points to the influence from the Industry Transformation Map on student training:

> The Government has come up with the Industry Transformation Maps for the whole of Singapore… Different sectors and domain areas, and within there, for anybody who want to progress in these sectors, a career map for them. What happens is that, from the point of a worker, what areas they are going into, the beginning, where they can progress. The next part is where they can go to, to progress further. From the point of view of the polytechnic, we come in as training provider… (Excerpt of interview 1A; start time 16:20 [min:sec])

Senior management MM alludes to the influence of the Ministry of Education (MOE) and other government agencies on Quality Management Systems in the polytechnic:

> MM: "I feel for PET and CET, the higher education division of MOE is very much into quality. This I have seen in a good number of reports that we have been submitting to be very much numbers. We must always record numbers. Of course, there is always our own motivation, applying for SQC where we report of these quality indicators. That one is purely, I cannot say purely, at the start it was push by the Government. All the starting point seemed to be a push by the Government."
>
> GH: "A push by the Government to go for Singapore Quality Class?"
>
> MM: "Yes"
>
> GH: "A push by the Government to go for ISO 9000?"
>
> MM: "Yes. Even if it is not a push by the Government. Hey, the other government agencies have gone for this certification, and we haven't gone, we should go also. Now, we are at the point, the other agencies have already allowed their ISO 9000 to lapse, let's also allow our ISO 9000 to lapse; the other agencies have allowed their SQC certification to lapse, let's also allow our SQC certification to lapse. We are following, following, following a certain pattern, we are so good in following pattern."… (Excerpt of interview 3; start time 9:23 [min:sec])

Senior management LL clarifies the influence of the Ministry of Education of Singapore (MOE) on teaching approaches and learning contexts:

> In terms of quality indicator, so, one example when the Government, the MOE came up with this "Teach Less Learn More", now they go into lifelong learning, actually dictates how teaching and learning in the polytechnic is skewing to. We then brought in pedagogy such as self-directed learning, problem based learning so that students trained are more self-directed… (Excerpt of interview 1A; start time 8:00 [min:sec])

What is important to the polytechnic will likely cascade to schools and influence views of staff, students and alumni on schools' quality practices (main themes 1 to 3).

Sub Theme 1.2: The Industry and Employers

My research proposes that views and expectations of employers are key influences of students' training outcomes. This contextual factor will probably influence the conception of quality as preparing students for work (main theme B). Senior management LL points to influences from industry needs on training outcomes:

> LL: "It would be the employers, actually, it would be what the industry needs. So, we have always been looking at what is it that the graduates need to demonstrate when they go to the workplace? What are some of the outcomes that the employers need of diploma graduates of TP?"
>
> GH: "Oh, I see, you are saying that it is the employers' expectation and what the employers need of the graduates. These are the key influences that kinda promoted this view of authentic assessment and practice, performance based assessment."
>
> LL: "Yes, because the polytechnic sector, or at least [the Polytechnic] is preparing our graduates for the world of work, and so they must be able to demonstrate their capability in whatever the discipline that they are working in, if they want a job."... (Excerpt of interview 1A; start time 11:53 [min:sec])

Senior management HH alludes to the influences from employers' feedback to polytechnic on the adequacy of students' knowledge to enter workplaces:

> HH: "...We don't expect our students to know everything, but at least the basic knowledge to start."
>
> GH: "What might have influenced the selection of SIP employers rating as a BSC indicator?"
>
> HH: "As we said, from employers' point of view, it is important to see whether students have acquired a certain knowledge. That's why we need employers to give us some feedback on our students..." (Excerpt of interview 2; start time 37:28 [min:sec])

This contextual factor also seems to influence the view amongst staff, alumni and students largely that quality practices should include preparing students for industry and employment, as discussed in main themes 1, 3 and 4. A key reason why employers can exert influence is due to wider context of Singapore's economistic purpose of education where education is meant to support economic development of the country and education is an individual investment to enhance future earnings as part of the human capital theory discussed earlier.

Sub Theme 1.3: National Level Skills Framework

This contextual factor will probably influence the key conception of quality as transforming students (main theme E) and quality practices related to student preparation for skills mastery and lifelong learning (main theme 4). Since the launch of the nation's SkillsFuture movement in 2015, there is a greater emphasis in skills development and lifelong learning. Embedded within the Industry Transformation Maps, the national skills framework influences the selection of key performance indicators in the revamped the Balanced Score Card 2019, as explained by senior management MM:

> In terms of skills mastery, we never really measured skills mastery… But since we have a new Principal, and it just so happen that the new Principal – also the same timing as SkillsFuture movement in Singapore (laugh). It was timely that we review the Balanced Score Card. In the Balanced Score Card, the new one, we are actually focusing on indicators, looking at domain skills, life skills and future skills – the 3S of [the Polytechnic]… (Excerpt interview 3; start time 17:47 [min:sec])

Along with nation-level emphasis in lifelong learning, senior management RR describes that there is greater push for the polytechnic to offer more continuous education and training (CET) programmes for adult learners:

> Because of the nationwide SkillsFuture, lifelong learning. The repercussion is coming to the IHLs, we are all gearing up for continuing education programmes. I would say the market is pretty saturated already, you see similar courses being offered. There is no point in duplicating these courses, where are the niche areas? Where are the emerging areas that is important for all of us to configure? … As I mentioned, it is very competitive out there. Every polytechnic, ITEs and universities have a training arm that focuses on continuing education. We are also competing with private sector, if you look at Deloitte, the big companies, they have a training arm offering courses to their employees. So where do we fit in? That's one of the most challenging factors… (Excerpt of interview session 5; start time 29:35 [min:sec])

3.2 Main Theme C2: Internal Contextual Factors

In this main theme, I propose six internal contextual factors that influence the conceptions of quality and quality practices in six sub themes (RQ2). There were forty-six counts from senior management interview transcripts containing these words: Management (20); PCEO/ Principal (10); SDL/ PBL/ eLearning* (9); and ISO9000* (7) related to first two sub themes 2.1 and 2.2. PCEO (or Principal of the polytechnic) and Management are key leaders of the polytechnic. The polytechnic level frameworks (*) mentioned by interviewees are related to either teaching approaches or quality.

<u>Sub Theme 2.1: Priorities of PCEO and Management</u>

This contextual factor will probably influence the key conception of quality as what is important to the polytechnic, given that priorities of key leaders usually cascade down to schools for implementations. I include the next two excerpts that uncover the influence from the principal and senior management of the polytechnic on the quality of teaching, learning and assessment. Senior management LL alludes to influences of key leaders on quality pedagogy:

> … I can say that there are principals who are more supportive of pedagogy, of teaching and learning than others. Others are more focused in other areas. So, when the ones who have been more supportive of pedagogies, they were the principals, you can see that the whole quality, the whole ambience of teaching and learning was stronger, I would say. Stronger, and people were more concerned about the learning of students using pedagogy than other principals who have their focus in other areas and skewed away from pedagogy… (Excerpt of interview 1A; start time 1:53 [min:sec])

Senior management HH points to the influences of PCEO or the Principal on quality assessment practices:

> HH: "We have met the staff session with PCEO. We ever asked him this question, with the kind of profile of students, do we expect the same kind of passing rate? I think Principal was saying that we should not compromise our standard, but we must put in our efforts to bring students up to the standard. Both sides have to do the work. With this kind of commitment from the higher management, staff is more confident and more comfortable to assess our students accordingly. That kinda maintain a certain quality."
>
> GH: "A certain quality and standard, especially if this communicated by PCEO, which is equivalent to the Principal of the polytechnic, and management in general from your school as well communicated to maintain a certain standard."
>
> HH: "It is not to leave the students alone, we have to whatever support needed, render the support to students."... (Excerpt of interview 2; start time 2:00 [min:sec])

Staff OO and PP suggest that a loop-sided focus of the School Management on industry projects negatively influences quality practices. Staff interviewees used a short form, 'glam' to mean glamorous, as seen from the interview transcript:

> OO: "...In fact, it is an un-written policy that your teaching has to be up a certain mark, beyond that it really doesn't matter, you reach the mark, which is you show up for class, your survey results are ok, that's fine already. Beyond that, there is no motivation actually. The management tends to push more on how successful your project are – other factors which are more measurable, which bring more, not sure what to say."
>
> PP: "More 'glam' (laugh)"
>
> OO: "... Unfortunately, teaching is not something that brings glam to the school, it is one of those things that gets forgotten."... (Excerpt of staff interview; start time 16:58 [min:sec])

<u>Sub Theme 2.2: Polytechnic Level Frameworks</u>

Polytechnic level frameworks influence what senior management interviewees perceived as quality practices in their course of work. For example, developing self-directed learning or SDL amongst students as one of the quality practices:

> AA: "As to the lifelong learning, we get all our students to the SDL track, through that they learn to monitor the work that they do. We also have problem based learning for all our HR subjects, so through this, they learnt skills, which I think, can be used in anywhere else, in their course of study or work."
>
> GH: "This SDL track, where does it come from?"
>
> AA: "It comes from the polytechnic as a whole. [Name of department] spearheaded this in conjunction with the schools."
>
> GH: "It came from the [name of department] and then it cascaded down to the schools."

AA: "That's right. We basically executed it from Year 1, Year 2 and Year 3."... (Excerpt of interview 4; start time 6:37 [min:sec])

A second example, assuring quality practices through quality management systems in the next excerpt:

MM: "... From the institutional point of view, then we have our formal system and structure, for example, we used to have our ISO 9000, that is part of the institution, the way we have developed and inculcated or so to speak reinforced quality in [the Polytechnic]. But ISO 9000 has been allowed to lapse, so we have our internal quality management system, so that's also formal. Even before those external mechanisms that force us to have quality education, our [the Polytechnic] Act in itself built in quality education."

GH: "You are saying that for institutional quality, there is this ISO that forms our views what should be institutional quality, is it?"

MM: "There is a formal structure, so I go back, [the Polytechnic] Act that says Senate must do something, those standing committees have been there as part of [the Polytechnic] Act. They are supposed to be looking into approval of course, making sure that it is relevant to industry, making sure that we deliver according to what is needed by Singapore economy. It is already part of our skeleton. In terms of the muscles that formed [the Polytechnic] – that will be the formal structure like ISO 9000 and EQMS < comprises school, course and subject reviews.>. Then [the Polytechnic], as a formal institution. There are certain requirements that we consider ourselves to be providing quality education. There are certain listing of requirements that we have to comply with, according to ISO 9000."... (Excerpt of interview 3; start time 1:49 [min:sec])

Staff interviewees shared about implementation issues such as the lack of resources and over reliance on templates that reduced the positive influences of polytechnic frameworks on quality practices, for example, in eLearning. Likewise, students and alumni participants ranked eLearning the lowest in terms of developing their skills amongst the teaching approaches and learning contexts surveyed. Otherwise, very few students and alumni participants commented about sub themes 2.1 and 2.2, probably they were not familiar with them.

Sub Theme 2.3: Staff Related Contextual Factors

This contextual factor influences more on quality practices. Within the polytechnic, it is common to refer teaching staff as lecturer, staff and tutors. I used "√" to indicate that research participants used these terms. I also tabulated their word counts (within brackets) in the questionnaire datasets for reference.

These keys words were frequently cited in the surveys:	**Survey respondents**		
	Staff	**Students**	**Alumni**
Lecturer	√ (17)	√ (44)	√ (31)

These keys words were frequently cited in the surveys:	Survey respondents		
	Staff	Students	Alumni
Staff	√ (26)	√ (14)	√ (21)
Tutors	Nil	√ (11)	Nil

Table 13 Codes and word counts from questionnaire surveys for sub theme 2.3 (staff related contextual factors)

Similarly, there are 94 counts from senior management interview transcripts containing these words: lecturer (20); staff (59); committed (7); learning support (3); help students (3); and connection (2). Thematic analysis suggests three staff profiles that positively influence quality education. Firstly, senior management HH credits the influences of committed staff members on quality practices:

> GH: "And from your experience here, could you describe a little bit about these committed staff… in ensuring quality teaching?"
>
> HH: "If they have to do within the campus, they have to spend the time, sometimes a lot of them have to bring work home. Sometimes, weekend they have to work, to make up the time."
>
> GH: "Oh, the commitment is seen by bringing work home."
>
> HH: "A lot of staff is doing that or stay back."… (Excerpt of interview 2; start time 8:36 [min:sec])

In support, student and alumni survey respondents also point to committed staff members who have enriched their learning experiences:

> Passionate lecturers who are very keen to help the students and enrich their learning experience. (Respondent 20180422-170340.293; student survey)
>
> Overall, my education at TP has been great. I felt I learned so much during my three years and there were great teachers, some very passionate about their line of work. This passion had rubbed off on me in some way and I feel that is most value-added experience any student can hope for. (Respondent 20180502-163910.661; alumni survey)

Secondly, senior management SS points to the connection between teaching staff and students is key for quality teaching and learning practices:

> I guessed lecturers do play an important part, it is not so easy to pinpoint exactly what qualities staff must have in order to make such an impression on the students. I am sure it is not just one quality, but a number of lecturer qualities: they must show care and concern, you must have made that connection, student is open to lecturer's comment and remake, take it into themselves, only when that happen, they feel they learnt the subjects. I know for certain lecturers, the good lecturers, making an impression on students during SIP, during Major Project. It's a reflection that staff have done a good job – setting the tone, the pace of the

> subject, making a safe place for students to enquire… (Excerpt of interview 6; start time 1:05 [min:sec])

In support of SS's perspective, I include quotes from staff, student and alumni research participants:

> …I think being genuinely concern for students could be an important point that is overlooked. Majority of people responds well to people who cares for them, doesn't have to be nice guy type. I think it's just plain human nature. (Respondent 20180329-134636.887; staff survey)

> Encourage lecturers to have more personal involvement in the class and support them to ensure he/she gives cares more about what the student is learning so that they can easily know what students are struggling with and take appropriate action. (Respondent 20180503-000913.994; student survey)

> I am fortunate. Majority of my lecturers – not like teacher-student relationship – more like friends – good friends. Majority of them, they noticed every single student. There was one time, I was heartbroken. When they saw us in trouble – they noticed us – more than just a teacher's perspective. They approached us one to one, asked if we were ok, they gave <us> encouragement and motivation to do better. Like what <alumnus RR> said, their teaching style was very open. They didn't mind staying up late to meet us, hanging out us with us – very welcoming. Whatever problem we have with our education, because of that, we improved a lot in our learning. (Alumnus ZI; alumni interview; start time 26:43 [min:sec])

Thirdly, staff members who are knowledgeable about their fields of practices positively influenced quality practices:

> Teacher themselves are industry practitioners who have the know-how and life-long learning spirit, that will be a good role model for our students. (Respondent 20180507-155547.544; staff survey)

> Furthermore, we are also given classes on the software we use, for example, in our modules that teach us software like [name of software1] and [name of software2] we are taught by active professionals in the industry. (Respondent 20180429-003624.790; student survey)

> … It also means that he is very knowledgeable in his field of expertise, and it shows that he or she is prepared to teach and impart the knowledge onto the students. Also, being competent is another quality I find very important: know what you can and cannot teach. If your knowledge is rusty, brush up before teaching it because students know when you don't prepare well for class. (Respondent 20180502-215820.608; student survey)

<u>Sub Theme 2.4: Assessment Related Contextual Factors</u>

This contextual factor probably influences more on quality practices. I tabulated word counts (within brackets) of three common forms of summative assessments, namely quiz, test and exams or examination in survey responses across survey datasets, as presented below. There are twenty-five counts from senior management interview transcripts containing these words: test (14); examination/ exams (6); and continuous (5). I excluded 'assessment' from word count because I often used it in the interview questions to elicit responses from interviewees.

These keys words were frequently cited in the surveys:	Survey respondents		
	Staff	Students	Alumni
Test	√ (6)	√ (19)	√ (16)
Quiz	√ (3)	√ (7)	√ (8)
Exams or examination	√ (2)	√ (9)	√ (7)

Table 14 Codes and word counts from questionnaire surveys for sub theme 2.4 (assessment related contextual factors)

I describe the nature of assessment-related contextual factors in three aspects. Firstly, senior management HH highlights that schools and teaching staff are sensitized to meet a certain passing rate, and this sensitivity could influence quality practices on the ground:

> HH: "Passing rate, I mean when subject has higher failure rate rather, then I think people start to question."
>
> GH: "When high failure rate, they will ask why."
>
> HH: "Correct. But certain subject, the nature of the subject is more difficult than other subjects. Again, the learning support that we have to render to students depending on the nature of the subject."
>
> GH: "If learning support is given to the students, it will help students?"
>
> HH: "It will help some of the students. Because certain subjects are more difficult, and they are kinda sensitive to passing rates, some of the assessment may not be what they should be. It should not be based on the cohort, that's what always said. It should be based on learning outcome."
>
> GH: "So you are saying that by right we should not pitch down."
>
> HH: "Yeah"... (Excerpt of interview 2; start time 16:27 [min:sec])

Secondly, students allude to experiencing high level of stress from assessment practices of their schools. The stressful environment or assessment related contextual factor negatively influenced quality practices. A key contributing reason is that the schedule for final examinations, major tests and project deadlines maybe too close to one another:

> Assessment practices SHOULD NOT cause unnecessary amounts of stress. Assessments should be spaced out and weighed evenly. Exams should not be the sole indicator of the student's ability. Although I agree that exams are important it should not be a life or death thing. Teachers should also be objective in their assessments. (Respondent 20180503-153929.488; student survey)

In support, students lament about "hell week" with crammed project deadlines and tests, which negatively affected their studies and friendships:

> NC: "To me, project deadlines are very close. All tests are crammed the same period."

ZJ: "The hell week!"

(A burst of laughter from all)

NC: "Yay, the hell week. Students lack sleep and they are pretty much unhappy. They don't have time to rest. They fall out with group mates. They don't have same working style… For me, the weightage of each paper is too high. If you screw up, you cannot get your <grade> A. One of my friends messed up and needed to get more than 100% in exams to get <grade> A. Then they don't care about the subject anymore."… (Excerpt of student interview; start time 13:00 [min:sec])

Thirdly, senior management MM describes a change of emphasis in quality assessment practices that increases skill-based assessments and reduces final examination:

MM: "…When you mentioned about SkillsFuture earlier, we are really pushing the word, skill based assessment, which has to be continual. The traditional MCQ, the traditional writing what you think you have learnt seemed to be an older generation kind of assessment. The new quality assessment that I am seeing, we are slowly, slowly going into, would be continuous assessment, really assessing the skills of the student…"

GH: "Skills based quality assessment would probably mean moving away from a final examination and more continuous assessment."

MM: "Correct. The traditional concept of what is quality assessment, which we do have External Examiners verifying that we do have quality assessment. It seems the perspective of having the final examination seems to be changing."… (Excerpt interview 3; start time 13:48 [min:sec])

In support of MM's perspective, alumni and staff shared that quality assessment practices should beyond written tests and examinations for other assessment types:

…*Well balanced* of both content/memory-based questions and application-based questions to broaden guided and independent thinking skills of students. *Mixed of different assessment* models, projects, quizzes, assignments. (Respondent 20180502-165057.511; alumni survey)

I suggest to put *less weightage on final exams and term tests*. We must take serious to students' assignments and projects. The *formative assessments could help students learn more*, and the final exams like a closing huge door would eliminate the knowledge from their minds. (Respondent 20180227-120520.400; staff survey)

Sub Theme 2.5: Curriculum Related Contextual Factors

This contextual factor will probably influence more on quality practices. I used words: content and curriculum for word counts to give a sense of their prevalence in the data sets. Staff interviewees remind me that it is important for them to meet the learning objectives of lessons as part of quality practices. As such, I revisit questionnaire datasets to include word count for learning objective or objective (Table 15). There are 95 counts of senior management interview transcripts containing these words: skills mastery (28); lifelong learning (19); curriculum (16); learning outcome (13); student profile/ TSP (11); and content (8).

These keys words were frequently cited in the surveys:	Survey respondents		
	Staff	Students	Alumni
content	√ (28)	√ (14)	√ (16)
learning objective or objective	√ (16)	√ (7)	√ (5)
curriculum	√ (4)	√ (6)	√ (6)

Table 15 Codes and word counts from questionnaire surveys for sub theme 2.5 (curriculum related contextual factors)

The datasets clarify the nature of curriculum related contextual factors in three aspects. Firstly, an over packed curriculum negatively influenced quality practices. The increased content seemed to impose too much demand on students' time and energy, as seen in the next three quotes:

> Quality over quantity. There is no point in cramming students with hours of knowledge that they will hardly be able to or motivated to absorb due to the sheer mental and physical stress and fatigue that the overly demanding curriculum places on students on a regular basis. (Respondent 20180503-205543.213; student survey)

> Quality does not equate to extensive coverage but rather coverage that establishes foundation of a subject. Through a deep understanding of it, students are able to apply learning to various contexts. (Respondent 20180420-112353.472; staff survey)

> MUST NOT PACK TOO MUCH INTO THE SYLLABUS. GIVE ADEQUATE TIME TO ENGAGE ON A TOPIC AT DIFFERENT LEVELS SO THAT DEEP LEARNING CAN OCCUR. NOT JUST A SUPERFICIAL BRUSH WITH A TOPIC. (Respondent 20180301-091245.526, staff survey)

> [The respondent provided all his/ her responses in the open-ended survey items in uppercase. I was unsure if the respondent meant to be emphatic about it.]

Secondly, an outdated curriculum negatively influenced quality practices. Staff and alumni respondents shared about keeping the student training relevant in the light of fast changing educational landscape and industry practices:

> …If we are looking at curriculum per se, quality would really include our ability to be able to keep our curriculum really updated. The rate things are changing now, the educational landscape has changed, even industry practices, industry landscapes across many industries, not just business. It does necessitate for us to be mindful of how updated our curriculum is, because that will impact the quality, at least in terms of equipping of technical competency. That's is related to updated curriculum as well… (Staff II, staff interview; start time 5:10 [min:sec])

> Because we are exposed to real working environment, sometime what we learn in school may not be used or relevant as it is moving super-fast. Syllabus should always update to the latest. [Name of industry] is advancing in an incredible speed. (Respondent 20180523-220511.653; alumni survey)

> Making sure the things being taught and learnt are relevant and up to date to what the current practices are in the industry. (Respondent 20180302-000102.93; alumni survey)

Thirdly, a curriculum that emphasizes development of the polytechnic's Desired Student Profile (or DSP) positively influences quality practices, as seen from senior management interviews, as seen from next two interview excerpts. Excerpt 1 points to a quality curriculum that emphasizes a dimension of the DSP – self-directed learner:

> LL: "So, it cannot just stop within the confine of a particular subject, and there must be concerted effort to build it into the curriculum. By the end of third year, students would have hone the skills, let say of critical thinking, self-direct learning. Which is why self-directed learning, an initiative helmed by [name of department]. [Name of department] is telling the schools is that you must have a minimum of one subject per semester to expose students to the framework of self-directed learning so that it keeps reminding them, honing the skills of self-directed learning. By third year, even if lecturers don't build it in curriculum and remind them to use it, they would have imbibed the skills and apply on their own. This is what we hope to see by the time they go out to SIP."
>
> GH: "Perhaps having the iteration could be a mark of quality."
>
> LL: "Yes"... (Excerpt of interview 1A; start time 24:38 [min:sec])

Excerpt 2 from senior management RR alludes to a quality curriculum that emphasizes another dimension of the DSP – skills mastery:

> When students graduate from our schools, they are equipped with the basic skills, I would say. They can start out as a junior [job title] in a setup. But of course, with experience, they can progress in their career. Looking at the initiative and why it is launched, the learning doesn't end at that point, they should always be ready to acquire learning from different platforms, be the specialist diploma and the short course. [Discipline specific name] as a discipline is so vast, in three years, definitely, you can't equip them with skills mastery so called. Of course, they have a basic level, which is good enough... Our three-year curriculum is very short... The way the curriculum is designed – because of its integrated character, in the end, students do gain mastery whether it is skill or [discipline specific term], but at what level, that is hard to measure. They are well equipped to get a job. Of course, there is no end to mastery. There could be several notches after you started to gain experience. But all our students are employed, within a few months... (Excerpt of interview 5; start time 38:11 [min:sec])

Sub Theme 2.6: Cohort Related Contextual Factor

This contextual factor will probably influence quality practices. Staff and alumni datasets suggest that cohort-related contextual factor can influence quality practices. During interviews, alumni are appreciative of their cohorts who help and spur one another to learning while a staff shares difficulty in teaching students who are disinterested in diploma content or related profession, as seen from next two excerpts from interview transcripts. The start time of the excerpts in terms of minutes and seconds into the interviews (within brackets) were included for reference.

Alumnus RR alludes to the place of seniors guiding juniors to enable learning practices in addition to learning from peers and self-learning as discussed in main theme 2. I concur with RR that a student community that helps and spurs one another to learn better could positively influence quality of learning practices:

> RR: "The peer I went through the poly with – they were curious – they were adventurous. Often, we hang out after class, we explored further concepts brought up in lessons, we explore little games on the side. It's important that the cohort is passionate, if most of the people are disinterested, no one spurs each other on. If you have a motivated group – you have rivalry, you have competition; you have also a lot of cross learning and peer-to-peer teaching. Everyone has strengths and weaknesses – when you have a population who is keen to improving each other. My cohort started night study group, in the night study group we explored beyond the curriculum concepts."
>
> GH: "What do mean by cohort? Do you mean your class?"
>
> RR: "The senior batch and my batch, even the senior batch came to interact with us. In our department, all three batches intermingled in night study sessions. Activities were initiated by student interest group, so we had game jam where – under a short period of time you made [discipline specific product] based on a theme – students were partnering – from different levels – got to share experiences with one another. Some were good in music – they focused on it – you got very good results."... (Excerpt of alumni interview; start time 32:55 [min:sec])

Conversely, staff OO shares about student cohort with poorer GCE 'O' subject scores having more attitude problems and not showing up for classes. Staff OO underscores the need of caring staff and Care Person (i.e. staff mentor) for these students:

> OO: "...We are getting generally <academically> weaker students. You can see that for some staff, when students do not show up for class, they could write email to Care Person that this person has not shown up for class. This caring part about the students, the staff worry for the students."
>
> GH: "When staff care for the students, it is a mark of quality."
>
> OO: "Yeah, I mean they are not obliged to inform the Care Person, but it depends on whether Care Person would act on the students and talk to students."... (Excerpt of staff interview; start time 9:11 [min:sec])

CHAPTER 4: DISCUSSION AND RECOMMENDATIONS

I will be addressing the three research questions (RQ1 to RQ3) in three sections. In the first section, I will compare and contrast key conceptions of quality based on my research with those cited in the literature for more insights. In the second section, I will relate contextual factors proposed by my findings to Singapore's macro context (Dimmock and Tan, 2013) and key components of a school improvement framework (Murphy, 2013) that influence school improvement. In the third section, I will draw upon works of Schuetze (2006) and Billet (2010) to illuminate issues related to adequacy of students' preparation of lifelong learning in the polytechnic. Instead of having a separate section for recommendations, I will propose recommendations alongside key discussion points throughout the chapter.

1. CONCEPTIONS OF QUALITY

I will compare and contrast the five conceptions of quality related to teaching, learning and assessment from my research (RQ1) with Harvey and Green's (1993) conceptions of quality, which are often cited in quality education. Firstly, I will discuss conception 1 (what is important) and conception 2 (preparing students for work) with Harvey and Green's quality as fitness for purpose. Secondly, I will relate conception 4 (setting standards and standardizing practices) with Harvey and Green's quality as perfection or consistency. Lastly, I will examine conception 5 (transforming students) and conception 3 (understanding concepts and deepening skills) with reference to Harvey and Green's quality as transformation.

1.1 "Quality as Fitness for Purpose" (Harvey and Green, 1993, p.16)

Two key conceptions of quality from my research, namely what is important to the polytechnic and preparing students for work align well to the conception of quality as fitness for purpose (Harvey and Green, 1993). The economistic purpose of education has been a dominant narrative propagated by the Government in Singapore since 1965 (Ho, 2003). In my research context, when there is a good fit to the purposes of key stakeholders such as the Government and the employers, then the polytechnic education is deemed to be of 'good' quality.

Aside from the Government's narrative, Chung (2010) asserts that the quality monitoring by external Quality Assurance agencies has led to the development of fitness for purpose as a dominant conception of quality in the post-secondary education landscape in Hong Kong. Likewise, there is an institutional level audit based on the Polytechnic Quality Assurance Framework (PQAF) instituted by the Ministry of Education, Singapore (MOE) for all polytechnics.

Houston's (2007) comment on the conception of quality as fitness for purpose imposed by external quality systems is that it leads to compliance and accountability of the institution to these external purposes and does not always improve student learning. Probably, one of the reasons that led to the polytechnic's decision to forego its external ISO accreditation in preference for an internally developed educational quality management system (Senior management interview 3; start time 9:23 [min:sec]). What I value of Houston's critique (2007) is his reminder that student learning and maximization of students' potential need to remain core amongst the many purposes of the polytechnic. Houston's core purpose (2007) is also compatible with conceptions of quality as

understanding concepts and deepening skills, and transforming students, as proposed by my research. Next, I will discuss nature of the polytechnic's fitness for purpose with the intent to broaden its purposes of the 'quality' education.

Fitness for Purpose: What Is Important to the Polytechnic

Harvey and Green (1993) distinguish the purpose in terms of fulfilling mission and meeting requirements of customers. From the thematic analysis of senior management interviews, findings suggest that key external stakeholders are the Government; the employers; and the public including parents of current and potential students. The key internal stakeholders are school management; students; and graduates. Since the notion of quality tends to be stakeholders-relative (Tam, 2001), it will be important to discuss about key values and interests of the polytechnic and its stakeholders next.

One of the polytechnic's shared values in the Balanced Score Card (BSC) is being responsible for its growth and success (Appendix BSC). The value underscores the need for polytechnic to stay competitive (Porter and Kramer, 2011) as an educational institution in the context where there are stiff competitions amongst polytechnics for potential students for their pre-employment training (PET) and continuous education and training (CET) offerings. The growth and success of the polytechnic in terms of its ability to attract potential students is important to the polytechnic within a context of decreasing student enrolment from secondary schools for its PET course offerings. A reduced student enrolment in the polytechnic means a proportionate reduction of the Government funding for its operation. In response to the reducing PET student enrolment, key priorities of the polytechnic are to manage its staff strength effectively to ramp-up, market and deliver its CET offerings (Appendix BSC). This is consistent within a market model of education where governance in education includes financial governance such as financial disciplines and cost cutting (Ball, 2009).

In pursuit of its competitiveness, the polytechnic may need to address economic and social conditions of the communities concurrently (Porter and Kramer, 2011). The ramping up of CET will address the economic condition of the communities (ibid, 2011) because the increased revenue from the CET allows the polytechnic to continue employment for its staff. Besides, the CET offerings aim to enhance trainees' job performance or skills in workplaces, meeting a key need for continued employment of the trainees in the communities. The polytechnic also needs to address social conditions in terms of meeting basic needs and well-being of the communities (Dembek *et al.*, 2016). Within this frame of thinking, the next two shared values in the BSC 2019 (Appendix BSC, p.2), namely "respect for the dignity of the individual" and "integrity of the highest order" may potentially address the basic needs and general well-being of the communities, which include staff, students, and parents. However, there is no KPI related to the polytechnic's shared values stated in the BSC, probably because they are not easily quantifiable.

The polytechnic uses the BSC as a business performance tool (Kaplan, 2009) to manage and (re)balance its many priorities since 2007. Beyond meeting targets spelt out in the BSC metrics, the literature underscores the importance to reconcile the interests of its communities (Porter and Kramer, 2011). There is probably scope for the polytechnic to explore using qualitative indicators (Senior management interview 6; start time 50:20 [min:sec]) and text analytics (Senior management

interview 3; start time 38:55 [min:sec]) to monitor, pursue and enhance social conditions of its communities. Otherwise, the extent of 'shared-ness' of the polytechnic's shared values with the communities will be limited and it may decrease communities' trust in the organization (ibid, 2011) and erode the relationships amongst school leaders, teachers and students (Lynch, 2014).

According to Harvey and Green (1993), understanding the mission of the polytechnic may provide insight into a fuller purpose of the polytechnic. Its mission is:

> To prepare school-leavers and working adults for a future of dynamic change, with relevant knowledge, life-long skills, character and thirst for continuous improvement (Appendix BSC, p.2).

The polytechnic's mission is anchored by its shared values such as "future-orientation" and "student-centeredness". Its mission seeks to prepare polytechnic graduates to be change-ready for the future. The mission statement seems to encompass a broader purpose, which goes beyond employment and continued employability.

Fitness for Purpose: Preparing Students for Work

My research suggests that preparing students for work is a dominant conception of quality in the polytechnic (Thematic analysis, main theme B). Within this conception, preparing students for lifelong learning (Senior management interview 1A; start time 1:53 [min:sec]), guiding them to apply knowledge and honing their job-related skills (Senior management interview 4; start time 1:25 [min:sec]) are valued.

I have earlier written about the on-going debate on the purpose of education in the literature review. The proposed conception of quality as preparing students for work is probably be too narrow for those who subscribe to the humanistic perspective of education. I find it helpful to reframe this discourse using a mixed economistic and humanistic perspective based on the notion of relevance from the perspectives of individuals, communities and societies (Barrett *et al.*, 2006). I take the position that there are aspects of humanistic purpose of education that will augment the overarching economic agenda of the Singapore. The polytechnic can broaden its students' preparation for work to include other dimensions of work such as having satisfaction in one's work (Winch, 2002), upholding ethical and civic values in workplaces (Musil, 2015; Winch, 2002).

Work preparation in work satisfaction

Skills for work is much valued by survey respondents, as seen from the word counts (in brackets) of "work" appearing in the survey data sets.

	Survey respondents		
These skills were important because they were:	**Staff**	**Students**	**Alumni**
Skills for work	√ (139)	√ (127)	√ (218)

Table 16 Word counts from questionnaire surveys related to skills for work

Some of the skills that survey respondents deemed to be useful to students include technical skills, hands-on skills, team working skill and problem solving skills. The finding is in support of the national level SkillsFuture movement that engenders a culture and societal support for continual (re)skilling of its workforce to keep them relevant to the changing industry landscapes (SkillsFuture, 2015b). In addition, skills preparation for work is in line with the polytechnic's strategic focus in developing domain and life skills amongst students. While there is instrumental value in the above skills for work, I concur with Winch (2002) that it takes both skills and dedication in one's work to bring about greater work satisfaction. The notions of doing well and taking pride in one's work are crucial for one's well-being in workplaces and has much more to offer than the instrumental value of skills alone (Winch, 2002). Perhaps, quality practices in school could emphasize more of these aspects for work preparation.

Work preparation in ethical and civic values

Musil (2015) refers to highly skilled workers who were responsible for financial woes related to the subprime mortgage in the US. These workers probably possess skills such as "critical thinking, written and oral communication, teamwork skills, and the ability to apply knowledge in real-world settings" (p.2) that are valued in the workplaces, however they lack ethical decision-making as seen from their pursuits of own economic benefits over their social responsibility. This ethical decision-making sits well with Winch's (2002) view that there is ethical dimension in all occupations because their products or services will impact the public. The ethical dimension serves to constraint occupational practices by considering the well-being of the "public, clients and practitioners" (p.269) besides the profitability of the commercial business.

To prepare students for work in this regard, Musil (2015) advocates for schools to require students to address ethical and civic values as they apply knowledge in real-world settings. Some of the civic related questions include:

> … how the workplace is organized, who has a say in how things are run, how wages and perks are dispersed, how ethical practices are encouraged or stifled, the social purpose of what is produced, who has access to purchasing it, what the affects are on the people and the planet producing it, who benefits from it, and whether there is exploitation (p.2).

By embedding civic questions in service learning and projects, students clarify their ethical and civic values as they make sense of what they mean to them to respond as socially responsible citizens in workplaces. Naturally, there is great benefit to the society as a whole when students are more socially responsible in their decisions and actions. In the polytechnic, this area of student preparation may need more attention. My insider's experience informs that schools typically brief their students on work values such as having integrity, honesty in handling data, and respect for colleagues and bosses as part of their preparation before sending students out for internship programme.

Typically, schools in the polytechnic do not offer substantial preparation in ethical and civic values as proposed by Musil (2015). The current preparation tends to focus on information sharing and grave consequences of unethical practices at workplaces. There is room for the polytechnic to deepen its effort in community service as core curriculum so that students experience what is means to live life beyond work such as to serve the community or society selflessly (Prusak, 2010). Student

preparation in ethical and civic values and work satisfaction dovetail with the polytechnic's mission to develop characters of its students (Appendix BSC). If a broader purpose is used as a quality measure, then the polytechnic needs to address gaps in its purpose in relation to the conception of "quality as fitness for purpose" (Harvey and Green, 1993, p.16).

1.2 "Quality as Perfection or Consistency" (Harvey and Green, 1993, p.15)

Next, my research suggests that conception 4 (standardizing practices and setting standards) relates to aspects of quality as perfection or consistency as proposed by Harvey and Green (1993). Within this conception, conforming to specifications consistently is important. However, quality as consistency can be problematic if quality is viewed in terms of "zero defects" or "getting it right first time" in an educational setting (ibid, p. 16). I argue that it is about getting more right than wrong and not zero defect here. Although I did not ask my interviewees explicitly about this, I believe few colleagues in the polytechnic will claim that they can get it right the first time with each student, each class and each cohort.

Going by the analogy of zero defect (ibid, 1993), a defective (intermediate or finished) product may be sent for rework within a manufacturing setting. In the polytechnic, there is a reliable 'rework' process for students to retake and clear the subject requirements. In practice, some students or the defective (intermediate) products do not exit the polytechnic as 'finished products' when they fail to meet the graduation requirements of the polytechnic. That said, upon graduation, there is also no mechanism for the polytechnic to recall their graduates akin to commercial companies recalling their defective (finished) products from the market. Thus, zero defect, while an aspirational notion, is currently not attainable even though there is an expectation within the polytechnic for high cohort or subject passing rates as mentioned by senior management HH during the interview (Interview 2; start time 2:00 [min:sec]).

From the thematic analysis, senior management and staff interviewees refer to learning outcomes as the specifications for consistent teaching, learning and assessment practices. They say more about the compliance to the learning outcomes (Senior management interview 2; start time 16:27 [min:sec]; Senior management interview 6; start time 22:18 [min:sec]; Respondent 20180428-174910.193, staff survey), which is more about standardizing practices rather than setting (high) standard as a mark of 'quality'. Setting high absolute standard for quality practice relates to a more exclusive notion of "excellence 1", which is congruent within the conception of quality as exceptional (Harvey and Green, 1993, p.12). "Excellence 2" is about compliance to specifications, which arises from the conception of "quality as perfection or consistency" (Harvey and Green, 1993, p.15).

2. With the market or neoliberal model of education, the significance of excellence as a mark of quality has evolved from "excellence 1" to "excellence 2", which has no absolute standard within the conception of quality as perfection (Harvey and Green, 1993, p.15). The notion of "excellence 2" is about being perfect or reliable in conforming to a set of specifications within a context of increased participation rate in higher education (ibid, 1993). There is probably no need to pitch for very high standard (or "excellence 1") as a prevalent quality practice in the polytechnic since the Singapore Government's mandate is for all polytechnics to prepare future workforce (with diploma qualifications) for the industry. Thus, "excellence 2" is more practicable or common than "excellence 1" in the polytechnic setting. In support of this point, staff and senior management

interviewees also see skills mastery in the polytechnic education in terms of equipping students with basic skills for entry level jobs (Senior management interview 5; start time 38:11 [min:sec]; Staff interview; start time 53:34 [min:sec]).

As discussed in the literature review, neoliberal educational institutions are known to emphasize "economic efficiency" (Weiner, 2004 p.21) over collegial relationships, moral and social values (Lynch, 2014). In support, Suanders (2015) argues that teaching staff should resist excellence as an organising framework because it legitimizes neoliberal practices in higher education. Associated with the term excellence or "excellence 1" (Harvey and Green, 1993, p.12) is intense competitions and comparisons amongst staff and universities since not all can be equally excellent (ibid, 2015).

As a pragmatist, I argue that there is no need to take an either/ or approach. There is room to discuss what should go into that set of specifications within the polytechnic. On this note, what is important to the polytechnic should include, in conception and practice, a greater emphasis in developing ethical and civic values in the case of student preparation for work. In fact, Prisacariu and Shah (2016) call for a definition of quality around ethics and moral values such as trustworthiness, responsibility and honesty in the context of failures in areas such as governance, financial and risk management, conduct of senior leaders and quality assurance issues in higher education.

1.3 "Quality as Transformation" (Harvey and Green, 1993, p.24)

My interest in the conception of "quality as transformation" (ibid, 1993) stems from the potential of this conception for students to change and become more effective individuals for their next phase, albeit further studies or jobs. The thematic analysis of the senior management data suggests several needs and challenges faced by polytechnic students, which include articulating their ideas to staff and other stakeholders confidently (Interview 5; start time 14:49 [min:sec]); asking questions to deepen understanding (Interview 6; start time 11:07 [min:sec]); and learning on their own (Interview 1B; start time 00:05 [min:sec]). In particular, I like senior management RR's metaphor of students "coming out of their cocoons and blossom" because these are metaphors of students' transformation. Students are used to a more structured learning environment in their secondary schools before joining the polytechnic (Interview 6; start time 11:07 [min:sec]). Enabling students to transform and overcome in one or more of the above challenges will likely help them in their work, study and life in general.

Drawing upon the insights of Mezirow (1997) and Christie *et al.* (2015), the polytechnic needs to do more to challenge students in their assumptions and engage students in discourse with staff, peers and role models to support individual transformation of students, especially to overcome some of the needs and challenges of polytechnic students listed above. I will elaborate the three key aspects related to individual transformation next.

Firstly, the polytechnic needs to challenge students' assumptions (Mezirow, 1997). Taking the example of helping students to learn on their own, my insider's experience informs that some students need to reframe a key assumption that they cannot learn by themselves. A second key assumption is that some students believe that they need not start learning on their own now (in the polytechnic). Yet, a third assumption is that their teachers will continue to teach them the content they need. There are probably other key assumptions held by students that the polytechnic will uncover as the polytechnic engages students more in this regard.

Secondly, students need to value and believe that a particular change is necessary (Christie *et al.*, 2015). Individual transformation of students' thinking and behaviour will take place if students believe that learning on their own is an important and necessary change. Given that a lead indicator in the BSC 2019 is meant to drive the development of "at least 40% of subjects across the school having at least 40% of eLearning" (Appendix BSC, p.7), it is a necessary change for students to learn how on their own.

Lastly, students need role models who are sources of motivation and encouragement to transforming individuals (Christie *et al.*, 2015). Employing role models to support the change, the polytechnic will need to identify and recognize role models amongst students, alumni and staff. However, senior management SS shares that it may be a challenging endeavour to find sufficient role models who continue to learn and pick up new skills in schools and at homes because lifelong learning is new to Singapore society as a whole (Interview 6; start time 42:14 [min:sec]).

Aside from addressing the need to change, I assert that it is crucial for schools to develop students' agency in terms of taking more responsibility for own learning. The polytechnic needs to include into its existing problem-based learning and self-directed learning frameworks: enhancing student support through role models (Christie *et al.*, 2015); providing opportunities to co-create learning contexts with students; and giving full freedom to students to choose their learning contexts (Neumann, 2013). The above discussion on the conception of quality as transforming students to take responsibility for learning on their own is related student preparation for lifelong learning. I will discuss the adequacy of the related quality practices in Section 3.

1.4 "Quality as Value for Money" (Harvey and Green, 1993, p.21)

Within the conception of "quality as value for money" is a pervasive use of performance or quality indicators to account institutional efficiency and effectiveness to funding bodies (or the Government) and customers (or users of the service) (ibid, 1993). Broadly speaking, the users of the polytechnic include students and their parents. Consequently, it is important to the polytechnic to address expectations of key stakeholders (Thematic analysis, main theme A). Tam (2001) elaborates Harvey and Green's view (1993) that conceptions of quality can be relative to different stakeholders because they have different interests and values.

I am surprised that senior management and staff interviewees do not develop this conception of quality as much. They do not use the term "value for money" (Harvey and Green, 1993, p.21) when they speak about quality education or quality indicators. One of the measures for "value of money" (ibid, 1993) is about staff productivity in terms of teaching hours and workload. From one perspective, there seems to be a general acceptance of the close link between quality and staff productivity. This is a consistent with the national narrative for Singapore's workers to increase work productivity to match pay increment, as espoused by Singapore's Prime Minister Lee (Lee, 2013). A second perspective is that the interviewees exhibit uncritical acceptance of the use of performance or quality indicators in the Balanced Score Card as part of the demand of the market model of education (Weiner, 2004). I concur with Harvey and Green (1993) that "value for money" (p.21) as an indicator for economic efficiency or productivity does not necessarily mean it is effective indicator to drive or support quality education.

This is a contested space because what is valued in quality education differs, depending on the overarching purpose of education – humanistic or economistic – as exemplified by perspectives of UNESCO and World Bank. I have chosen to highlight the perspectives of these two supranational organizations because their programmes have contributed to Singapore's journey from a third world (in year 1965) to first world country (in year 2000) in terms of global competitiveness and development (Institute for State Effectiveness, 2011). In Singapore, economistic purpose of education continues to be predominant as seen from an excerpt of the National Day Rally speech by Prime Minister Lee when he addressed the needs of current and future workforce:

> Our education system gives young Singaporeans a head start when they enter the job market. But our support does not end there. As people progress in their careers, SkillsFuture will help to keep their knowledge and skills up to date. We need to do this, because jobs and skills are turning over faster than ever. (Lee, 2019)

In addition, Marshall (2016) asserts that Harvey and Green's "quality as value for money" (1993, p.21) means quite differently to the organization and students (and their families). The conception of "quality as value for money" is translated in terms of encouraging staff productivity through performance-related pay (Ball, 2015) and its emphasis of "economic efficiency" (Weiner, 2004, p.21).

Unlike academics such as Ball (2015), Weiner (2004) and others in many parts of the world who challenge and resist against the market or neoliberal model of education, there seems to be a general acceptance of the market model of education in the polytechnic. Perhaps it is due to its long-standing, overarching economistic understanding of education. Nonetheless, I am supportive of Weiner's (2004) view that an overemphasis of instrumental value (i.e. economic efficiency) is unhealthy and Lynch's (2014) view for more emphasis in cultivating moral and social values. There is wisdom to address competitiveness of the polytechnic and improve social conditions of its community concurrently (Porter and Kramer, 2011), as discussed earlier.

Next, Prisacariu and Shah (2016) assert that, arising from conception of "quality as value for money" (ibid, 1993, p.21), universities are pressured to ensure that their programmes are relevant to industry needs and their graduates are employable. The pressures can be huge if the universities have a long tradition for academic pursuits, which may not necessarily view graduates' employability as a key educational goal. However, preparing students for industry, although narrow in focus, has always been the Government's mandate for all polytechnics in Singapore from the very first day when the first polytechnic was set up in 1954. Graduates' employability continues to be a key quality or performance indicator for all polytechnics to this day.

To extend this discussion, embedded within Harvey and Green's (1993) conception of "quality as transformation" (p.24) is another notion of value-add in terms of increased knowledge, skills and abilities of students. From the thematic analysis, senior management interviewee MM shares about measuring students' life skills as a value-add (Interview 3; start time 26:15 [min:sec]). The finding concurs with Gibbs's "educational gains" (2010; pp.6) that premises on the increased performance on a particular measure at the start and the end of student's studies in the institution. One alumnus commended passionate teachers having value-added to his/her learning experiences:

> Overall, my education at TP has been great. I felt I learned so much during my three years and there were great teachers, some very passionate about their line of work. This passion had rubbed off on me in some way and I feel that is most value-added experience any student can hope for. (Respondent 20180502-163910.661, alumni survey)

The above discussion supports a view from Harvey and Williams (2010) that both purpose and context are necessary to analyze the conceptions of quality of higher education. Next, I will discuss these contextual factors in the polytechnic.

2. CONTEXTUAL FACTORS

In this section, I will discuss contextual or environmental factors that influence the conceptions of quality and practices in the polytechnic. I will also propose and discuss factors that have influenced the selection of quality or performance indicators in the revamped Balanced Score Card 2019 (RQ2). These contextual factors operate within polytechnic's performative culture, which I will elaborate next.

2.1 Performative Culture

As discussed, Singapore has a dominant economistic purpose of education, and polytechnics are set up to support this purpose by preparing students for employment. Within this conception of quality, the polytechnic has a performative culture (Perryman, 2009; Ball, 2003), as seen from the institutional mechanisms such as performance indicators (in the BSC), appraisal conversations, audits and external examiners employed to encourage strong performances or outputs.

Based on my initial document analysis of the Balanced Score Card (BSC) from the academic year 2008/2009 to 2017/2018, there were occasions when schools did not meet the BSC indicators in one year; but these schools will typically exceed the expected performance targets in the next year. Reflecting upon the guiding questions for document analysis of the BSC records listed in the Methodology Chapter, the witting evidence (Marwick, 2001) of the BSC records conveys schools' strong commitment to meet the performance or quality indicators of the BSC metrics. In meeting the BSC indicators, schools also portray their alignment of plans and activities to the polytechnic's overall priorities. This finding is consistent with the conception of quality as what is important to the polytechnic.

However, the notion of performativity carries a negative connotation in literature. I draw upon three insights from Ball (2003) and Perryman (2009) to discuss possible ways to mitigate the negative effects of a performative culture within the polytechnic. Firstly, the polytechnic may need to manage the pressure felt by managers and teachers to perform; otherwise, there may be fabrications such as staging coherent documents and practice in preparation for an upcoming audit (Perryman, 2009; Ball, 2003). It also means that key issues that really matter are not be surfaced and addressed. Otherwise, when staff members are under pressure to 'show the best' of their school practices, they may just prioritise their energies for short-term improvements focusing on tactical projects with auditable outcomes (Ball, 2003). It is heartening to note that the polytechnic has decided to discontinue with the ISO audits in 2019, which is the other major external audit in the polytechnic besides the Government's polytechnic quality assurance framework (PQAF) for all polytechnics.

Secondly, there is room for the polytechnic to value professional judgement of teachers over measurable performance indicators or auditable outputs to encourage quality practices. It is important to encourage teachers "to have a rationale for practice, account of themselves in terms of a relationship to the meaningfulness of what they do…" (Ball, 2003, p.222). For example, the thematic analysis of staff data reveals that teaching staff members view 'quality' teaching practices in terms of helping students to understand concepts, explaining content and interacting with students (sub themes 1 to 3 of main theme 1), and the polytechnic may want to continue to encourage these practices as part of quality staff performance.

Thirdly, Ball (2003) reminds me that the polytechnic may want to encourage those involved in institutional audit to be transparent about polytechnic's weaknesses or gaps as part of its improvement or quality journey. As managers and staff members prepare for the PQAF audit, they should not feel that punitive actions will be taken against them for being honest about their views. Since the polytechnic has an entrenched performative culture, this transparency of one's views will reduce cynicism and (covert) resistance of managers and staff members as described by Perryman (2009). It is critical to understand the macro and organizational factors (Dimmock and Tan, 2013) that feed the performativity culture of the polytechnic, which I will discuss later. Since the market model of education is here to stay in Singapore polytechnics, a greater clarity of these factors may help the polytechnic to rebalance its performance metrics for long-term improvement.

2.2 Revamped Balanced Score Card (2019)

Initially, I propose to carry out a document analysis of the BSC records from academic year 2008/2009 to 2017/2018 to have historical perspective of quality development in the polytechnic (RQ2). The initial analysis reveals that BSC indicators have been stable for the last ten years except the introduction of a few new indicators to reflect the increased emphases of eLearning in 2015 and continuous education training (CET) for adult learners in 2012. Mid way through my research, the polytechnic reviewed the stable BSC metrics in 2018 and revamped it in 2019. The institutional move is a significant development to my research. The revamped BSC metrics suggest that the polytechnic's priorities may have shifted. Some of these priorities are CET, graduate employment and eLearning (Appendix BSC). The revamped BSC metrics have a mixed of leading and lagging indicators, unlike the previous metrics, which do not use these terms. The notion of leading indicator alludes to the polytechnic's intention to use leading indicators to predict the health of its diploma programmes and drive performance towards fulfilling the polytechnic's priorities (Supovitz *et al.*, 2012; Mankiw, 2007). One of these priorities is to improve the polytechnic's graduate employment rate because this leading indicator indicates the extent to which the polytechnic fulfils its mission to produce workforce for the industry.

The leading indicators drive and lagging indicators monitor the polytechnic's pursuit of its strategic objectives (Appendix BSC). In one of the staff communication sessions in year 2018, the new PCEO refreshed the strategic objectives using the acronyms of 3S, 3E and 3R (Excerpt of senior management interview session 3; start time 17:47 [min:sec]). The 3S emphasizes on polytechnic's skills training for students and CET's adult learners to improve their employability. The 3E challenges schools and departments to higher business efficiency and effectiveness to enable transformation of the polytechnic. The 3R premises on work redesign and review to increase the relevance of staff and

their contributions in the context of decreasing student enrolment from secondary schools, increasing CET offerings for adult learners, and changing polytechnic education that focuses more on skills.

Perhaps, there can be more indicators focusing on educational improvement in the BSC metrics. For example, leading indicators of student dropout rates to identify students who are at risk academically to provide additional support to them (Supovitz *et al.*, 2012). My interview with senior management MM supports the document analysis that current BSC metrics lacks leading indicators for student preparation in lifelong learning and skills mastery, which is a key area of my research (Interview 3; start time 17:47 [min:sec]).

Next, the BSC metrics communicate the priorities of key leaders and the support for quality practices related to the key performance indicators (KPI). The polytechnic's strong interest in CET is evident in its BSC 2019 metrics. Seven out of the seventeen KPI of the BSC either drive or monitor the polytechnic's progress in the CET course offerings and uptake, for example, in terms of total trainees hours, revenues, job enhancement of trainees (Appendix BSC). Not being selected as one of the KPI of the BSC 2019 also suggest the relative places of importance of these performance or quality indicators within the polytechnic (Appendix BSC).

As such, I will clarify what are the contextual factors that may have influenced the selection of the BSC metrics 2019 (refocused RQ2). Understanding these contextual factors will illuminate influences that sustain the performative culture and why conceptions of quality related to what is important; preparing students for work; and understanding concepts and deepening skills seem to be dominant conceptions amongst the senior management interviewees. Research participants (staff, students and alumni) also value practices that are congruent within these key conceptions. I recognize that conception of quality as what is important (to the polytechnic) may overlap with other conceptions or it may be an overarching one. Harvey and Green (1993) also hold the view that their proposed conceptions of quality are inter-related. For now, I have kept them as separate conceptions.

2.3 External Contextual Factors

Dimmock and Tan (2013) assert that there are macro society, economic and political factors that operate at the country level. Murphy (2013) elaborates these factors as forces that shape the conception of school improvement in a post-industrial economy where there is greater emphasis for school improvement in terms of the use of information technology, upskilling of staff and students, and making better provision of service to students and community. I will refer these factors as external contextual factors to the polytechnic. I propose four key external contextual factors, namely the Government's priorities (including those of MOE); the industry needs (including those of employers); the public's expectations (including those of parents); and the national level skills framework (Thematic analysis, main theme C1). Influences of these contextual factors are mediated within a performative culture, in which the polytechnic's performance is judged and compared with other polytechnics in Singapore.

"Tight coupling" (Dimmock and Tan, 2013, p.332)

I agree with Dimmock and Tan (2013) that there is "tight coupling" between the Government and polytechnics in Singapore, which mediates influences of the external contextual factors (i.e. the

Government's priorities and industry needs) on conceptions of quality and practices in the polytechnic. While Dimmock and Tan (2013) acknowledge schools in Singapore positively influence student learning through careful selection of school leaders and resource management, they are critical of the Ministry of Education's (or MOE's) tight control over its schools, namely primary schools, secondary schools and junior colleges.

Unlike the MOE schools, tertiary institutions like the polytechnics have greater autonomy in its planning, decision-making and operations. Even so, I argue that expressions of the vertical tight coupling of the MOE and polytechnic's school leaders are evident in terms of strong alignment of direction or policy, for example, the ramping up of continuous education training courses (CET) in the polytechnic and increasing focus on graduate employability. That said, I assert that tight vertical coupling is a double-edged sword for school improvement. On one end, the cohesion and alignment between the MOE and polytechnic school leaders enable the entire system to implement policy swiftly and consistently across the polytechnic sector, which is one of key construction principles for school improvement (Murphy, 2013). On the other end, the "tight coupling" limits creativity and heterogeneity of school leaders (Dimmock and Tan, 2013) and leadership is crucial for school improvement (Murphy, 2013).

Stakeholders' Expectations

Since quality is stakeholders relevant (Tam, 2001; Harvey and Green, 1993), key stakeholders' expectations will likely influence polytechnic's views of what is important to its quality education (Thematic analysis, main theme C1, sub themes 1.1 and 1.2). Within a performative culture, I assert that a high-performing polytechnic is probably one that engages and addresses expectations of its key stakeholders. However, in doing so, it also pulls the polytechnic from different ends (Senior management LL; Interview 1B; start time 00:05 [min:sec]).

On one end, the polytechnic's quality education is about preparing students for work. The Government expects the polytechnic to fulfil its mission to train future workers for targeted industry. The industry expects polytechnic students to be work-ready with the necessary knowledge, skills and attitude upon graduation. Within this conception, it is congruent that there is an increasing expectation for the polytechnic to address issues related low graduates' employment rate in targeted industries. On the other end, the polytechnic's quality education is also about preparing their students for further studies. In Singapore society, there is strong family support for many polytechnic students to delay seeking immediate employment, in preference for further studies at local or overseas universities. This family factor (Dimmock and Tan, 2013) makes it complex for the polytechnic to meet the Government's expectation to supply future workers (with diploma qualifications) to industry while catering to the aspirations of students to pursue university degree qualifications (Loh, 2016).

Within a performative culture, different stakeholders' expectations will compete and demand for the polytechnic's energy and time for quality performances or outputs. Perhaps, not only is the polytechnic pulled by expectations; it is probably stretched out by the demands as well. Ball (2003) describes a performativity that terrorizes teachers in UK:

> There is a flow of changing demands, expectations and indicators that makes one continually accountable and constantly recorded. We become ontologically insecure: unsure whether we are doing enough, doing the right thing, doing as much as others, or as well as others, constantly looking to improve, to be better, to be excellent. And yet it is not always very clear what is expected (p.220)

I believe a similar one terrorizes polytechnic's schools and staff members as they prepare students for work and further studies. I argue that the polytechnic may have too much on its plate. Perhaps, it is good to stop and ask – why are we doing what we are doing? Whose mandate should the polytechnic be fulfilling? What is the polytechnic's mission in practice? How do quality practices look like?

National Level Skills Frameworks

Arising from the Singapore Government's SkillsFuture movement are thirty-three national level skills frameworks that target growth and priority sectors. These frameworks are progressively developed and enhanced to guide skills training of Singapore workforce from 2016 to 2019 (SkillsFuture, 2020). The skills frameworks contain information on descriptions of key skills, job roles and career pathways and training programmes. One of the intents is to provide information for the Singapore society to make informed choices of upgrading opportunities and support the workforce to remain employable and relevant in the context of changing industry landscape. That said, all polytechnics have to align and map their curricula to the national level skills frameworks. These skills frameworks reinforce the conception of quality as preparing students for work and quality assessment practice that emphasizes application of knowledge and skills (Thematic analysis, main theme C1, sub theme 1.3).

Naturally, skills development for growth and future sectors are potential quality indicators in future BSC metrics. Senior management LL underscores the important place of the skills frameworks in diploma courses (Excerpt of interview 1B; start time 3:30 [min:sec]). At this point, the polytechnic monitors the extent of mapping of the diploma courses to the skills frameworks to demonstrate the relevancy of student training to the job roles and needs of the targeted industry sectors. In this exercise, the polytechnic needs to balance both humanistic and economistic purposes of education. Privileging certain skills in the frameworks may also mean the demise of other skills not in the frameworks. It is definitely in the interest of Singapore for the polytechnic to also emphasize and inculcate citizenship, care for society, ethical values and instil pride in doing one's job well amongst its students, as discussed earlier.

2.4 Internal Contextual Factors

Murphy's (2013, p.258) metaphors of the effective school improvement are in terms of building construction and improvement project, namely "building materials", "construction principles" and "organisational supports". By "building materials", Murphy (2013) lists aspects such as classroom instruction, curriculum relevance and rigour, learning environment for students and staff, school leadership, engagement with school community and students' performance. I will refer Murphy's (2013) building materials and the organizational factors (Dimmock and Tan, 2013) as internal contextual factors that influence conceptions of quality and promote certain practices within the polytechnic.

Senior management MM clarifies that both external and internal contextual factors inform the polytechnic's view of what is relevant and important, which will help the polytechnic to decide what indicators form the BSC metrics 2019 (Excerpt of interview session 3, start time 17:47 [min:sec]). As tabulated below, senior management, staff, student and alumni research participants allude to six key internal contextual factors, namely key school leaders (polytechnic and schools); student cohort; staff; polytechnic level frameworks (including those for teaching approaches and learning contexts); assessment; and curriculum (Thematic analysis, main theme C2).

		Research participants			
Contextual factors related to:		**Senior Management**	**Staff**	**Students**	**Alumni**
1.	PCEO and deputy principals	√			
	Management	√	√		
2.	Polytechnic frameworks	√			
	Teaching approaches and learning contexts		√	√	√
3.	Staff	√	√	√	√
4.	Assessment	√	√	√	√
5.	Curriculum	√	√	√	√
6.	Student Cohort		√		√

Table 17 A list of contextual factors arising from thematic analysis

In particular, I will discuss how the internal contextual factors influence key conceptions of quality and practices that are congruent with these conceptions. Where relevant, I will highlight contextual factors that influence the selection of indicators for the revamped BSC 2019 (Appendix BSC).

Key School Leaders

As a contextual factor, key school leaders reinforce a dominant conception of quality, namely what is important to the polytechnic (Thematic analysis, main theme A). School leaders integrate and enable all components in the school improvement to function well (Murphy, 2013). Within the polytechnic, its key school leaders are the PCEO or principal, deputy principals and school management. I argue that changes in the key school leadership have influenced the selection of key performance indicators of the revamped Balanced Score Card (BSC) 2019. Between 2016 and 2018, the polytechnic has a new PCEO, a new deputy principal and several new senior appointments in key departments. As mentioned earlier, the BSC metrics have been stable except a few incremental changes of indicators until 2018.

Next, Murphy (2013) underscores the place of "organisational supports" (p.260) in terms of policies and practices that can either help or hinder school improvement. For example, the extent of support

of key school leaders for quality pedagogy and teaching and learning matters will influence practices in schools (Senior management LL; interview 1A; start time 1:53 [min:sec]). Key school leaders play critical roles in formulating policies that guide quality practices in the polytechnic. The communication of strategic objectives, policies and practices by key school leaders set the tone for the polytechnic's priorities and supports for these practices. To strengthen this point, the perceived priorities of key leaders will promote certain practices in schools. For example, staff interviewees PP and OO share about the loop-sided focus of school management on high profile collaborative projects over teaching practices:

> So many photos and so many MOUs being signed <for projects> versus maybe three to five photos in a year on teaching awards. So, I agree with OO in the sense of the balance and the focus – it is not because we defocus it, we do – it is not given as much emphasis as it should be because we are an education institution. (Staff PP; staff interview; start time 16:58 [min:sec]).

To reinforce the importance of quality teaching, learning and assessment practices, the polytechnic leadership may need to communicate overtly its interest in students' learning and educational development above other interests and required measurements (Houston 2007; Tam, 2001). It is a delicate balancing performance for the key school leaders because the polytechnic needs to address interests of other key stakeholders such as employers, government and its funding agencies as well (Thematic analysis, main theme C1).

Polytechnic Level Frameworks

The tabulated survey data reveals that majority of the research survey participants concur that these teaching approaches and learning contexts deepen students' skills except for eLearning. These teaching approaches and learning contexts are congruent with conceptions of quality as preparing students for work, and understanding concepts and deepening skills because they afford opportunities for hands-on, self-directed learning and skills development in real world environments or contexts. Murphy (2013) cautions that structure, as provided by the framework in this case, does not guarantee improvement.

As a contextual factor, the polytechnic frameworks guide quality practices of key institutional teaching approaches and learning contexts such as problem-based learning (PBL) and eLearning. The congruency of 'poor' experiences with eLearning amongst teaching staff, students and alumni survey participants is an interesting finding (Table 18). While most schools meet the BSC indicator for eLearning, which is the percent of eLearning in curriculum, there is a mismatch with experiences of research participants that eLearning is a quality practice on the ground:

> Our students now, they really do appreciate the ability for them to interact. When we talk about quality eLearning type of materials, the level of interaction cannot be just a set of audio-notes uploaded – that is zero interaction… they will not find the level of engagement, they would think that eLearning is not meaningful… (Staff interview; start time 23:42 [min:sec])

> The [diploma specific title] course, the online courses that I watched from Stanford, I felt that was more interesting, of higher level of thinking, the professors in Stanford gave you a lot of

higher order questions to think about compared to the eLearning lectures - staff <in my school> just read off the slides… (Alumni interview; start time 43:25 [min:sec])

…E-lecture was not useful, it's too long, nobody bothers. Teachers could go on and on, and not to the point. (Student interview; start time 37:20 [min:sec])

	Percent# of Survey respondents who gave "strongly agree" and "agree" ratings		
Key teaching approaches and learning contexts:	**Staff**	**Students**	**Alumni**
Project work	98%	85%	87%
Skill-based practicum	96%	85%	90%
Student internship	92%	85%	94%
PBL	78%	80%	87%
eLearning	45%	39%	46%

(Note: #% based on total number of survey respondents who opted for "strongly agree" and "agree" over total respondents. The other options in the 6-point scale were "neutral", "disagree", "strongly disagree" and "NA". Respondents who opted for "NA" responses and missing data were excluded from computation.)

Table 18 Perceptions of the research survey participants on teaching approaches and learning contexts that deepen students' skills

Next, a wide base of support from schools and staff members is crucial for sustainable improvement (Murphy, 2013). Staff interviewee II uses the word, "again" deliberately because II has earlier described the implementation approach to develop SDL skills amongst students as one onerous paper exercise, even though an institutional framework is in place:

> …It really boils down to, I think to the eLearning resource: the ability to put in the teachers' presence, the ability to put in interactivity and engagement, the ability to help students to understand what they are doing like the amount of feedback given. So, eLearning itself is <u>again</u> a good pedagogical approach, really, it is own target own time, it is self-paced, it appears to be the direction to go. <u>Again</u>, it comes down to implementation. (Excerpt of staff interview; start time 23:42 [min:sec])

It makes sense for the polytechnic to draw upon Marshall's (2016) conception of quality as "sense making" because quality is complex and this conception emphasizes on-going consultations with internal stakeholders "to enable a range of alternative conceptions to co-exist in a way that builds organisational resilience and supports multiple changes simultaneously" (p.224). In this regard, the on-going consultations with students and teaching staff about implementation approaches of the polytechnic frameworks will also widen the support base (Murphy, 2013) for the framework to impact quality practices.

Staff

My research agrees with Murphy (2013) that "quality instruction" by "effective teachers" using "quality pedagogy" is a key building material of school improvement (p.258). It supports Gibbs' view (2010) that staff and students' interaction is a key factor for educational gains. This is an evergreen principle of quality practice that encourages close student-faculty contact (Chickering and Gamson, 1987). To elaborate, my research reveals that three teaching staff profiles influence quality practices positively, one of which is having teaching staff who will spend time interacting and connecting with students (Thematic analysis, main theme C2, sub theme 2.3). A second finding suggests that quality teaching practices include interacting with students (Thematic analysis, main theme 1, sub theme 3), and a third finding suggests that quality learning practices include staff showing interest and engage students in their learning practices (Thematic analysis, main theme 2, sub theme 2.1).

In support, alumnus ZI shares about her positive experience with members of teaching staff that encourage, motivate and help students to learn:

> I am fortunate. Majority of my lecturers – not like teacher-student relationship – more like friends – good friends. Majority of them, they noticed every single student. There was one time, I was heartbroken. When they see us in trouble – they noticed us more than just a teacher's perspective. They approached us one to one, asked if we were ok, they gave encouragement and motivation to do better (sic). Like what <alumnus RR> said, their teaching style was very open. They didn't mind staying up late to meet us, hanging out us with us – very welcoming. Whatever problem we have with our education, because of that, we improved a lot in our learning. (Alumni interview; start time 26:43 [min:sec])

However, alumnus ZI offers another example when a teaching staff compromises quality practices due to a lack of connection and engagement with students:

> This particular lecturer – every day – seminar question – everyone's answer seemed to be so wrong. She relied on module answer – she couldn't control her temper – she could not explain properly – she relied too much on model answer, she didn't put herself in our perspective – put in lay man terms for us to understand. We struggled a lot in that module, in a way the quality not there, she didn't know what we wanted, we didn't know what she wanted – she relied very much on model answer. (Alumni interview; start time 31:25 [min:sec])

That said, it is important for the polytechnic to promote a culture amongst teaching staff to care for and connect with their students that goes beyond the teaching effectiveness ratings and teaching awards. It is important for the polytechnic to engage staff on its shared value of "student-centeredness" (Appendix BSC, p.2) for a wider base of support (Murphy, 2013). I also agree with Gibbs (2010) that staff cannot optimally connect with and care for their students if their workloads are too high. Perhaps, the polytechnic needs to navigate its drive to increase work productivity of staff carefully because an increase of non-teaching work duties will compete for staff's time from caring for students. In summary, as a contextual factor, teaching staff can positively or negatively influence quality teaching, learning and assessment practices in schools. It will make sense for the polytechnic to:

> Encourage lecturers to have more personal involvement in the class and support them to ensure he/she gives cares more about what the student is learning so that they can easily know what students are struggling with and take appropriate action. (Respondent 20180503-000913.994; student survey)

Student Cohort

As a contextual factor, student cohort positively influences quality of learning practices through self-sustained, vibrant learning environment (Thematic analysis, main theme C2, sub theme 2.6). It affirms one of Chickering and Gamson's (1987) principles of good practice that collaborative learning deepens and extends students' learning. In support, Gibbs (2010) reports that the extent of collaborative learning amongst students is important for education gains. The finding affirms Murphy's (2012) view that "personalized learning environment for students" (p.258) is a key building material for school improvement, and in this environment, there are opportunities for students connect with one another for learning.

The vibrant learning environment affords healthy competition and rivalry that motivate students like alumnus RR to explore beyond curriculum concepts as discussed earlier (Alumni interview; start time 32:55 [min:sec]). While my research questions do not ask about which skills will be useful for a self-sustained and vibrant learning community, my research uncovers what survey respondents consider to be most useful skill that have been deepened by the teaching approaches and learning contexts in the polytechnic. Taking number of responses from students and alumni survey respondents together (reflected in brackets), the more frequently cited skills are hands-on skills (58); people skills (50); communication skills (52); and team skills (48). These skills will probably be helpful to the students within their learning communities.

To end, student cohort as a contextual factor is congruent with the proposed conception of quality as understanding concepts and deepening skills (Thematic analysis, main theme C) and quality learning practices in terms of learning from fellow students (Thematic analysis, main theme 2, sub theme 2.2). Although the BSC 2019 metrics do not feature learning communities as a key performance indicator, there are communities of practice for staff to hone their business and learning analytics skills in the polytechnic (Appendix BSC). Likewise, to influence students' learning practices positively, I recommend the polytechnic and its schools to support more self-sustained learning communities of students. One form of the polytechnic's support is the on-going rejuvenation of learning spaces. Perhaps, there are other forms of support, which probably need student consultations.

Curriculum

As a contextual factor, I assert that curriculum influences scope and outcomes of quality practices in the polytechnic. It corroborates with Murphy's (2013) view that curriculum is a key building material for school improvement. He lists "content coverage; time; rigor; and relevance" of the curriculum (p.258) as key aspects to be addressed for school improvement. My research finding elaborates that the research participants see the relevance of curriculum in terms of industry practices and polytechnic's Desired Student Profile (DSP) within a fast changing educational landscape (Thematic analysis, main theme C2, sub theme 2.5). In addition, Murphy (2013) alludes to a curriculum that is

relevant to the society in general. Along this line, since 2018, the polytechnic sets aside one third of its curriculum for students to develop the DSP:

> … through which every [polytechnic] student is envisioned to be a lifelong learner, a future-oriented creator and a values-centred leader. To this end, [polytechnic] has adopted Self-Directed Learning, Problem-Based Learning and e-Learning as key pedagogies that critically develop students in transferable skills and competencies such as resilience, problem solving, and digital literacy. (Appendix BSC, p.4)

However, going beyond the aspirational nature of the DSP is challenging because of insufficient iterative exposures for students to develop all these 'good stuffs' in an already packed curriculum (Senior management LL; Interview 1A; start time 24:38 [min:sec]). As it is, some student survey respondents described their experiences with the curriculum as "suffocating" (Respondent 20180303-173812.143) and "demanding" (Respondent 20180503-205543.213).

Other staff survey respondents suggest schools to reduce content coverage so that there is time to engage students to think more deeply about what they are learning (Respondent 20180301-091245.526), and this is consistent with a key conception of quality as understanding concepts and deepening skills within the polytechnic (Thematic analysis, main theme C). I believe few schools and teaching staff will disagree with the intent of the DSP. However, schools and teaching staff also value their diploma specific content. As part of "sense making" (Marshall, 2016, p.224), the polytechnic may need to emphasize on-going consultation with internal stakeholders, namely schools, staff and students to address their quality experiences with the DSP.

Assessment

As a contextual factor, assessment focus and load influence quality practices. Survey respondents see quality assessment practices as: those practices that encourage application rather than memorization of knowledge, check for students' understanding of content and attainment of knowledge and skills and provide regular feedback to students to improve their works (Thematic analysis, main theme 3). My research findings concur with Murphy (2013) that monitoring students' progress as part of school improvement will influence quality practices positively.

Within a performative culture, it is not surprising that assessment performance is a key concern amongst students and schools (and staff). Firstly, student interviewees have much to say about the stress of high-stakes examinations. From my insider's experience, the high stress arises from students having to sit for three to five final examination papers within one-week period. Some diploma courses have moved towards project-based and continuous assessments and reduced the number of subjects with final examinations. Instead of final examinations, students make presentations and submit prototypes or project reports (Student interview; start time 47:00 [min:sec]) as part of their "performance-based goals" (Murphy, 2013; p. 259). However, student interviewees still experienced high level of stress during the "hell week" leading to the final examinations where there are multiple project deadlines and assessments (Student interview; start time 13:00 [min:sec]).

Secondly, there is sensitivity surrounding high subject failure rates in schools (Senior management HH; interview session 2; start time 16:27 [min:sec]). This finding concurs with my insider's experience

that there is expectation for schools to keep subject failure rates low and teaching staff to explain why students are not performing in subject assessments. Perhaps, this sensitivity and the need to account for students' failure rates deter staff from employ more application-based assessment, which can be challenging for some students. That said, I am not suggesting that it is wrong for the polytechnic to ask its schools to account for unusually high subject failure rates. In fact, Murphy's school improvement framework (2013) underscores the need to monitor students' progress and account for students' performance through "performance-based goals; systematic used of data; and shared accountability" (p.259). What is probably needed is for the polytechnic to emphasize the notion of shared accountability amongst schools, staff and students if the polytechnic hopes to encourage more quality assessment practices in the form of application-based assessments. By the term 'shared accountability', I mean that it is important for schools to allocate sufficient resources to staff to do their jobs, for staff to prepare students for application-based assessments, and for students to do their part as well.

3. LIFELONG LEARNING AND SKILLS MASTERY

In this section, I will discuss key aspects of student preparation in lifelong learning (inclusive of skills mastery) within a "SkillsFuture Ready" Polytechnic [Goh, 2016] (RQ3).

3.1 Preparing Students for Lifelong Learning

I will focus my discussion mainly on lifelong learning, which includes skills mastery. The student, alumni and staff survey datasets report that a credible proportion of questionnaire survey respondents (67% to 82%) perceived that school preparation for students in lifelong learning has been adequate and more than adequate. That said, there are the others (18% to 33%) who informed the research that the preparation can be better. The increased emphasis from the Government's skills frameworks (Thematic analysis, main theme C1, sub theme 1.3) and the polytechnic's framework in self-directed learning (Thematic analysis, main theme C2, sub theme 2.2) are key contextual factors that reinforce quality practices in preparing students for lifelong learning.

In the student preparation for lifelong learning, schools need to go beyond the instrumental value of having a future orientation (Thematic analysis, main theme 4, sub theme 1.1). One of my findings reveals that it is important to encourage student interests (Thematic analysis, main theme 4, sub theme 1.2). The finding is consistent with Schuetze's (2006) focus on learners' needs during lifelong learning. The next finding is about supporting students with mentors and role models (Thematic analysis, main theme 4, sub theme 1.3). This finding is in support of Billet's (2010) view that lifelong learning is a "social-personal process" (p.401) during which it can be "individually transformative" for the learners (p.402).

To delve deeper, I will interact with key ideas of the social and personal dimensions of lifelong learners and the personal transformations to review the adequacy of school's preparation of students as lifelong learners in the next few paragraphs. Firstly, schools need to go beyond economistic and employability purposes to address other social, personal and learning needs of students while preparing them for lifelong learning (Billet, 2010; Schuetze, 2006). The rationale and purpose to prepare polytechnic students for lifelong learning in polytechnic students are primarily for graduates' employability:

> With the dynamic changes in our working environment, it would be more useful and meaningful to develop life skills in our learners. Learners with strong life skill sets are likely to respond positively to changes around and ahead of them. It would suffice for us to equip our students with foundation knowledge of their selected curriculum at polytechnic level. With the rapid speed at how things around us are changing, any deepening of technical or domain skills would have to be picked up along the different stages of a learner's life. Hence, if they have sound life skills like being self-directed learners or resilience, they would be more aware of the need to keep abreast of times, less fearful of uncertainties and changes and be more open to the need to be lifelong learners. (Respondent 20180328-140743.704; staff survey)

However, to better engage and motivate polytechnic students to embark on the journey of lifelong learning, schools may need to go beyond useful skills for work purposes to cater to a wider range of student interests to motivate students to learn (Schuetze, 2006). From my insider's knowledge, a common module for all students in the polytechnic known as Guided Learning is a potentially suitable vehicle to do just that.

Perhaps, it is for the polytechnic to consider nudging students to learn in different settings (Schuetze, 2006), including informal ones at home and outside of school so that students are reoriented to value learning opportunities outside of formal curriculum and schools (Aspin and Chapman, 2000). Focusing on the learners' needs corroborate with the finding that students will pick up new knowledge and skills along the way if they deem these useful and necessary (Christie *et al.*, 2015). When schools engage students through their personal interests and motivate them to learn, they are more likely to pick up new or deepen knowledge and skills. For example, if students see lifelong learning as a means for personal development (Aspin and Chapman, 2000), they are more willing to invest time and energy to do so:

> Every student is different. If they see <that> it's useful to upgrade oneself through lifelong learning, that will sustain the spirit. (Senior management HH; interview 2; start time 25:50 [min:sec])

Secondly, schools need to address the social portion of the "social-personal process" of lifelong learning (Billet, 2010, p.401) where schools nurture communities of support for students during the learning process from peers, staff members, family members and community at large. Alumnus RR alludes to a self-sustaining and supportive learning community comprising fellow students that influence quality of learning practices (Thematic analysis, main theme C2, sub theme 2.6). It is probably necessary for schools to support students through their emotional transformation because polytechnic students can be frustrated and discouraged at early stage of lifelong learning, like the PhD candidates discussed in Cheng's work (2014), when they meet with obstacles during their studies. Polytechnic students tend to struggle with self-learning, and encouraging words and approach from teaching staff will help:

> Positive nurturing consultation and feedback without hurting the feeling and without judging the students' ability limits, focus on encouraging growth mindsets. (Respondent 20180325-185538.200; staff survey)

There is untapped potential to invite and engage the community at large as social models (Christie *et al.*, 2015) of lifelong learners to inspire students in an unfamiliar and arduous journey of lifelong learning, which may be "individually transformative" in nature (Billet, 2010, p.402). To support the social process of lifelong learning, polytechnic's staff members can serve as social role models for their students (Thematic analysis, main theme 4, sub theme 1.3). However, schools may find it challenging to identify adequate adult models of lifelong learning to support their students as discussed earlier. There is a need for schools to invest time and energy to develop the social support network for their students. Otherwise, it may be difficult for students to adjust to the demand of personal effort required for lifelong learning (Billet, 2010). When students are busy in meeting the pressing demands of the formal curriculum, the 'distant' need for lifelong learning will likely take a back seat whilst at the polytechnic.

Lastly, the polytechnic and its schools are probably more adept in enabling intellectual transformation of students for lifelong learning. Cheng's (2014) notion of intellectual transformation premises on a change of student's perspective of subject matter due to increased and deeper understanding of subject knowledge. School can encourage students to pick up new skills, for example:

> The school might need to encourage students to pick up new skills during their holidays to further equip themselves or at least introduce the concept of lifelong learning. This will prepare the students when they graduate and understand the value of life-long learning, even as an alumnus in the workforce. It will be useful to have industry-related talks or cross-disciplinary talks offered to all students at the start of the first semester in the final year. This might help spark interest in students to pick up a variety of skills, which can be an asset to have when looking for employment. (Respondent 20180503-172211.161; alumni survey)

To sustain the journey of lifelong learning, it is important for school to cultivate students' interest in the subject domains, in addition to encouraging students' wider interest as discussed earlier:

> When the lessons are interesting, students will start to explore and learn by themselves. If not, they would start to lose interest in the subject contents and finally would not learn well. (Respondent 20180305-164923.365; staff survey)

> The learner: gains interest in a particular field that provides more sustained motivation; gains knowledge; and gains skill. (Respondent 20180523-151033.435; staff survey)

The deliberate effort on the part of the schools to enable students to make meanings of the learning is crucial. It will need to go beyond a student briefing session based on the national narrative of lifelong learning for employability.

3.2 Quality Indicators of Lifelong Learning

My research reveals that there is room to explore quality indicators of lifelong learning. The polytechnic measures its effort to support lifelong learning through key BSC performance indicators related to continuous education and training (CET) offerings (Appendix BSC, p.7 and p.8). These BSC indicators are measures of schools' performance in supporting CET and not measures of students' progress in lifelong learning. The closest proxy indicators (non-BSC indicators) are measures related

to students' readiness for self-directed learning (SDL). However, preparation for lifelong learning goes beyond readiness for SDL, as discussed earlier. I will recommend three quality indicators for lifelong learning (inclusive of skills mastery).

Firstly, the polytechnic can consider the number and impact of social mentors (peers, staff and others in community) as a measure of lifelong learning. This quality indicator communicates the importance of making provision for social-personal support during lifelong learning (Billet, 2010). Besides, the indicator emphasizes the qualitative nature of mentor's support, which is in line with senior management interviewees' suggestion to deploy meaningful quality indicators that have both number and contexts (Interview 3; start time 38:55 [min:sec]; Interview 6; start time 50:20 [min:sec]).

Secondly, the polytechnic can consider to track the number of students who are engaged in lifelong learning in different learning contexts. Billet (2010) and Schuetze (2006) argue that lifelong learning should also occur in other informal settings at homes, workplaces and community aside from formal settings in educational institutions. There is value in doing so if the polytechnic intends to develop its students to learn for work and life.

Thirdly, the polytechnic can probably track the "educational gain" of key skills (Gibbs, 2010; p.6) since it does not have a measure for skills mastery in the BSC:

> In terms of skills mastery, we never really measured skills mastery… It was timely that we review the Balanced Score Card. In the Balanced Score Card, the new one, we are actually focusing on indicators, looking at domain skills, life skills and future skills – the 3S of [name of Polytechnic]. (Senior management MM; interview 3; start time 17:47 [min:sec])

MM shares that the polytechnic is currently tracking development of key skills in other surveys as articulated by the new PCEO. However, it will take time to collect database across the schools in the polytechnic to review what may constitute as meaningful quality indicators to measure mastery of these skills amongst students during their diploma studies.

To extend the discussion about quality indicators in general, three of the six senior management interviewees ask for qualitative dimension to enrich quantitative measures in the BSC. However, SS problematizes the use of both quantitative and qualitative indicators:

> SS: "Many of the indicators have to be numerical; very hard to measure something qualitatively."
>
> GH: "Or are you saying that you would like to see some qualitative kind?"
>
> SS: "You may have too, because the numeric ones that can be easily measured are more or less measured; it's the qualitative ones that are the hardest. But then again, the qualitative ones without enough numbers saying it; is also not strong enough evidence to say that it is important."
>
> GH: "If you have quality indicator that has both quantitative and qualitative dimensions, like you said. Is there such a thing?"
>
> SS: "Is there such a thing? Off hand, it is very hard. To me, having discussions with students, having discussions with employers, what are the weaknesses, and then do something

> strongly. I mean really put it into the curriculum if it can be put in, to measure it, that's important." (Interview 6; start time 50:20 [min:sec])

As an insider, I am aware of the polytechnic's initiatives to explore text analytics to glean insights from open-ended items of surveys related to staff teaching effective, student satisfaction of their studies and graduate employment (Senior management interview 3; start time 26:15 [min:sec]). This is an encouraging sign that the polytechnic is using more analytics tools to analyze qualitative data, which will be very difficult and time-consuming analysis to perform previously, as mentioned by SS. This development is bolstered by the public service's drive to use more data analytics to make informed decisions, and the polytechnic is actively building its capability to perform data (including text) analytics in the last two years. It is likely that I will see more of qualitative data used to enrich current numerical BSC indicators over the next few years.

To end, the Government's priority of lifelong learning is clearly for the continued employability of current and future workforce (SkillsFuture, 2015a). I recommend the polytechnic to take a broader view of preparation to include transforming its students for work and life. If the polytechnic continues to invest more time and energy to fine-tune the social-personal preparation of students for lifelong learning, it is more likely that its schools can win over more of the remaining 18% to 33% of the questionnaire survey respondents who disagreed or strongly disagreed that schools' preparation of lifelong learning is adequate. The preparation of students for lifelong learning is likely to include personal transformation of students, during which schools and social models (Christie *et al.*, 2015) will support their students undergoing the transformation.

I concur with the Singapore Government that a key issue of lifelong learning is to nurture and build a supportive culture of lifelong learning in the society (SkillsFuture, 2015a). Notwithstanding that it requires a huge financial undertaking and commitment on the part of the Singapore Government to build a supportive culture of learning for all citizens, it will also take time and effort for individuals, schools, community and society to co-create this cultural change. Student preparation will need to go beyond the Government's narrative of employability, financial subsides and rich provisions of courses for all (Billet, 2010).

CONCLUSION

1. Conceptions of Quality

My research uncovers that there are five key conceptions of quality related to teaching, learning and assessment practices in the polytechnic, namely what is important (to the polytechnic); preparing students for work; understanding concepts and deepening skills; setting standards and standardizing practice; and transforming students (RQ1). Of which, the more dominant conceptions are what is important (to the polytechnic) and preparing students for work. I argue that the polytechnic needs to broaden its purpose to go beyond employability, giving more emphases to student preparation in civic mindedness, ethical development and personal well-being in workplaces and life.

2. Quality Practices

My research reveals that quality practices in teaching, learning and assessment are those that helped students to understand subject knowledge (RQ1). I argue that preparing for lifelong learning is an individual transformation process, and the polytechnic needs to go beyond economic purpose to address social, personal and learning needs of students as part of their preparation for lifelong learning (RQ3). Preparing students for lifelong learning will include supporting them to break out of their "cocoons and blossom" (RR, senior management interview). The conception of quality as transforming students has promising potential in this regard (Thematic analysis, main theme 4).

3. Contextual Factors

My research points to ten key contextual factors that likely influence the conceptions of quality and practices in the polytechnic (RQ2), as tabulated below.

Key external contextual factors	**Key internal contextual factors**
(1) The Government's priorities; (2) Industry needs; (3) National level skills frameworks; and (4) Public's expectation (including parents of current/ potential students).	(1) Key school leaders; (2) Polytechnic level framework; (3) Staff related factor; (4) Student cohort related factor; (5) Curriculum related factor; and (6) Assessment related factor.

Table 19 Key internal and external contextual factors that influence the conceptions of quality and practices in the polytechnic

My research suggests that the leadership change within the polytechnic around 2017 has influenced the subsequent review of and revamp of the BSC in 2019 (RQ2). In addition, the wider context of Singapore's economistic understanding of education, its market practices in education and the performative culture in the polytechnic will mediate the basket of contextual factors identified in my research.

I argue that the polytechnic needs to consider different ways to engage its community (staff, students, alumni and parents) to partake in its shared values:

> Responsibility for the continued growth and success of [the polytechnic]; respect for the dignity of the individual; integrity of the highest order; student-centeredness; future-orientation (Appendix BSC, p.2)

There is room to increase the 'shared-ness' of the polytechnic's shared values with its communities or stakeholders and elevate the status of these stakeholders within the polytechnic. The potential in using the shared values to co-create a stronger partnership between the polytechnic and its community is tremendous. While I am not suggesting that the polytechnic panders to the whims and fancies of its stakeholders, regular engagement sessions such as staff engagement sessions by the PCEO is a step in the right direction. The consistent applications of these shared values need to guide practices within the polytechnic.

4. Recommendations from the research

I propose three key recommendations to broaden the conceptions of quality in the polytechnic, beyond the strong emphases on employment and continued employability of polytechnic graduates. Firstly, quality as what is important to the polytechnic can include a stronger emphasis to improve social conditions of its immediate community (students, alumni, staff and parents) concurrently. Secondly, quality as students' preparation for work can include other dimensions of work such as having satisfaction in one's work, upholding ethical and civic values in workplaces. Thirdly, quality as transforming students can include making provisions to support students during their individual transformative journeys, beyond the emphasis of instrumental value of future skills and orientation.

Next, I propose three other recommendations to harness the polytechnic's contextual factors to positively influence its quality practices. Firstly, the polytechnic may need to elevate the status of 'smaller' stakeholders (students, alumni, staff and parents) and engage them through regular, on-going consultations to address their experiences of quality practices. Secondly, there is room for the polytechnic to encourage a culture amongst teaching staff to care for and connect with their students as part of its quality teaching practices. Thirdly, there is great potential for the polytechnic to nurture more self-sustained and vibrant student communities to enhance students' learning practices.

To end, I assert that the polytechnic may need to address social, personal and learning needs of students as part of their preparation for lifelong learning. The polytechnic may want to consider the next three quality indicators to drive/ monitor lifelong learning. Firstly, the number of social mentors (peers, staff and others in community) as a measure of lifelong learning provision. Secondly, the number of students engaged in lifelong learning in other informal settings at home, in the workplace and community to send a strong message that learning occurs beyond formal settings in the polytechnic. Thirdly, it is probably helpful to use text analytics to gain insight into qualitative dimensions of lifelong learning as another indicator to enrich the above two quantitative measures. In the next five segments, I will reflect upon other aspects of my EdD journey.

5. What have I learned from this research?

I learned that it is important not to be bounded by my own experiences as a long-standing member of staff to dominant narrative of graduate employability and performative culture of the polytechnic but to also consider different perspectives for work and life. For example, there is value in encouraging more professional judgement among staff and to develop their rationale for their own

teaching practice, aside from using performance indicators to drive/ monitor quality teaching practices. Next, as a manager in the polytechnic, I think it is important to talk with different groups of stakeholders (students, alumni and staff) more often, as part of my own sense making of quality issues in the school. When the stakeholders are comfortable with you, they will be more likely to share their views and experiences of quality issues and practices, which they may not share as much in quality related surveys and audits. Lastly, I would like to embrace a more abundant view of human purpose to include civic mindedness, taking pride in my work and general well-being, beyond the economistic purpose of education and the view of seeing education as an economic investment.

6. Why does my research matter?

To my knowledge, there is no published report on conceptions of quality in polytechnics in Singapore. There will be opportunities for me to share my research via three platforms within Singapore and overseas. The first will be to offer lunch time talks/ workshops within my polytechnic. I believe policy makers and colleagues will be interested in what I have to say about conceptions of quality and contextual factors that influence quality practices in the polytechnic. The second platform will be to give talks across the polytechnic sector. There may be interest from the sector, which comprises five polytechnics in Singapore, to assess the extent to which my research findings and recommendations resonate with quality experiences and practices within the sector and individual polytechnics. That said, I do not claim that my research can be generalized for the sector and other polytechnics. Although there are similarities amongst polytechnics in terms macro level and family factors, organizational level contextual factors that influence quality practices of each polytechnic can differ. The third platform will be to disseminate my research through regional/ international conferences and peer reviewed journal publications. The academic communities may take an interest in conceptions of quality education in a Singaporean polytechnic.

7. A Sponsored Insider Researcher

As an insider researcher and a sponsored candidate, I am transparent throughout my research process and I am mindful not to come across an overly critical of the polytechnic (my sponsor). There were occasions where I rephrased certain research findings and recommendations to ensure that they conveyed the message without having to use provocative language. A constant challenge is for me to recommend areas for consideration without annoying policy makers in the polytechnic.

Next, I cannot rule out the possibility that, as an insider researcher and a manager in the polytechnic, there is no power relationship between research participants and me that may have influenced the research process. Perhaps the research participants might say more if I was not from the same polytechnic. That said, I find that recognizing and appreciating the goodwill of my research participants extended to me during the research process have helped me to sustain a warm and open environment, especially during the interview sessions.

8. A Mixed Methods Researcher

I find the mixed methods research process demanding for a solo researcher (like me) who holds a full-time job. It took me half a year to conduct the student, alumni and staff questionnaires based on a total sampling quota of 450. Another half a year to perform thematic analysis (phase 1 to phase 5) of the questionnaire and interview datasets. I spent another three months to trim, fine-tune key

themes in the thematic analysis (phase 6) because the iterative process of the earlier phases 1 to 5 generated voluminous and repetitive data, bursting the word count of the thesis. Nonetheless, I do not regret my choice to employ a mixed methods approach because I find that having a thoughtful mix of qualitative and quantitative data is more persuasive to policy makers in the polytechnic. I must say that it was a painful process to trim the data to meet the word count requirement of the thesis.

9. My Ontological Journey

At the start of the EdD programme, I made an uneasy shift from a realist ontology because I recognize that research is not value-free. I was amongst those who felt confused and flustered during the EdD module 1 when professors challenged the notions of an objective truth and a neutral researcher, which some of us from the medical/ biological sciences took for granted. While my ontological position has shifted, as a STEM educator in the polytechnic, I still hold a high regard for quantitative research such as the clinical trial research, hypothesis testing and validation of survey instruments. In my research, I employed questionnaires, which collected tons of quantitative data that is helpful to me. However, I agree that the quantitative data is incomplete and insufficient to explain the research findings.

Next, my shift from a realist ontology does not mean that I have shifted entirely towards an interpretivist ontology. I recognize the place of qualitative research such as grounded theory, thematic analysis and interviews to explain subjective and unpredictable human behaviours in my world. I learnt that it is important for me to be transparent with my values and choices made during the research process. I conducted interviews, which generated a rich source of qualitative data to explain the views and experiences of my research participants. Yet, I feel uneasy to claim that I am an interpretivist researcher because I also appreciate numbers from the quantitative methods. Perhaps, it has to do my training in the biological sciences.

At this point, I feel that a pragmatic worldview best describes my ontological position. I do not hold strongly to a realist or interpretivist ontology. During the thesis writing, I maintain a position that there is no need to have an either/or approach regarding the choice of quantitative and qualitative research approach. On that note, I justified a mixed methods approach for my research. On reflection, this pragmatic worldview is congruent with my practice to employ appropriate method(s) to address or solve issues in other work settings. However, I am worried that I may experience a double-dose challenge from the quantitative and qualitative communities of researchers. The ontological journey has been a transforming experience for me. It is a journey that I feel will continue to find myself.

APPENDICES

Appendix BSC The Balanced Score Card 2019 (Abridged Version)*

[Page 1]

ANNEX A. BSC-4G: STRATEGY MAP , STRATEGIC OBJECTIVES & KPI

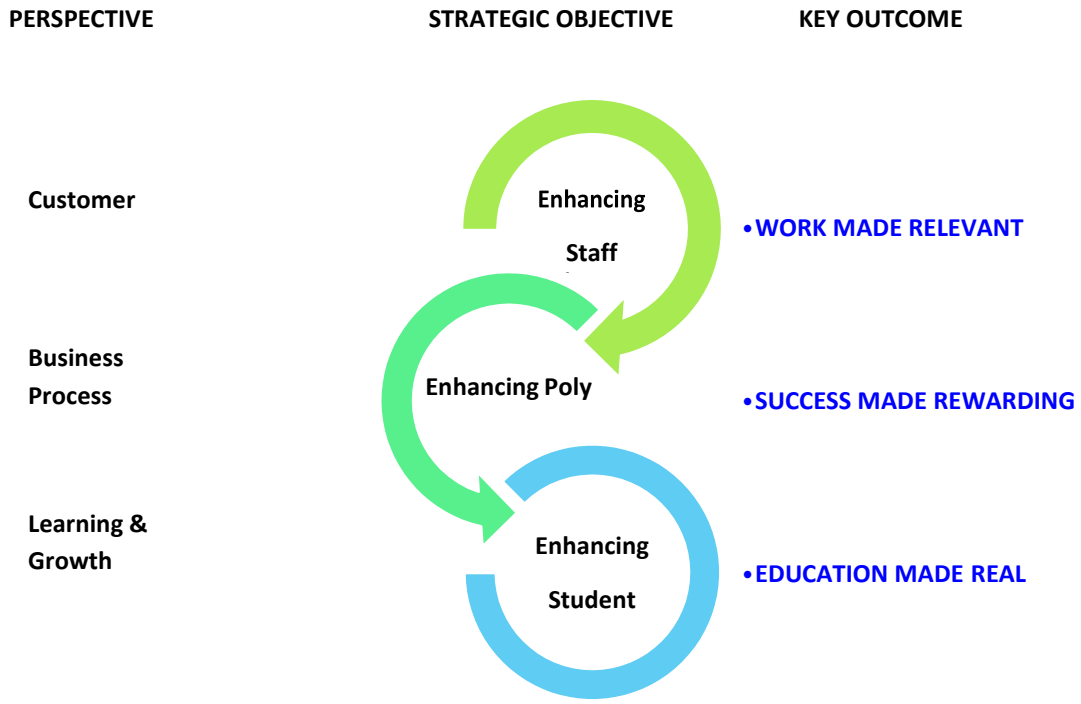
1. [Name of polytechnic] adopted the Balanced Scorecard (BSC) as our performance management system in 2001. The BSC has enabled strategic alignment, deployment, and monitoring across schools and departments.

2. The current BSC Strategy Map (BSC-3G) was introduced in 2007 as a guide for alignment of the BSC to [name of polytechnic]'s mission, vision, shared values and strategic thrusts.

3. In the past 10 years, there have been significant changes in the educational landscape. These include the introduction of the SkillsFuture and Public Sector Transformation (PST) movements. With these changes, the BSC-3G weakened in relevance.

4. To address the above issues, [name of department] reviewed the BSC-3G and defined a new BSC-4G Strategy Map. The BSC-4G aims to be more unifying and directional, taking on a Whole-of-[name of polytechnic] approach. Objectives are anchored on three key elements - Students, Staff, and the Organisation. Through the BSC-4G, we aim to pursue the three key outcomes shown in **Exhibit 1**.

Exhibit 1. BSC-4G Three Key Outcomes



* ***Details of the BSC 2019 were withheld during the professional clearance process.***

[Page 2]* **Exhibit 2. BSC-4G**

MISSION
To prepare school-leavers and working adults for a future of dynamic changes, with relevant knowledge, life-long skills, character and a thirst for continuous improvement.

SHARED VALUES
Responsibility for the continued growth and success of [name of polytechnic]; Respect for the dignity of the individual; Integrity of the highest order; Student-centredness; Future-orientation

[Page 4]* **[Desired Student Profile]**
… Curriculum design and delivery employ approaches that develop students along the line of the [Desired] Student Profile ([D]SP) through which every [polytechnic] student is envisioned to be a *lifelong learner*, a *future-oriented creator* and a *values-centred leader*. To this end, [the Polytechnic] has adopted Self-Directed Learning, Problem-Based Learning and e-Learning as key pedagogies that critically develop students in transferable skills and competencies such as resilience, problem solving, and digital literacy. Students are engaged in effective learning through [the Polytechnic's] Learning Enterprises, where they learn to be more practice-oriented and focus on problem-solving in realistic learning environments.

[Page 6]*

Key Performance Indicators [BSC 2019 Metrics]

There are 17 KPIs which will be driven by specific departments, alongside relevant Schools and Departments. KPIs are classified either as lead or lag indicators.

Summary of KPIs

Strategic Objective	Monitoring Approach	Indicator & Description	Owner*
Domain Skill	Lead • Target • Trend • X-poly	**PET Overall Graduate Employment Rate (FG+PNS)** *Percentage of economically active PET fresh and post-NS graduates who are working in full-time permanent / part- time / temporary / freelance job, as measured in the annual Graduate Employment Survey*	[S]
Life Skill	Lead • Target • Trend	**% Graduating students who participated in at least one Student Overseas Trip (SOT)** *Percentage of unique student (graduating cohort) participating in SOT (OSIP, OIP, OCP, OSP, OST) at least once* *[OSIP-Overseas Student Internship Programme; OIP-Overseas Immersion Programme; OCP-Overseas Community Project; OSP-Overseas Special Programme; OST-Overseas Study Trip]*	[I]

Strategic Objective	Monitoring Approach	Indicator & Description	Owner*
Life Skill	Lag • Target • Trend	**PET SIP Performance Rating** *The percentage of students who receive from SIP Company Supervisor, the rating of "Strongly Agree" or "Agree", in response to the statement in the SIP Performance Appraisal that "Overall, the student has met the desired learning outcomes for the internship"*	[S]
Future Skills	Lead • Target • Trend	**CET Course Run:Offered Percentage** *Percentage of CET Courses Run over Courses Offered* *CET Courses refer to Full Qualification courses, Workforce Skills Qualifications (WSQ) courses, Short and customised courses, Micro-Learning Courses (MLCs) and SII courses*	[T]
Future Skills	Lead • Target • Trend	**CET Trainee Training Hours** *Summation of all CET courses' Trainee Training Hours* *[Total (Duration of course in no. of hours x no. of trainees in the course)]*	[T]
Future Skills	Lag • Target • Trend	**CET Actual Revenue** *Actual CET revenue for the year*	[T]
Future Skills	Lag • Target • Trend • X-poly	**CET Job Enhancement Rating** *Percentage of responded trainees who report on positive outcome on job performance or skills enhancement, as measured in the annual CET survey conducted by SkillsFuture Singapore*	[T]
Business Excellence	Lead • Target • Trend	**% Diploma Courses meeting eLearning Target** *At least 40% of subjects across the school having at least 40% of eLearning; Target applies to both PET/CET diplomas*	[L]
Business Excellence	Lead • Target • Trend	**# Digitalisation, Innovation or Productivity Improvement Projects completed (DIPIP)** *Number of digitalisation, innovation or productivity improvement projects implemented per school/department*	[S]

[Page 8]

Strategic Objective	Monitoring Approach	Indicator & Description	Owner*
Business Excellence	Lag • Target • Trend	**PET Student Satisfaction Rating** *Percentage of PET students who indicated "Strongly Agree" or "Agree" that they are satisfied with their overall experience at TP, as measured in the Student Satisfaction Survey*	[S]
Business Excellence	Lag • Target • Trend	**CET Course Satisfaction Rating** *Percentage of total trainees who provided a "Satisfied" or "Very satisfied" response under overall satisfaction in the CET Course Satisfaction Survey*	[T]
Resource Efficiency	Lead • Target • Trend	**Recurrent Budget Utilisation Rate** *Percentage of actual EOM and OOE incurred over original allocated EOM and OOE budget*	[F]
Work Skills Reprofile	Lead • Target • Trend	**% Staff involved in Teaching or Supporting CET** *Percentage of academic staff in TP involved in teaching or supporting CET*	[T]
Work Skills Reprofile	Lead • Target • Trend • X-poly	**% Academic Staff involved in Industry Attachment** *Percentage of academic staff who are engaged with the industry through an immersive Industry Attachment experience*	[S]
Work Skills Reprofile	Lag • Target • Trend	**% Staff Reprofiled** *% Staff Reprofiled (out of staff names surfaced to HR for Reprofiling)*	[S]
Work Area Review	Lag • Target • Trend	**MMF Allocation** *Headcount as at end March, end June, end September and end December for each year*	[H]
Work Area Review	Lag • Target • Trend • X-poly	**Engagement to Organisation Score** *Employee Engagement Score which is the average score from the questions under Engagement to Organisation category of the Single Public Service Employee Engagement Survey conducted every 2 years.*	[H]

Appendix A1-1 The alignment of the proposed questionnaire items for teaching staff to the research question 3

Research Question	Proposed Questionnaire Items for Teaching Staff
RQ3 To what extent have the conceptions of quality, practices and contextual factors influenced the selection of quality indicators in the BSC? a) To reposition as a "SkillsFuture Ready" Polytechnic, how adequate are current quality indicators in the BSC for skills mastery and lifelong learner development?	Items 1 to 5: focusing on the extent to which current key pedagogies within the polytechnic helped to develop students' skills. The problem-based learning subjects (item 1)/ e-learning subjects (item 2)/ practicum subjects (item 3)/ student internship (item 4)/ projects (item 5) helped my students to deepen their skills in their chosen diploma study. Strongly Agree; Agree; Neutral; Disagree, Strongly Disagree; Not Applicable (means no such subjects in my diploma study) Give ONE example of the skills most frequently acquired through subject item 1/ 2/3/4/ 5 that is most useful to my students _____. Please explain your choice of skills_____ Item : 6 -8 focusing on quality practices on the ground Rank for the following items where you have seen quality teaching (item 6)/ learning (item 7)/ assessment (item 8) practices in your school (1 for most frequently seen and 5 for least frequently seen) : ☐ Lecture Theatre ☐ Classroom ☐ Laboratory ☐ Learning Enterprises (eg. KoolWerkz, Sugar Loaf, IBM-ITSM) ☐ Other learning spaces (in your opinion, name one most helpful learning space _____) Give ONE example of the quality teaching (item 6)/ learning (item 7)/ assessment (item 8) practice that you

Research Question	Proposed Questionnaire Items for Teaching Staff
	have most frequently seen on the ground for item 6/7/8 that is most useful to my students _____. Please explain your choice of practice_____ Item 9-11: focusing on the adequacy of current quality practices for the Skills Future How adequate are the current teaching (item 9)/ learning (item 10) / assessment (item 11) practices in my school prepare my students for the SkillsFuture? More than enough; Enough; Not quite Enough; Not enough at all; I don't know If you would like to offer any other views (on items 9 to 11), pls do so here _____
b) What other quality indicators should be considered for skills mastery and lifelong learner development which are emphasised in the SkillsFuture Policy?	Item 12: focusing on other (new) quality practices for the Skills Future If you have opted for "Not quite enough"/ "Not enough at all"/ "I don't know", what other quality practices are needed to prepare my students for SkillsFuture? _____

Appendix A1-2 The alignment of the proposed questionnaire items for students/alumni to the research question 3

Research Question	Proposed Questionnaire Items for Students/ Alumni
RQ3 To what extent have the conceptions of quality, practices and contextual factors influenced the selection of quality indicators in the BSC? a) To reposition as a "SkillsFuture Ready" Polytechnic, how adequate are current quality indicators in the BSC for skills mastery and lifelong learner development?	Items 1 to 5: focusing on the extent to which current key pedagogies within the polytechnic helped to develop students' skills. The problem-based learning subjects (item 1)/ e-learning subjects (item 2)/ practicum subjects (item 3)/ student internship (item 4)/ projects (item 5) helped me to deepen my skills. Strongly Agree; Agree; Neutral; Disagree, Strongly Disagree; Not Applicable (means no such subjects in my diploma study) Give ONE example of the skills most frequently acquired through subject item 1/ 2/3/4/ 5 that is most useful to me in my study *[For alumni: my workplace]* _____. Please explain your choice of skills_____ Item : 6 -8 focusing on quality practices on the ground Rank for the following items where you have seen quality teaching (item 6)/ learning (item 7)/ assessment (item 8) practices in your school (1 for most frequently experienced and 5 for least frequently experienced) : ☐ Lecture Theatre ☐ Classroom ☐ Laboratory ☐ Learning Enterprises (eg. KoolWerkz, Sugar Loaf, IBM-ITSM) ☐ Other learning spaces (in your opinion, name one most helpful learning space _____) Give ONE example of the quality teaching (item 6)/ learning (item 7)/ assessment (item 8) practice that you have experienced on the ground for item 6/7/8 that is

Research Question	Proposed Questionnaire Items for Students/ Alumni
	most useful to me in my study *[For alumni: my workplace]* _____. Please explain your choice of practice_____ Item 9-11: focusing on the adequacy of current quality practices for the Skills Future How adequate have the teaching (item 9)/ learning (item 10) / assessment (item 11) practices in my school been to prepare me for the SkillsFuture? More than enough; Enough; Not quite Enough; Not enough at all; I don't know If you would like to offer any other views (on items 9 to 11), pls do so here _____
b) What other quality indicators should be considered for skills mastery and lifelong learner development which are emphasised in the SkillsFuture Policy?	*[For alumni ONLY]* Item 12: focusing on other (new) quality practices for the Skills Future For item 11, if you have opted for "Not quite enough"/ "Not enough at all"/ "I don't know", please answer this question, What other quality practices are needed to prepare me for SkillsFuture? _____

Appendix P1-1 Pilot study 1-1: The revised semi-structured interview checklist for senior management interview

From the pilot, I learnt that it was necessary to include separate questions on quality teaching, quality learning and quality assessment to elicit participant's responses in each of these aspects. Participants found the term "contextual factor" difficult. It might be necessary to use "environmental factor" as an alternate term where needed. I had discussed other aspects of my reflection on the pilot interview with a member of the senior management in the Methodology Chapter.

I enclosed the revised semi-structured interview checklist for reference. The focus of the revised interview checklist is to illuminate:

A) RQ1: What are the conceptions, practices and contextual factors that have influenced the identification and use of quality indicators to drive/ monitor quality in teaching, learning and assessment within a polytechnic and school?

Possible questions:

- What is your personal view on the purpose of the polytechnic education?
- What is your personal view of: (1) quality teaching, (2) quality learning and (3) quality assessment?
- What forms your views of the polytechnic on quality in teaching, learning and assessment?
- What practices and contextual factors promote: (1) quality teaching, (2) quality learning and (3) quality assessment in the polytechnic/ school?
- What practices and contextual factors constraint: (1) quality teaching, (2) quality learning and (3) quality assessment in the polytechnic/ school?
- How do you know when there is: (1) quality teaching, (2) quality learning and (3) quality assessment in the polytechnic/ school?

B) RQ3: To what extent have the conceptions of quality, practices and contextual factors influenced the selection of quality indicators in the BSC?

- To reposition as a "SkillsFuture Ready" Polytechnic, how adequate are current quality indicators in the BSC for skills mastery and lifelong learner development?
- The polytechnic is preparing to be a "SkillsFuture Ready" polytechnic, what quality indicators are needed to drive (1) quality teaching, (2) quality learning, and (3) quality assessment in the polytechnic/ school?
- (If necessary to prompt, researcher may ask "What other quality indicators should be considered for skills mastery and lifelong learner development which are emphasised in the SkillsFuture?")

(Depending on which school/ department, the researcher may need clarify data from document analysis of BSC records by prompting interviewee of certain performance indicators (PIs) where schools outperform others in meeting or consistently not meeting the PIs)

C) RQ2: To what extent have performance indicators been met?

- What performance indicators in teaching, learning and assessment are **met** by your department/ school **consistently**? Why are the PIs consistently met?
- What performance indicators in teaching, learning and assessment are **not met** by your department/ school **consistently**? Why are the PIs consistently met?
- What performance indicators in teaching, learning and assessment are **sometimes met** by your department/ school? Why are the PIs consistently met?

(Depending on which school/ department, the researcher may need to clarify data from document analysis of BSC records by prompting interviewees of certain performance/ quality indicators in order to solicit interviewees' opinion on the thinking that led to school/ department to select new PI, modify existing PI or drop existing PI.)

D) RQ2: To what extent have the conceptions of quality, practices and contextual factors influenced the selection of quality indicators in the Balanced Score Card (a key quality management tool)?

- What are some quality indicators related to teaching, learning and assessment found in the Balanced Score Card (BSC)?
- What view/ practices/ contextual factors influence the selection of these quality indicators?
- What new quality indicators have been included? Why are these indicators included?
- What quality indicators have been excluded? Why are these indicators excluded?

Appendix P1-2 Pilot study 1-2: Transcript of the pilot interview with a senior management staff

From the pilot, I learnt that it was helpful to transcribe the recorded interview within the day or next, where practical. The proposed notations such as (Laugh), [job scope], [.] were user friendly. It took me an hour to transcribe the interview, which lasted 11:04 minutes. With more experience, I estimated that I might need three to four hours to transcribe a one-hour interview. Post interview, I found it useful to write notes related to the interview setting and profiles of interviewees, for example key job functions that might help me to understand interviewees' perspectives and experiences. I enclosed the transcript of the pilot Interview for reference.

Transcript (Interview on 10 June 2017, number of interviewee: 1); interviewer: GH, Participant: AL; length: 11:04 minutes.

AL: (Laugh)

GH: "Hi [name of AL], thanks for agreeing to be interviewed. This is just a pilot, a trial. So [name of AL] this interview is trying to find out your thinking of quality, to what extent the environmental, the contextual factor affects your thinking in quality of teaching, learning and assessment. And whether the ground factor also influence the thinking on this quality matters. Just to put on record, what is your role in the school?"

AL: "(Laugh), I am currently looking into the [job scope] of the school, so specifically looking at the documentation, process, and whether documents are in place. The various assessment practices in school (sic)."

GH: "What is the title of your appointment?"

AL:" [Job title]"

GH: "Ok, you look after the operation of academic matters and the work instructions of the school and so forth."

AL: "Yes"

GH: "Regarding the conception of quality in teaching, learning and assessment. What is personal thinking about quality teaching, learning and assessment?"

AL: "Quality teaching and learning, first of all, I perceive it as one to be aligned to learning outcome, students able to learn effectively."

GH: "So, when there is quality teaching, when there is quality learning and when there is quality assessment, how do you see it (sic)?"

AL: "Quality teaching and learning, students are able to learn effectively. There are opportunities for them to develop the desired skills, demonstrate that they have achieved the learning outcome, the desired graduate profile also (sic)."

GH: "So, can you give some examples of the desired graduate profile that are important to teaching, learning and assessment?"

AL: "They are able to problem solve, they are able to work well in team, they are able to think out of the box."

GH: "What are the environmental or contextual factors that you think influence your thinking in teaching, learning and assessment?"

AL: "What are the factors that affect my thinking?"

GH: "Yes"

AL: "Factors affect my thinking, it would be what I hope for my students (.), I am not very sure what this question means?"

GH: "What are some government policies, polytechnic policies, are there certain people who say certain thing or do thing in certain way that impress upon you that this is an important manifestation of quality teaching, quality learning and quality assessment (sic)."

AL: "I think policy would be one aspect that could influence my thinking but that not be the primary thing. I believe it would be more my belief and identity as a teacher, an educator that influence my thinking of what quality in teaching might be."

GH: "What is your belief that kind of influence the thinking of quality, learning and assessment?"

AL: "I think, as educator, we have to go beyond delivering content. And therefore, that would influence what I believe as quality teaching and learning."

GH: "So, beyond delivering content, then what more do you think should be done before you call in quality teaching, learning and assessment?"

AL: "There should be opportunities in class where we will inculcate good characters, learning disposition?"

GH: "So, are any ground practices in the school might have formed some of your thinking about quality teaching, quality learning and quality assessment?"

AL: "In the school (.), at the polytechnic level, the directive, we should look into giving, creating opportunities for students to be independent in their learning. It could be in the form of blended or full e-learning modules where students are empowered to pace own learning. It could be in the form of PBL where they would be given opportunities to do their own research and then tutor would facilitate their learning."

GH: "So, do you recall any polytechnic level policy that actually drive certain thinking in quality teaching, quality assessment and quality learning?"

AL: "Polytechnic's directive would be percentage of implementation of elearning, how many iteration of PBL (.), PBL exposure to students. I think there is this framework where I cannot remember the name, whereby, the educator would be doing their own reflection, their assessment of their teaching

and learning in terms of curriculum design, subject delivery and assessment, there is such as framework."

GH: "Do you recall any significant others when they say certain thing, it kind of drive quality teaching, learning and assessment?"

AL: "Significant others (..), probably not others but books."

GH and AL: (Laugh)

GH: "Ok, what might that be?"

AL: "The strong impression is from the book I read called the Courage to Teach by Palmer, I think so. Some educators are complaining that it is not that they are not able to teach but it is the quality of students given to them. The analogy is as good as a doctor who said that it is not because they cannot treat their patients but because their patients are not in the good state of health in the first place. (Laugh) So I think, as educator, we need to reflect how we could better help our students."

GH: "Ok, just last one or two questions. The polytechnic is repositioning itself to be SkillsFuture-ready. So what do think might be some indicators that they should clarify for quality teaching, learning and assessment?"

AL: "Indicators to clarify (..). Whether, if you are looking at the skills framework, so basically, there must be opportunities for students to demonstrate the mastery of skills, so then, our assessments, are we well aligned to such intention? Because, I think in the past, we, our focus is more on Bloom's Taxonomy, the cognitive part, but how about the manipulative part which is the skill demonstration. So that part can be clearer."

GH: "So, some indicators for skills, skills mastery and all that (sic). Any other indicators that promote or drive quality teaching, learning and assessment, in preparing to be SkillsFuture ready?"

AL: "Indicators? Skillsfuture ready? I guess another indicator is what our employers say about our graduates. We can say we have prepared them well enough for the future but if our industry say otherwise, there is a discrepancy between what we feel and what the industry expect. So I guess, the alignment is something what we need to look at, and some indicators in this aspect would be helpful."

GH: "I see, anything else that you would like to say about quality teaching, learning and assessment?"

AL: "No (Laugh)"

GH: "Oh, thank you very much [name of AL] (Laugh)".

END OF INTERVIEW

Appendix P2 Pilot study 5: A semi-structured interview with staff

1. Key revisions of the proposed interview checklist

I conducted the pilot interview with one staff, the insights gained on clarity and difficulty of the questions were helpful for the actual group interview checklist. I revised semi-structured interview checklist for group staff interview in six areas detailed below.

Firstly, I used an alternative term "environmental factor" to "contextual factor" where necessary so that staff members were clear about what I hoped to find out from them. I used both terms "environmental factor" and "contextual factor" interchangeably, and allowed staff to offer some examples of contextual factors, as a preamble to exploring part 1 main theme 1 (contextual factors). However, I used the term "contextual factor" most of the time because the term alluded to an important area of my research.

Secondly, I replaced the phrase within brackets for a question in part 1 main theme 1 - which of these contextual factors "do you judge"... to which of these contextual factors "resonate more with you" as key influence on quality practice because the latter was more commonly used in my context.

Thirdly, I reminded participants that they could talk about any other contextual factors besides those surfaced from the staff questionnaire.

Fourthly, I reminded staff on general classification of skills listed in the staff survey, namely technical skills, hands-on skills, cognitive skills and life skills that schools hoped to deepen in their students through key teaching approaches and learning contexts. This helped to set the context in which the part 1 main theme 2 (eLearning) was explored further.

Fifthly, at the start of part 1 main theme 3, I found it necessary to give a few examples of how students could be transformed such as a change of views and skills but to keep the examples brief to minimise influencing staff interviewees' views.

Sixthly, I provided a list of quality/ performance indicators (without targets) from the Balanced Score Card (BSC) to participants for Part 2 because staff interviewees could not remember these indicators. I reminded participants that they did not have to limit their responses to the BSC.

2. Revised semi-structured interview checklist

I enclosed the revised semi-structured interview checklist for reference. There are recurring themes from the staff questionnaire administered to about 150 staff across schools A to E. In Part 1 of the interview, I will like to seek your opinion on some of these key themes. In Part 2, I will like to seek your views of quality/ performance indicators in teaching, teaching and assessment. Some of these indicators are found in the Polytechnic's Balanced Score Card (or BSC). You can also offer any other views that you judge to be important.

Part 1

Main Theme 1: Contextual Factors

Teaching, learning and assessment do not happen in a bubble, there are contextual factors also known as environmental factors that may affect the process of teaching, learning and assessment.

From the staff survey, I have broadly classified the survey responses in four contextual/ environmental factors: (1) curriculum related contextual factors, (2) key teaching approaches and learning contexts related contextual factors; (3) assessment related contextual factors; and (4) staff related contextual factors.

From the group interview, I will like to clarify views of staff related to contextual factors with the following questions:

- In your opinion, which of these contextual factors resonate more with you as key influence on quality practices on the ground. You can name one or more factors. Please explain your view. (I will also seek other staff interviewees for their views on the named contextual factor.)
- In your opinion, what other contextual factors are of important in influencing quality practices on the ground? Please explain your view. (Similarly, I will also seek other staff interviewees for their views on the named contextual factor.)

Main Theme 2: eLearning

From the survey, when eLearning percentage is much lower than the other teaching approaches such as PBL, project-based learning in terms of helping students to deepen their skills. Are you surprised by this theme? Please share your view with me.

Main Theme 3: How were Students Transformed?

From the survey, some staff see quality in terms of students being transformed by the education they receive here. What is you view about this?

Part 2

A) Preparing To Be A "SkillsFuture Ready" Polytechnic

With reference to my research question, I am interested to uncover staff views on quality indicators of a "SkillsFuture Ready" polytechnic. The polytechnic is preparing to be a "SkillsFuture Ready" polytechnic. Based on your experiences in your respective schools:

- What practices might your schools need to emphasize more to prepare students for: (1) lifelong learning and (2) skills mastery?
- How adequate are current quality indicators in the BSC for: (1) skills mastery and (2) lifelong learner development?
- What other quality indicators in BSC should be considered for: (1) skills mastery and (2) lifelong learner development which are emphasized in the SkillsFuture?"
- What quality indicators are needed to drive :(1) quality teaching, (2) quality learning, and (3) quality assessment in your school?

B) Performance Indicators

I am interested to uncover staff interviewees' views with reference to my RQ2: to what extent have performance indicators been met?

I might ask the following questions:

- Please share with me about a BSC performance/quality indicator in teaching, learning and assessment that your school does well? Why so?
- Please share with me about a BSC performance/quality indicator in teaching, learning and assessment that your school that has room for improvement? Why so?
- If not, you can also share about any other quality indicators.
- Name one performance indicator in teaching, learning and assessment that is **met** by your department/ school **consistently**? Why is the PI consistently met?
- Name one performance indicator in teaching, learning and assessment that is **not met** by your department/ school **consistently**? Why is the PIs consistently not met?
- Name one performance indicator in teaching, learning and assessment that is **sometimes met** by your department/ school? Why is the PIs consistently met sometimes?

(Depending on which school/ department, the researcher may need to clarify data from document analysis of BSC records by prompting interviewees of certain performance/ quality indicators in order to solicit interviewees' opinion on the thinking that led to school/ department to select new PI, modify existing PI or drop existing PI.)

C) Selection of Performance Indicators

With reference to my research question, I am interested to uncover staff interviewees' views on the following:

- Name one quality indicator in the Balanced Score Card (BSC) that you judged to be important for teaching, learning and assessment?
- In your opinion, what view/ practices/ contextual factors might have influenced the selection of the quality indicator?
- What new quality indicators have been included in the last few years? Why are these indicators included?
- What quality indicators have been excluded in the last few years? Why are these indicators excluded?

Appendix P3 Pilot study 6: A semi-structured interview with a student

1. Key revisions of the proposed interview checklist

I piloted the interview checklist with a Year 3 (or final year) student. The student was from one of the schools. Being a final year student in a diploma programme, I judged that the student to be a suitable choice since I intended to involve a mix of Year 3 students in the actual interview. As discussed in the Methodology Chapter, I used the insights from thus pilot to inform the alumni interview as well. The main reason was due to the difficulty in getting alumni to participate in surveys, thus I involved the limited pool of alumni for the actual interview only.

In the pilot, I focused mainly on two aspects: one, clarity of the interview questions to the student; and two, the suitability of the interview questions to elicit the information to address the research questions. The pilot was conducted in a guest lobby, where there was minimum disruption. I showed the student the proposed interview checklist and sought for student's repsonses.

The first set of questions sought student's view on recurring themes from the student questionnaire on contextual factors (main theme 1). I named these contextual factors related to: curriculum; key teaching approaches and learning contexts; assessment; and staff. I noticed student stumped by the words, contextual factors. When I used "environmental factors" as alternative words to 'contextual factors', student seemed to understand the question. When I probed further to ask for examples of "contextual or environmental factors", student replied that noisy and distracting lecture theatre affected quality teaching and learning practices. Student also said the PBL (problem based learning) required students to search for information. Student commented that some subjects were content heavy. Based on student's response, I revised the checklist for me to give a general idea of contextual factor, and allowed students to offer some examples, as a preamble to exploring the first set of questions in the actual group interview. I also used the term environmental factor interchangeably with the term contextual factor at the start of the interview. However, I used the latter term more often during the interview because contextual factor alluded to an important area of my research.

The second set of questions in the proposed checklist was meant to clarify student's view about eLearning being relatively less able to help students to deepen their skills in comparison to other teaching approaches and learning contexts (main theme 2). The student shared that other classmates had problems with eLearning because they found it difficult to learn on their own. Student shared that staff should not just read off the presentation slides from the videos. From the student response, it seemed to me that the student understood the question, and the student response would potentially uncover rich information regarding the theme on eLearning.

The third set of questions intended to explore the theme on how students might have transformed (main theme 3, which is a personal interest). From the pilot, the student hesitated to reply. When I offered an alternative word, 'change' to 'transformed', the student cited examples, namely deepening of skills, understanding knowledge. If necessary, I might need to probe about a change of mindset and attitude during the actual interview. Although my research question did not intend to explore students' conception of quality, my intention here was more to gather rich data on students'

transformation by the education they received in the polytechnic. I used the data generated from the interview when I discussed the conceptions of quality related to teaching, learning and assessment at the later stage. For the actual group student/ alumni interview, I shortlisted participants from a bigger pool of volunteers who indicated their agreement to be interviewed after completing the questionnaires.

The fourth set of questions was meant to uncover views of alumni about student preparation for skills mastery and lifelong learning by schools (main theme 4). I was interested to uncover aspects of student preparation that alumni participants still valued, having been to workplaces. As mentioned earlier, I did not pilot these questions with an alumnus. However, I did not anticipate problem because alumni should be familiar with skills mastery and lifelong learning. If necessary, I might need to provide initial examples. From this pilot, the student understood the question and shared about skills deepening through projects and research skills through problem based learning that addressed the nature of school preparation that the student valued.

Lastly, I spent about fifteen minutes on the three sets of questions with one student in the pilot interview. I estimated that the student/ alumni group interview might take forty-five minutes to one hour to conduct since I had invited five students/ alumni, one from each school (A, B, C, D and E) for the actual group interview.

2. Revised Interview Checklist

I enclosed the revised interview checklist for student and alumni interviews for reference. There are recurring themes from the student questionnaire administered to about 150 students across the schools, and I will like to seek your opinion on some of these key themes. You can also offer any other views that you judge to be important.

Main Theme 1: Contextual Factors

Teaching, learning and assessment do not happen in a bubble, there are contextual factors also known as environmental factors that may affect the process of teaching, learning and assessment. From the student survey, I have broadly classified contextual/ environmental factors to seek your views:

- Do you agree that curriculum related contextual factors influence quality practices on the ground? Please explain your view.
- Do you agree that key teaching approaches and learning contexts related environmental factors influence quality practices on the ground? Please explain your view.
- Do you agree that assessment related environmental factors influence quality practices on the ground? Please explain your view.
- Do you agree that staff related environmental factors influence quality practices on the ground? Please explain your view.

- In your opinion, what other environmental factors are of important in influencing quality practices on the ground? Please explain your view.

Main Theme 2: eLearning

From the survey, the eLearning percentage is much lower than the other teaching approaches such as PBL, project-based learning in terms of helping students to deepen their skills. Are you surprised by this theme? Please share your view with me.

Main Theme 3: How Have I Been Transformed?

From the survey, some students see quality as being transform by the education they receive here. What is you view about this?

Main Theme 4: Preparing To Be A "SkillsFuture Ready" Polytechnic [*For alumni only*]

I am interested to uncover alumni views on quality indicators of a "SkillsFuture Ready" polytechnic. I have these three questions in mind.

The polytechnic is preparing to be a "SkillsFuture Ready" polytechnic. Based on your experiences in respective schools and workplaces,

- What practices might your schools need to emphasize more to prepare students for: (1) lifelong learning and (2) skills mastery?
- What quality indicators are needed to drive :(1) quality teaching, (2) quality learning, and (3) quality assessment in your school?

(If necessary, researcher may ask alumni: "What other quality indicators should be considered for: (1) skills mastery and (2) lifelong learner development which are emphasised in the SkillsFuture?")

Appendix P4-1 Pilot studies 2 to 4: Staff, student and alumni questionnaires

I invited three staff, three students and three alumni to participate in the questionnaires and solicited their comments on staff, students and alumni questionnaire respectively. The three participants of each questionnaire were from three different schools in a polytechnic to simulate the maximum variation sampling in the actual studies, which covers five schools. I employed purposive sampling in the pilot studies to reflect the sampling approach in the main studies. Some of the participants - three staff, one student and one alumnus were from my personal contacts. The other two students and two alumni were introduced to me via snowball sampling due to my limited contact with students and alumni from other schools.

1. Choice of Participants for Pilot Studies

I first reflect on the staff pilot study (Pilot Study 2), follow by alumni pilot study (Pilot Study 3) and then the student pilot study (Pilot Study 4) in terms of the choice of participants and experience with the purposive sampling employed. Next, I will discuss the issue related to choice of e-survey platform. Lastly, I will reflect on the comments of the participants on the pilot questionnaires.

In the staff pilot study, my choice of participants was influenced by the following considerations: firstly, these staff participants were colleagues with whom I worked in various committees in the polytechnic, and were supportive of my research study. Secondly, all of the staff participants had more than 10 years of teaching experience in the respective schools. As expected, their familiarity with teaching, learning and assessment practices in their schools helped to further clarify and enhance the pilot (staff) questionnaire. I will elaborate their comments on the pilot (staff) questionnaire later.

For the alumni pilot study, I asked an alumnus contact to introduce two other friends from two different schools for the pilot (alumni) questionnaire. The alumnus contact worked less than a year (full-time) in relevant industry after graduation but had since switched to part-time employment, in preparation for a post-diploma programme. The two other alumni worked less than a year part-time and started their degree programmes. Two of the three alumni commented on the pilot (alumni) questionnaire, which I will elaborate later.

From the alumni pilot study, I sensed a major challenge would be getting sufficient alumni for the main study. To reduce the difficulty to access alumni for main study, I relaxed the sampling criterion that asked for alumni with one to two years of work experience. I decided to include alumni with less than one year or more than 2 years of work experience. Since I did not intend to study the alumni perspectives from varying work experience, the difference in years of work experience might not matter.

For the student pilot study, I approached three students who worked with me in another project to introduce friends from another school to pilot (student) questionnaire. Two of them agreed to help me to introduce a friend each, from other school. My students shared that they did not have many

friends from other schools but they would try. It dawned upon me that snowballing technique might not be as easy to recruit participants as I thought it to be. Through students' referrals, a year 2 and a year 3 students agreed to participate in the pilot. The third student was a year 3 student who made the referral. As a group, these students gave brief comments on words that were difficult for them, which I will discuss further.

2. Survey Duration And Platform

Next, I would like to discuss keys aspects related to the conduct of the pilot questionnaires. Firstly, I sent an email to each participant, provided details of my research project with an information sheet and a web link to access the questionnaire. I incorporated comments from the earlier ethical clearance to inform students and alumni of all research questions of my main study, even though I did not intend to ask them about the conception of quality in the polytechnic.

Secondly, I made available the questionnaires to participants for a week. With email or WhatsApp (text messaging) reminders, all participants submitted their questionnaires within a week. However, I catered at least two weeks in the main study for the duration of questionnaires because it required considerable attention on my end to track who had and had not submitted their completed e-questionnaires.

Thirdly, I constructed the questionnaires using an institutional e-survey platform because it was a familiar platform to the participants. However, there were limited survey question types available in the platform. For example, it did not have question types that allowed relative ranking of choices and selection of more than one options. But the limitations did not matter to my main study as much because I asked participants to name one key skill or one quality practice that mattered to them most (Staff questionnaire, items 5 and 9). What I found to be particularly helpful was that the system offered a question type that allowed multiple question items with similar option scale to be presented in a tabulated format (Staff questionnaire, items 4, 8, 12 and 13). The other limitation of the platform was a system generated remark "denotes mandatory question" that could not be removed even though all question items in the questionnaire were optional. As such, I had informed participants at the start via the project information sheet that they could choose not to answer any question.

3. Authentication of Survey

I had considered whether or not the questionnaire need to be authenticated. In the pilot, the staff questionnaire was authenticated while student and alumni questionnaires were not. Students and alumni accessed the pilot questionnaires directly through a web link (i.e. not authenticated) while staff accessed the staff questionnaire with their institutional passwords. In the pilot, I opted for an authenticated staff questionnaire because I could access information such as school, office telephone number and email address of participants from the institutional e-survey platform, and that would help me to contact staff participant subsequently. However, it would mean that the staff questionnaire was not anonymous to me. The three staff involved in the pilot did not raise issue with the staff survey was authenticated, probably due to their familiarity with the institutional e-survey platform. I specifically asked one of them if other staff would mind since they were aware that the e-

survey platform allowed me to trace their identities. The staff's opinion was that staff probably would not mind because the information that I sought through the staff questionnaire was not sensitive in nature.

To explore further, I went on to ask the other two staff members (not involved in the earlier staff pilot) on the same topic during tea break, they were divided in their opinions about using an authenticated questionnaire for staff. It informed me that some staff participants in the main study might be uncomfortable if the questionnaire was authenticated. Thus, I decided to reconfigure the staff questionnaire, to be non-authenticated and accessible by a web link, just like the student and alumni questionnaires for the main study. In this way, the participants could remain anonymous and not traceable to individuals. In order to facilitate follow up on the survey, I included an item to request for full names, email addresses and mobile numbers if participants agreed to be included for interview subsequently in all questionnaires used in the main study.

To better manage the recruitment of 150 staff, 150 students and 150 alumni across schools (A to E) for my research, I decided to administer the staff, student, and alumni questionnaires using unique web link address for each school. In doing so, I could locate participants to their respective schools and monitor the sample mix across schools without having to know the identities of the participants. It will help me to analyse the data at the school level, in addition to the polytechnic level. I envisaged that participating schools would be interested about the aggregated findings of their respective schools.

4. Alternative Terms And Additional Options

I replaced several difficult words or phrases as suggested in the pilots. Two difficult terms "pedagogies" and "quality practice" were surfaced through the student and alumni pilots. Incidentally, a staff in the pilot suggested that I could use "pedagogies or learning approaches" in view of questionnaire items in Section 2. I concurred with the comment about pedagogies and replaced the phrase with "teaching approaches and learning contexts" in the main study. However, I retained the term quality practice for all questionnaires, as discussed earlier.

I considered if I should replace the term "deepen skills" to "develop skills", as suggested in the staff pilot. I wondered how many others might hold the view that skills were deepened when graduates started working. However, I decided to retain "deepen skills" in all questionnaires in the main study since the intention of my study was to investigate the extent to which current key pedagogies in schools helped to deepen and not just develop students' skills. Seeking participants' views on what pedagogies (or teaching approaches and learning contexts) helped to deepen students' skills while in the polytechnic (Staff questionnaire, section 2) served as a prelude to seeking their views on the adequacy of current quality practices in preparing students for skills mastery (Staff questionnaire, section 4).

Lastly, I concurred with suggestions in the staff pilot and included "centre of excellence" as another learning spaces to deepen students' skills (Staff questionnaire, section 3). I also added an option, "Adequate" between "More than adequate" and "Somewhat adequate" because of the relative

difference between the latter two options (Staff questionnaire, section 4). Similar revisions were carried out for student and alumni questionnaires.

Appendix P4-2 The revised staff questionnaire for the main study

Title: StfM18-1 - Staff Survey	
Purpose I am conducting research on quality teaching, learning and assessment practices in the Polytechnic. Your anonymous views, expressed through the survey below, would be extremely valuable for this study.	
Section 1 gathers participant information that would help in the subsequent analysis of aggregated data.	
1	Your school in the polytechnic
	1 ASC 2 BUS 3 DES 4 ENG 5 HSS 6 IIT
2	Your diploma team/ section (Please spell in FULL)
3	Year(s) of teaching experience in this polytechnic
	1 Less than 1 year 2 1 to 2 years 3 3 to 9 years 4 10 years or more
Section 2 focuses on your views about the extent to which key teaching approaches and learning contexts within your school have helped to deepen students' skills. *(General categories of skills could be broadly classified to include technical skills, hands-on skills, cognitive skills and life skills.)*	

4	Which of the following teaching approaches and learning contexts deepen students' skills?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	NA (means I have not seen it yet)
Problem-based learning						
E-learning						
Skill-based practicum (eg. culinary, prototyping etc)						
Student Internship						
Project Work						

5	Please name ONE specific skill, deepened through the above teaching approaches and learning contexts, that you judge to be most useful to students.
6	Please explain why you judged that skill to be most useful to students in question 5. (If you wish to name one/ two other skills that are also very useful to students, please feel free to include here as well.)

Section 3 focuses on your views about quality practices in teaching, learning and assessment in your school. (*In this survey, teaching practices refer to how a teaching staff delivers subject knowledge and skills. Learning practices refer to how a teaching staff helps students to learn subject knowledge and skills. Assessment practices refer to how a staff checks for students' understanding/ attainment of subject knowledge and skills.)*

7	Please share your key view on what is "quality" in teaching, learning and assessment practices.

8	Bearing in mind your view of "quality" in the preceding question, how often have you seen quality practices in following venues/ learning spaces?

	All the time	Most of the time	Sometimes	Once a long while	Not at all	NA (means I have not been to the venue/ learning space)
Lecture Theatre						
Classroom						
Laboratory						
Studio						
Learning Enterprise (eg.Koolwerkz, Top Table, IBM-ITSM)						
Centre of Excellence						
Others						

9	Please state ONE example of the quality practices in teaching, learning and assessment that you judge to be most useful to students.
10	Please explain why you judged that quality practice to be most useful to students in question 9. (If you wish to name one/ two other quality practices that are also very useful to students, please feel free to include here as well.)

11	If you have selected the options "all the time" and "most of the time" for the item "Others" in question 8, please name ONE such venue/ learning space. (Otherwise, please state "NA".)

Section 4 focuses on your views about the adequacy of quality practices in your school that prepare students for SkillsFuture. *(SkillsFuture is a national movement that encourages Singapore workforce and employers to embrace a culture that supports lifelong learning and skills mastery.)*

12 How adequate has your school prepared students for lifelong learning?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						
Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						
Assessment practices (i.e. how a teaching staff checks for students' understanding/ attainment of subject knowledge and skills)						

13 How adequate has your school prepared students for skills mastery?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						
Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						

	Assessment practices (i.e. how a teaching staff checks for students' understanding/ attainment of subject knowledge and skills)						

If you have selected option "Not quite adequate"/ "Not adequate at all" in question 12 or 13, please answer the next question. (Otherwise, please indicate "NA".)

14	Please name ONE or TWO quality teaching/ learning/ assessment practices that your school might need to emphasize more to prepare students for lifelong learning and skills mastery? (If you judge that your school has already done a great job in these areas, please state "Good job".)
15	If you would like to offer any other views on how quality teaching, learning and assessment practices in your school could be further enhanced, please do so here. (Otherwise, please indicate NIL.)
16	I hope to follow up on this survey with an interview (group/ individual). Your participation would be very valuable for the research. Would you like to be included in a pool of participants for an interview between April - June 2018? (If "Yes", I would appreciate that you write your full name, email address and mobile phone number here. Otherwise, please state "No".)

-- End --

Appendix P4-3 The revised student questionnaire for the main study

Title: StuM18-1 - Student Survey	
Purpose I am conducting research on quality teaching, learning and assessment practices in the Polytechnic. Your anonymous views, expressed through the survey below, would be extremely valuable for this study.	
Section 1 gathers participant information that would help in the subsequent analysis of aggregated data.	
1	Your school in the polytechnic
	1 ASC 2 BUS 3 DES 4 ENG 5 HSS 6 IIT
2	Your diploma course in the polytechnic (Please spell in FULL)
3	Year of study in your diploma course
	1 Year 1 2 Year 2 3 Year 3 4 Year 4 and beyond

Section 2 focuses on your views about the extent to which key teaching approaches and learning contexts within your school have helped to deepen students' skills. *(General categories of skills could be broadly classified to include technical skills, hands-on skills, cognitive skills and life skills.)*

4 Which of the following teaching approaches and learning contexts deepen your skills?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	NA (means I have not seen it yet)
Problem-based learning						
E-learning						
Skill-based practicum (eg. culinary, prototyping etc)						
Student Internship						
Project Work						

5 Please name ONE specific skill, deepened through the above teaching approaches and learning contexts, that you judge to be most useful to you.

6 Please explain why you judged that skill to be most useful to you in question 5. (If you wish to name one/ two other skills that are also very useful to you, please feel free to include here as well.)

Section 3 focuses on your views about quality practices in teaching, learning and assessment in your school. (*In this survey, teaching practices refer to how a teaching staff delivers subject knowledge and skills. Learning practices refer to how a teaching staff helps students to learn subject knowledge and skills. Assessment practices refer to how a staff checks for students' understanding/ attainment of subject knowledge and skills.)*

7	Please share your key view on what is "quality" in teaching, learning and assessment practices.
8	Bearing in mind your view of "quality" in the preceding question, how often have you seen quality practices in following venues/ learning spaces?

	All the time	Most of the time	Sometimes	Once a long while	Not at all	NA (means I have not been to the venue/ learning space)
Lecture Theatre						
Classroom						
Laboratory						
Studio						
Learning Enterprise (eg.Koolwerkz, Top Table, IBM-ITSM)						
Centre of Excellence						
Others						

9	Please state ONE example of the quality practices in teaching, learning and assessment that you judge to be most useful to you.
10	Please explain why you judged that quality practice to be most useful to you in question 9. (If you wish to name one/ two other quality practices that are also very useful to you, please feel free to include here as well.)

11	If you have selected the options "all the time" and "most of the time" for the item "Others" in question 8, please name ONE such venue/ learning space. (Otherwise, please state "NA".)

Section 4 focuses on your views about the adequacy of quality practices in your school that prepare students for SkillsFuture. *(SkillsFuture is a national movement that encourages Singapore workforce and employers to embrace a culture that supports lifelong learning and skills mastery.)*

12 How adequate has your school prepared you for lifelong learning?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						
Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						
Assessment practices (i.e. how a teaching staff checks for students						

13 How adequate has your school prepared you for skills mastery?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						

	Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						
	Assessment practices (i.e. how a teaching staff checks for students						

If you have selected option "Not quite adequate"/ "Not adequate at all" in question 12 or 13, please answer the next question. (Otherwise, please indicate "NA".)

14	Please name ONE or TWO quality teaching/ learning/ assessment practices that your school might need to emphasize more to prepare you for lifelong learning and skills mastery ? (If you judge that your school has already done a great job in these areas, please state "Good job".)
15	If you would like to offer any other views on how quality teaching, learning and assessment practices in your school could be further enhanced, please do so here. (Otherwise, please indicate NIL.)
16	I hope to follow up on this survey with an interview (group/ individual). Your participation would be very valuable for the research. Would you like to be included in a pool of participants for an interview between April - June 2018? (If "Yes", I would appreciate that you write your full name, email address and mobile phone number here. Otherwise, please state "No".)

-- End --

Appendix P4-4 The revised alumni questionnaire for the main study

Title: AluM18-1 - Alumni Survey	
Purpose I am conducting research on quality teaching, learning and assessment practices in the Polytechnic. Your anonymous views, expressed through the survey below, would be extremely valuable for this study.	
Section 1 gathers participant information that would help in the subsequent analysis of aggregated data.	
1	Your school in the polytechnic
	1 ASC 2 BUS 3 DES 4 ENG 5 HSS 6 IIT
2	Your diploma course in the polytechnic (Please spell in FULL)
3	Year(s) of working experience (part-time and full-time in total)
	1 Less than 1 year 2 1 to 2 years 3 More than 2 years 4 NA (means I have not been working since graduation)
4	Your job title (If you are not in employment currently, please state your last job title.)

Section 2 focuses on your views about the extent to which key teaching approaches and learning contexts within your school have helped to deepen students' skills. *(General categories of skills could be broadly classified to include technical skills, hands-on skills, cognitive skills and life skills.)*

5 Which of the following teaching approaches and learning contexts deepen your skills?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	NA (means I have not seen it yet)
Problem-based learning						
E-learning						
Skill-based practicum (eg. culinary, prototyping etc)						
Student Internship						
Project Work						

6 Please name ONE specific skill, deepened through the above teaching approaches and learning contexts, that you judge to be most useful to you in your workplace.

7 Please explain why you judged that skill to be most useful to you in question 6. (If you wish to name one/ two other skills that are also very useful to you in your workplace, please feel free to include here as well.)

Section 3 focuses on your views about quality practices in teaching, learning and assessment in your school. (*In this survey, teaching practices refer to how a teaching staff delivers subject knowledge and skills. Learning practices refer to how a teaching staff helps students to learn subject knowledge and*

skills. Assessment practices refer to how a staff checks for students' understanding/ attainment of subject knowledge and skills.)

8	Please share your key view on what is "quality" in teaching, learning and assessment practices.
9	Bearing in mind your view of "quality" in the preceding question, how often have you seen quality practices in following venues/ learning spaces during your diploma study?

	All the time	Most of the time	Sometimes	Once a long while	Not at all	NA (means I have not been to the venue/ learning space)
Lecture Theatre						
Classroom						
Laboratory						
Studio						
Learning Enterprise (eg.Koolwerkz, Top Table, IBM-ITSM)						
Centre of Excellence						
Others						

10	Please state ONE example of the quality practices in teaching, learning and assessment that you judge to be most useful to you in your workplace.

11	Please explain why you judged that quality practice to be most useful to you in question 10. (If you wish to name one/ two other quality practices that are also very useful to you, please feel free to include here as well.)
12	If you have selected the options "all the time" and "most of the time" for the item "Others" in question 9, please name ONE such venue/ learning space. (Otherwise, please state "NA".)

Section 4 focuses on your views about the adequacy of quality practices in your school that prepare students for SkillsFuture. *(SkillsFuture is a national movement that encourages Singapore workforce and employers to embrace a culture that supports lifelong learning and skills mastery.)*

13 How adequate has your school prepared you for lifelong learning?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						
Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						
Assessment practices (i.e. how a teaching staff checks for students						

14 How adequate has your school prepared you for skills mastery?

	More than adequate	Adequate	Somewhat adequate	Not quite adequate	Not adequate at all	I do not know
Teaching practices (i.e. how a teaching staff delivers subject knowledge and skills)						

	Learning practices (i.e. how a teaching staff helps students to learn subject knowledge and skills)						
	Assessment practices (i.e. how a teaching staff checks for students						

If you have selected option "Not quite adequate"/ "Not adequate at all" in question 13 or 14, please answer the next question. (Otherwise, please indicate "NA".)

15	Please name ONE or TWO quality teaching/ learning/ assessment practices that your school might need to emphasize more to prepare you for lifelong learning and skills mastery? (If you judge that your school has already done a great job in these areas, please state "Good job".)
16	If you would like to offer any other views on how quality teaching, learning and assessment practices in your school could be further enhanced, please do so here. (Otherwise, please indicate NIL.)
17	I hope to follow up on this survey with an interview (group/ individual). Your participation would be very valuable for the research. Would you like to be included in a pool of participants for an interview between April - June 2018? (If "Yes", I would appreciate that you write your full name, email address and mobile phone number here. Otherwise, please state "No".)

-- End --

Appendix T1 The six-phase thematic analysis (Braun and Clarke, 2006, p.87)

1. Familiarizing yourself with your data: Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes: Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes: Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes: Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes: Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report: The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis

Appendix T2 Findings from thematic analyses (Phase 1 to Phase 5)

Due to the iterative process of the six-phase thematic analysis (Braun and Clarke, 2006), it generated large amount of (repetitive) texts that cannot be included in the thesis due to the word counts constraint. However, to illustrate the rigour of the six-phase process, I will include details of the thematic analysis from student data (phase 1 to phase 5) here. Next, I also provided details of the thematic analysis from alumni data (phase 5) and the thematic analysis from staff data (phase 5) so that phase 5 of thematic analysis from student, alumni and staff survey datasets will be available for reference. In Chapter 4, I presented findings of the thematic analysis (phase 6) based on student, alumni and staff datasets.

1. STUDENT DATASET (PHASES 1 to 5)

1.1 Phase 1

"Familiarizing yourself with your data: transcribing data (if necessary), reading and re-reading the data, noting down initial ideas." (Braun and Clark, 2006)

Key themes from student data

From (re)reading of qualitative comments amongst the student survey data, I hoped to illuminate what students considered as quality teaching, learning and assessment practices from their experiences on the ground (RQ1). Few students gave quality comments that seemed related to contextual factors surrounding these quality practices. If they did, I included them as well (RQ2). I was also interested to uncover what students judged to be their most important skills deepened in the polytechnic, as well as the adequacy of their skills mastery and lifelong learner development by the polytechnic/ schools (RQ3).

In phases 1 to 3, I was concerned only to identify codes and themes without analysing the frequency or 'strength' of the themes at this stage. As the themes became more developed in phase 4, I reread the entire data set to further enrich the developed themes with indicative 'strength' in terms of frequency.

In phase 1, my initial ideas were presented below.

Quality practices

When teaching staff:

- explained more and read less from the teaching materials.
- helped students to understand the teaching materials.
- spent time to guide students outside/ after scheduled class.
- conducted interactive sessions with students.
- were comprehensive in subject coverage.
- gave regular feedback to students on their work.

When students:

- had opportunities to learn from one another through presentations and discussions.
- reported experiencing learning through hands-on activities/ sessions and projects.
- reported experiencing learning through real-life projects, cases and problems.
- reported experiencing personal "transformation" in terms of increased understanding of knowledge, improved skills, and better grasp of overall perspectives of projects/ subject matter.
- were assessed based on their understanding and applications of content rather than their ability to memorize content.

Contextual factors

- Students reported experiencing quality practices more often in key institutional learning contexts such as project works, case-based learning and problem-based learning as compared to e-learning.
- Students reported experiencing quality practices more often in facilities (such as classes, laboratories, studios, learning enterprises, centres of excellence) used for small group teaching as compared to facilities (e.g. lecture theatres) for large group teaching.
- Passionate/ Dedicated/ Caring teaching staff who made a difference to their learning.
- Some students asked for staff to respect their views and works.
- Students asked for removal of high-stake final examinations for subjects/ modules, which were institutional requirements for subjects with final examinations.
- The curriculum is too crammed for learning.

Most important skills

- When asked to choose one most important skill deepened by key learning contexts in the polytechnic, more students judged generic skills to be more important than technical skills to them.
- Students named generic skills that were deemed to be useful for future jobs or life such as problem-solving skills, team-working skills, people skills, research skills, independent learning skills.
- Other students named technical skills related to their diploma studies such as computer coding skills, drawing skills, culinary skills, laboratory skills, software skills, Excel skills, business plan development, engineering skills.
- Some students used terms such as soft skills and life skills. I inferred that they meant to differentiate these skills from "hard"/ technical skills. Students viewed soft/ life skills to be

more useful for their future jobs, industry and lives in general. Some further explained that technical skills were of lesser importance to them because these skills could get outdated.

Skills Mastery and Lifelong learner developments

- Students felt that preparation for skills mastery and lifelong learner developments by the polytechnic/ schools were adequate.
- Students viewed that there could be more laboratory/ hands-on activities for skills mastery.
- Some students asked for more freedom in the choice of project topics/ areas/ approach and less handholding by teaching staff.
- Some students named key institutional learning contexts such as e-learning, problem-based learning and project works helped to learn independently, which they viewed to be important for lifelong learners.

Some of my initial ideas might be conflicting ideas, and these ideas will be further examined later in phases 2 and 3. For example,

- Some students experienced quality practice in terms of comprehensive coverage of content while others lamented that there was too much content.
- Some students experienced e-learning as a quality practice because it helped to them to be more independent in their learning, but others had trouble learning from e-learning materials.
- More students named generic/ life skills over technical skills to be the most important skill deepened by the various learning contexts in the polytechnic, but it did not follow that technical skills were not important to students.

1.2 Phase 2

"Generating initial codes: coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code." (Braun and Clark, 2006)

In this phase, I generated initial codes from survey data that seemed interesting to me because it may address my research question about students' experiences of teaching, learning and assessment practices in the polytechnic (Boyatzis, 1998).

I viewed the qualitative data as one set of data for coding even though survey questions elicited respondents' comments for different aspects of the study such as: suggestions for quality practices that school might need to emphasize more to prepare students for lifelong learning and skills mastery; examples of quality practices in teaching, learning and assessment that are most useful to students; and views of "quality" in teaching, learning and assessment practices.

In this way, the source of data for coding was enriched, and not limited to responses by survey question. I had taken heed of Braun and Clark's advice (2006) to code as many interesting themes as possible and keep surrounding data without losing their contexts. The initial codes with data excerpts

were as tabulated below. The e-survey system assigned each respondent a long string of numbers, eg Respondent 20180325-143133.216.

Data extract	**Coded for**
Quality Practices	
"I would think that the teachers would have to explain the teaching materials better, not to say that they aren't adequate, but I do feel that sometimes I get quite lost and have to review the materials again." (Respondent 20180325-143133.216, student survey) "Explaining in detail and patiently" (Respondent 20180502-201739.944, student survey)	Explaining content
"Must focus more on allowing students understand well. If lecturers are just going to go through the slides without giving more or something extra or even explain well, then we might as well skip lectures and read on our own. More beneficial that way." (Respondent 20180509-215719.698, student survey) "Quality in learning is when you are able to understand what your teacher teaches you in one try without any major confusion while quality teaching is when a teacher is able to deliver the curriculum in the shortest and simplest to understand way and is able to make most of the students understand what was taught." (Respondent 20180324-225736.117, student survey)	Understanding content
"I feel that the adequacy of quality practices is different for every module due to the different lecturers teaching the subjects. For some modules, I feel the lecturers can improve on the way they deliver certain subject knowledge. Instead of just reading off from the slides, one could rephrase sentences for better understanding or even better share their personal work experience with the students." (Respondent 20180305-170105.904, student survey) "Students tend to learn better in an interactive setting where it's more relatable to them and they'll be able to have a better memory and understanding of what's going on in class rather than just reading from the lecture notes."	Not reading from the slides

Data extract	Coded for
(Respondent 20180302-155307.745, student survey)	
"Our lecturers would need to guide us more in subjects that involves [subject topic] since it seems like an entire new field of study to us as opposed to what is learnt in secondary school." (Respondent 20180325-182303.60, student survey) " 'Quality' is when there's a variety of educational tools used to effectively guide and teach us. Sitting in a classroom listening to the lecturer speak about the tutorial content for 2 hours can be draining, since it is pretty passive. There are more effective and interesting ways to learn, such as through creative and innovative activities (games, assignments we need to finish through interacting with others, for example), in my view." (Respondent 20180502-234208.745, student survey)	Guiding students
"Quality teaching is when Lecturers Ensure that all students understand what he/she is trying to say. It is also when lecturers are able to have make up lessons for the weaker students or to those who needs help. Lecturers shouldn't teach based on just reading off the lecture notes. Quality learning is when lecturers are able to give extra practices and going through them. Quality assessment is when lecturers are able to have a forum in which students can ask anonymously and go thru them during lectures. Or ask the weaker ones whether they understand." (Respondent 20180419-185608.514, student survey) "...For the weaker students, it will be great if the educator can fork out time to organize remedial sessions specially for them. (Respondent 20180425-124248.719, student survey)	Supporting lower attaining students to learn
"Having more classes that open a discussion, like using a topic and allowing people to speak about their perspective on the topic. This helps expand everyone's learning because someone may have taught of something that another person may not. This give more learning with one another and understand where everyone is coming from." (Respondent 20180505-165500.125, student survey) "This software is widely used and through these teaching approaches (especially Project Work and SIP) I am able to practice it	Opportunities to learn from one another

Data extract	Coded for
and receive guidance from both my peers and supervisors. The trial and error phase during Project Work help me be more observant of details and protocols that I need to apply during the SIP period." (Respondent 20180430-175526.250, student survey)	
'[A quality practice] does not involve a lot of explaining and lengthy paragraphs to read. Once we understood the instructions to the hands-on activity, we are free to proceed with it at our own pace (within the teaching period of course). Furthermore, it will definitely make the lesson memorable if the product made after the hands-on activity is worth keeping; something that we would admire and come back to recreate if possible." (Respondent 20180301-140759.283, student survey) "Practical gives us a lot of hands on and complete understanding of applying theories we learnt." (Respondent 20180508-190222.927, student survey)	Hands-on activities/ sessions/ practicum/ projects
"Please not only focus on the content but grow them as individuals. Influence them, make students curious, don't spoon feed us with all the answers." (Respondent 20180311-153850.762, student survey) "I think that quality teaching is when the student is able to understand the topic, apply it and is able retain this information in the future. Developing the student's curiosity in a certain subject could be another measure of 'quality' teaching. Getting the student to engage and be interested could be a sign of 'quality' teaching." (Respondent 20180503-153929.488, student survey)	Transforming students – curious minds
"Assessment wise, I believe that the tutors check our understanding on different concepts and different thinking abilities plus problem solving abilities through our daily consultation sessions, and through our presentations. While consultations provide us feedback from one tutor, presentations usually provide us with the feedback of 2 or 3 tutors. For instance, in our most recent presentation, 25/4/19 [sic; should read 25/4/18], we had to give an individual presentation on an issue we want to address in our given [project], along with our proposal on what we want to achieve with our design. This presentation allowed us to showcase our thinking skills, in the sense that we had to think of an issue related to our [project],	Transforming students -increased understanding/ confidence of subject matter

Data extract	Coded for
show the evidence to back up our issue, show how it is relevant to our site, and show them through our proposal that it is an issue that can be achieve. With the information we presented to them, the tutors would then give us their feedback and ask us questions or give us advice on the different areas of our proposal or issue that we could work on." (Respondent 20180429-003624.790, student survey)	
"Project work have allowed me to communicate with my group mates better, it helps me to learn better when in a group context and develop my social skills." (Respondent 20180424-103307.152, student survey) "Through Student Internship and Project Work, teamwork is crucial. Without teamwork, things will not be done. I've learned that different people work differently, and I have to be a team player and more understanding to get things done." (Respondent 20180424-102927.311, student survey)	Transforming students - improved soft skills
"Learning industry practice is the most useful in a technical field like [name of industry]." (Respondent 20180428-223124.489, student survey) "I worked in a research lab during my internship period and I had gained a lot of laboratory skills during my times spent there. I think the lab skills I had gained there would be the most useful to me because it is a life-long skill and it will be especially useful for me ('…') who wants to work in the research industry in the future. Other than technical skills (lab skills), I had also gained a lot of valuable soft skills in my job which would be useful to me when applying job in the future. For example, communication skills between an employee and an employer, presentation skills and problem-solving skills. (Respondent 20180305-170105.904, student survey)	Transforming students - improved technical skills
"[Learning different views people have on the same matter] is the most useful as I feel it helps widen your perspective and learn more through working with other people." (Respondent 20180502-201938.302, student survey)	Transforming students - widened perspectives of projects/ subject matter

Data extract	Coded for
"Teachers bring up recent incidents relative to the current topic being learnt and asks students to give their opinions based on what they've learned so far." (Respondent 20180512-115515.367, student survey)	
" 'Quality' in assessment would refer to the educator being able to identify appropriate checkpoints to help note the areas the students aren't unsure in. (E.g. after every chapter/sub-chapter or during tutorials, the educator can make Kahoot! quizzes or face-to-face questions to check on the students' understanding) This will help clarify the doubts of students immediately and these doubts would not be delayed till revision lectures to be clarified. As for skills, frequent hands-on will definitely help the students to better their skills. This is because when provided with more hands-on (ungraded) means there will be more opportunities to make mistakes and learn from the mistakes…" (Respondent 20180425-124248.719, student survey) "[Quality] assessment: Through quizzes, assessments and examinations is to see whether students understand the knowledge well." (Respondent 20180228-225626.757, student survey)	Checking for understanding
"…I believe the "quality" of teaching and learning can be improved further if the teacher is able to relate a certain subject to a realistic situation, the application of the subject in real life (maybe based on experience) and methods to make content easy to remember. For example, I felt I learned the most during the internship because I am constantly learning and applying techniques in the laboratory. Hence, I find that it would be good if there are more practical assessments or experience that allows the students to apply what they had learnt in the classroom to real life situation. This would allow the students to have better understanding of subject and learn faster and more efficiently than just learning things in classroom." (Respondent 20180305-170105.904, student survey) "In assessment, staffs must ensure that the assignments are relevant to the work industry, so that students are equip with the foundations."	Emphasizing applications to real life/ work situations

Data extract	Coded for
(Respondent 20180423-101352.355, student survey)	
"Teaching staffs could assist us better by giving us feedback on our work more regularly. They should also check and make sure of our understanding of the subject more often." (Respondent 20180421-005317.306, student survey) "Quality teaching is when the lecturer does not spoon feed you all the information and answer, rather he or she helps to guide you towards the right track with subtle hints of the answer. The lecturer also provides quality feedback to the students after marking or looking through their work." (Respondent 20180329-152945.614, student survey)	Regular/ useful feedback
The most important skills	
"As for soft skill, nowadays everything is changing. Need to adapt the soft skills we have with new changes. As for communication skills, it is important. It applies to our daily lifestyle, especially within our workplace environment." (Respondent 20180425-190240.360, student survey) "In schools, we are more likely to deal with problems crafted by the teachers as a form of our projects/assignments. They do not exactly match up to the extent of what some industries are experiencing. And as Polytechnic students, we are expected to experience not only what it is like to be in the workforce, but also be prepared for it beforehand! Therefore, I would say that when we are given actual real-life problems faced by industries to deal/solve, it will help facilitate in the learning and also gain life skills like Problem Solving and Decision Making which will definitely be beneficial to us in the future." (Respondent 20180301-140759.283, student survey)	Soft/ Life skills
"Employers ultimately look for employees with the necessary practical skills. So <practical> skill is useful in the sense that it will give you a better chance to get hired and also increase your confidence in performing well in the workplace." (Respondent 20180325-004525.902, student survey)	Practical/ Hands-on skills

Data extract	Coded for
"As the projects that were given, help us better understand both the technical skills and practical reality. They provide us with practical skill as we tend to get projects that are based on existing companies or real-world situation, and with this we are able to gauge what working life feels like and they prepare us for life skills such as decision making, critical thinking and effective communication. As these are the important skills that would actually help us in the future. Even though we have technical skills but if we are unable to translate it to real-world situation, it would be practically useless." (Respondent 20180505-165500.125, student survey)	Technical skills
"Fundamental technical skills are essential for effective application when embarking into working life. Undeniably, this should be complemented with hands-on skills and other soft skills." (Respondent 20180416-212148.911, student survey) "To me, I believe that it is providing relevant technical, practical skills and other skills like soft skills that will remain applicable and useful to us in the future, be it in further studies or in work. Tests should be assessing these aspects as well." (Respondent 20180303-210928.870, student survey)	Essential skillset for work/ future
Contextual factors	
"Focus on the quality of learning and not instead on how much you are able to squeeze into the already suffocating curriculum, which is becoming more and more of a problem across the world, especially in countries like Singapore" (Respondent 20180303-173812.143, student survey) "Quality over quantity. There is no point in cramming students with hours of knowledge that they will hardly be able to or motivated to absorb due to the sheer mental and physical stress and fatigue that the overly demanding curriculum places on students on a regular basis." (Respondent 20180503-205543.213, student survey)	Crammed curriculum
"Passionate lecturers who are very keen to help the students and enrich their learning experience." (Respondent 20180422-170340.293, student survey)	Passionate/ Caring staff

Data extract	Coded for
"Encourage lecturers to have more personal involvement in the class and support them to ensure he/she gives cares more about what the student is learning so that they can easily know what students are struggling with and take appropriate action." (Respondent 20180503-000913.994, student survey)	
"Furthermore, we are also given classes on the software we use, for example, in our modules that teach us software like [name of software], we are taught by active professionals in the industry." (Respondent 20180429-003624.790, student survey) "Being able to deliver your lectures or teach skills confidently is one of the skills that I find is most useful because I would have confidence in the lecturer's teaching ability and trust the content in which he is teaching me. It also means that he is very knowledgeable in his field of expertise, and it shows that he or she is prepared to teach and impart the knowledge onto the students. Also, being competent is another quality I find very important: know what you can and cannot teach. If your knowledge is rusty, brush up before teaching it because students know when you don't prepare well for class" (Respondent 20180502-215820.608, student survey)	Taught by active professionals/ knowledgeable staff
"Major Project involves the application of knowledge in a practical learning situation. The subject covers acquiring new knowledge in technology and skills in project management, problem solving and communication. These are useful as they are an essential thing to know if the students were to work in the industry." (Respondent 20180423-101352.355, student survey) "For E-learning and project work, I acquire research skills since there is no lecturer to spoon-feed us with the answers to all our questions and it's necessary to research online on things we do not understand in order to increase our knowledge and answer our own questions. This skill is useful as it can improve on our efficiency to do better in upcoming project work that requires you to be independent." (Respondent 20180325-004525.902, student survey) "Many times, the only thing you can depend on, is yourself. Through E-learning, Student Internship and Project Work, is what made me	Key learning contexts deepen knowledge and skills

Data extract	Coded for
felt that way. Reason being, for E-learning many times students take it for granted and do not fully utilize the privilege of learning from home and do something else instead of actually doing E-learning which is one of the perks but also a double-edged sword as it can be a motivation or distraction. For Student Internship, what I learnt for those were that self-learning was important because what I was taught was always to google first before asking which I felt was a very important lesson as I came to realise the power of the internet and amount of information available which applies to learning as well. For Project Work, it's not always that you get good groupmates and at times you have to carry the group and rely on yourself hence individual learning but if everyone does their own individual parts and help each other out, it would be the best." (Respondent 20180303-234043.587, student survey) "Since I'm in the [name of diploma course], research is very important to deepen my knowledge about [discipline specific term]. Through the 5 teaching approaches mentioned in question 4 combined, I was able to upgrade my skills in research, especially in the academic level." (Respondent 20180502-215820.608, student survey)	
"Assessment practices SHOULD NOT cause unnecessary amounts of stress. Assessments should be spaced out and weighed evenly. Exams should not be the sole indicator of the student's ability. Although I agree that exams are important it should not be a life or death thing. Teachers should also be objective in their assessments" (Respondent 20180503-153929.488, student survey) "Fairness. This is because there are many times different Teachers teach their students differently / providing hints for exams differently. Similarly, Teachers marking varies as well. This actually caused a lot of confusion and unhappiness in students." (Respondent 20180509-105901.310, student survey)	High-stake assessment
Skills Mastery and Lifelong learner developments	
"I believe that the school needs to focus on giving more quality assessments. Some tests from some modules right now do not	A mindset/ belief

Data extract	Coded for
promote understanding at all and does not give us the mindset to ensure lifelong learning and skills mastery." (Respondent 20180509-225609.785, student survey) "Learning doesn't end in school, as I believe learning is a lifelong journey" (Respondent 20180308-222925.718, student survey)	
"Apart from grades, I believe experience is also a highly sought-after skill by employers as <students> being able to apply knowledge learnt in school will help companies greatly. Another skill that I find useful would be lifelong learning whereby students are taught to research on their own and keep themselves updated with latest trend and technology even after graduating from school." (Respondent 20180419-174302.913, student survey) "Self-learning. It is important when I future my studies in university because there will be a lot of self-directed learning." (Respondent 20180502-231243.140, student survey)	Able to research/ learn on your own in the future
" 'Quality' is producing students who graduate with greater interest in the diploma that they have pursued. Meaning to say that they either want to further their studies in the subject or are keen in doing research to better the work sector that they are posted to." (Respondent 20180228-005917.655, student survey) "Quality learning would be to account for the nitty-gritty things in a topic and going deep into the topic of interest, to the endpoint where the person who learnt is able to teach the concept learnt." (Respondent 20180420-175732.486, student survey)	Pursuing/ deepening their interests
"Please not only focus on the content but grow them as individuals. Influence them, make students curious, don't spoon feed us with all the answers." (Respondent 20180311-153850.762, student survey)	Being curious
"Materials given are only specific to the subject of study, it does not help us in the future where we will work with all sorts of things and be exposed to a completely different environment."	Being future-oriented

Data extract	Coded for
(Respondent 20180325-012739.505, student survey) "The use of other real-life scenarios that we will be tested or need to use in future." (Respondent 20180325-004525.902, student survey)	

1.3 Phase 3

"Searching for themes: Collating codes into potential themes, gathering all data relevant to each potential theme." (Braun and Clark, 2006)

The different codes are analysed and combined to form an overarching theme (Braun and Clark, 2006, p.89-90). I found it helpful to tabulate the different codes into possible themes below. I differed from Braun and Clark's approach (2006) here in that I chose not to differentiate the possible themes into main themes and sub-themes, not to discard any themes or organize codes that did not seem out of place under 'miscellaneous' at this point because I wished to consider a more complete picture generated from quantitative data of the student survey and the possible themes generated from qualitative data of the student survey in the next phase of thematic analysis.

An initial thematic map arising from the qualitative student survey data, showed possible themes that were broadly categorized into four groups related to quality practices, most important skills deepened by key learning contexts, contextual factors that might influence conceptions of quality and ground practice, and preparation for skills mastery and lifelong learning.

Coded for	Possible themes
Quality Practices	Teaching, learning and assessment practices judged to be of "quality" by students when the practices:
Explaining content Understanding content Not reading from the slides	Developed students' understanding
Guiding students Supporting lower attaining students to learn	Guided and supported students
Opportunities to learn from one another	Provided opportunities for students to learn from peers
Hands-on activities/ sessions/ practicum/ projects	Provided opportunities for applying knowledge and practising skills
Checking for understanding	Checked for students' understanding

Coded for	Possible themes
Emphasizing applications to real life/ work situations	Favoured students who could apply knowledge and skills
Regular/ useful feedback	Provided opportunities for students to make improvement of their work upon receiving staff feedback
Curious mind Increased understanding/ confidence of subject matter Improved soft skills Improved technical skills Widened perspectives of projects/ subject matter	Fostered desired student profile
Most important skills	Categories of skills, deepened by key learning contexts, that were judged to be most useful to students include:
Soft/ Life skills	Skills required for now and future (including further studies and work)
Practical/ Hands-on skills	Skills that translated knowledge to practice
Technical skills	Skills needed for work
Essential skillset	Essential skillset needed for now and future (including further studies and work)
Contextual factors	Contextual factors that influenced conception of quality and practices on the ground include:
Crammed curriculum	Curriculum that inspired or dampened students' interests
Key learning contexts	Key learning contexts that deepened or constrained knowledge and skills
High-stake assessment	Assessing students' understanding and application of knowledge and demonstration of skills or students' ability to memorize content
Passionate/ Caring staff	Staff profiles that encouraged or discouraged student learning

Coded for	Possible themes
Taught by active professionals/ knowledgeable staff	
Skills mastery and lifelong learning	Student preparation for skills mastery and lifelong learning includes:
A mindset/ belief Being future-oriented	Cultivating mindset/ belief of students that believe in deepening their knowledge and skills for now and future
Able to research/ learn on your own in the future	Enabling students to learn by themselves and from peers for now and future
Pursuing/ deepening their interests Being curious	Nurturing subject interests and curiosity of students for now and future

1.4 Phase 4

"Reviewing themes: Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis." (Braun and Clark, 2006)

As suggested by Braun and Clarke (2006), I reviewed all the collated extracts for each theme and judged that they seemed to form a coherent pattern (i.e. Level 1). The Level 1 themes as tabulated above were subsequently considered for Level 2 themes when they are congruent with the entire set of qualitative and quantitative data of the student survey where available. At this point, I differentiated main and sub themes. Still, I chose not to discard any Level 1 themes for now. Not all the data were coded or formed into themes as well because they did not appear to address my research questions.

In this phase of the thematic analysis, I used the 'Find' function of the Microsoft Office EXCEL programme to search for frequencies of key words of the level 1 themes since the raw survey data was already in the EXCEL format. Word counts of these key words gave a sense of 'strength' of these themes, as tabulated in the developed thematic map below. I did not choose words, namely, teaching, learning, assessment, practices, deepen, skills and quality for word counting because these were the words used in the student questionnaire survey, and I was concerned that these words might be 'leading' respondents to use the same words as well when asked to provide short responses in the student survey.

The developed thematic map, showing the following main and sub themes as tabulated below.

Level 1 themes	Level 2 themes
(I) Teaching, learning and assessment practices judged to be of "quality" by students when the practices:	

Level 1 themes	Level 2 themes
• Developed students' understanding 157 counts of student responses containing words "understand" or "understanding"	Main theme 1: key teaching practices that developed students' understanding of their chosen areas of studies Sub theme 1.1: helpful practices Sub theme 1.2: unhelpful practices
• Guided and supported students • Provided opportunities for students to learn from peers • Provided opportunities for applying knowledge and practising skills 51 counts of student responses with these words: provide (17), opportunities (7), opportunity (7), guide (4), guidance (4), support (4), interactions (4) and peers (4)	Main theme 2: key learning practices that supported students to develop understanding of their chosen areas of studies Sub theme 2.1: staff's extra lessons Sub theme 2.2: peer interactions Sub theme 2.3: self-practice
• Favoured students who could apply knowledge and skills • Checked for students' understanding • Provided opportunities for students to make improvement of their work upon receiving staff feedback 94 counts of student responses containing these words: apply or application (61), improve (15), check (10) and feedback (8)	Main theme 3: key assessment practices that developed students' understanding of their chosen areas of studies Sub theme 3.1: assessment focus Sub theme 3.2: regular check points/ staff feedback
(II) Categories of skills, deepened by key learning contexts, that were judged to be most useful to students include:	
• Skills for work • Skills for future • Skills for studies and further studies 189 counts of student responses containing these words: work (127), future (44), studies or further studies (18).	Main theme 1: most important skills deepened by key learning contexts in the polytechnic Sub theme 1.1: what are these skills? Sub theme 1.2: why are these skills important?

Level 1 themes	Level 2 themes
Since students cited many different skills in the student survey, I had listed only those with double-digit word counts - hands-on (31), research (29), communication (25), thinking (23), people (20), team (18), presentation (17), application (14), problem solving (13), programming (12), technical (11) and laboratory (10) skills.	
(III) Contextual factors that influenced conceptions of quality and practices on the ground include:	
• Curriculum that inspired or dampened students' interests • Key learning contexts that deepened or constrained knowledge and skills • Based on quantitative data of Q4 of student survey, percent# of respondents whose skills had been deepened by the following teaching approaches and learning contexts: o Skill-based practicum (85%) o Student internship (85%) o Project work (85%) o PBL (80.0%) o E-learning (39.0%) #% based on total number of student respondents who opted for "strongly agree" and "agree" over total respondents. The other options in the 6-point scale were "neutral", "disagree", "strongly disagree" and "NA". Respondents who opted for "NA and missing data were excluded from computation. • Based on quantitative data of Q8 of student survey, percent* of respondents who had seen quality practices in the following key facilities: o Class room (80.6%) o Laboratories (73.9%)	Main theme 1: what are the contextual factors and how they influenced conceptions of quality and/ or practices on the ground? Sub theme 1.1: curriculum related Sub theme 1.2: key teaching approaches and learning contexts related Sub theme 1.3: assessment related Sub theme 1.4: staff related I inferred from qualitative comments of various questions in the student survey that the above sub themes 1.1 to 1.4 were key contextual factors. Students' clarification of the sub theme will be sought during student interviews. I intend to clarify during the student interview to understand the big difference in the e-learning percentage as compared to other teaching approaches and learning contexts.

Level 1 themes	Level 2 themes
○ Studio (57.7%) ○ Learning enterprise (54.9%) ○ Lecture theatre (43.1%) ○ Centre of excellence (42.1%) ○ Others (23.7%) *% based on total number of student respondents who opted for "all the time" and "most of the time" over total respondents. The other options in the 6-point scale were "sometimes", "once a while", "not at all" and "NA". Respondents who opted for "NA means not been there at all" and missing data were excluded from computation. • Assessing students' understanding and application of knowledge and demonstration of skills or students' ability to memorize content • Staff profiles that encouraged or discouraged student learning I grouped qualitative student responses from the survey items in three groups: staff, assessment and curriculum for now. Frequencies of key words in the student responses are listed within brackets, • Staff-related 69 counts - lecturer (44), staff (14) and tutors (11) • Assessment-related 35 counts - test (19), quiz (7), examination or exams (9) • Curriculum-related 20 counts - content (14) and curriculum (6) There is a fourth group of student responses related to key teaching approaches and learning contexts. The extent to which various teaching approaches and learning contexts deepened their skills were earlier	

Level 1 themes	Level 2 themes
presented in percentages as described earlier in Q4 of survey item.	
(IV) Student preparation for skills mastery and lifelong learning includes:	
• Cultivating mindset/ belief of students that believe in deepening their knowledge and skills for now and future • Enabling students to research/ learn by themselves for now and future • Nurturing subject interests and curiosity of students for now and future 149 counts of student responses containing these words: future (44), research (29), interest (23), studies or further studies (18), I believe (18), self-directed/ self-learning (9), curious or curiosity (8).	Main theme 1: what student preparation for skills mastery and lifelong learning should entail? Sub theme 1.1: mindset/ belief of students Sub theme 1.2: self and peer learning Sub theme 1.3: interest and curiosity of students
• Fostered desired student profile (Codes: Curious mind, increased confidence of subject matter, improved soft skills, improved technical skills, widened perspectives of projects/ subject matter) 44 counts of student responses containing these words: improve (15), confidence or confident (12), mind (9), curious or curiosity (8). The word counts for various skills were described earlier.	Main Theme 2: Desired student profile fostered by quality practices [The theme was relocated from part (I) to part (IV) because the desired output of quality practices would likely apply to above main theme 1.] I will likely pursue main themes 1 and 2 further because I am drawn to the conception that quality in teaching, learning and assessment should 'transform' students.
• Based on quantitative data of Q12 of student survey, percent* of respondents perceived that quality practices in their schools prepared them for lifelong learning: o Teaching practice (71.7%) o Learning practice (72.3%) o Assessment practice (68.0%)	From the quantitative data, it is interesting for me to understand why 25.0% to 28.6% (or about a quarter) of student respondents judged that they were "somewhat adequate" prepared for skills mastery and lifelong learning? (A possible main theme 3)

Level 1 themes	Level 2 themes
• Based on quantitative data of Q13 of student survey, percent* of respondents perceived that quality practices in their schools prepared them for skills mastery: o Teaching practice (67.7%) o Learning practice (69.4%) o Assessment practice (68.0%%) *% based on total number of student respondents who opted for "more than adequate" and "adequate" over total respondents. The other options in the 6-point scale were "somewhat adequate", "not quite adequate", "not adequate" and "NA". Respondents who opted for "NA means I don't know" and missing data were excluded from computation. • When teaching, learning and assessment practices were considered as an integrated whole, percent^ respondents who opted for "somewhat adequate" preparation for skills mastery and lifelong learning ranged from 25.0% to 28.6% • When teaching, learning and assessment practices were considered as an integrated whole, percent^ of respondents who opted for "not quite adequate" and "not adequate" preparation for skills mastery and lifelong learning ranged from 0.7% to 4.8% ^% based on total number of student respondents who opted for "somewhat adequate" over total respondents. The other options in the 6-point scale were "more than adequate" and "adequate", "not quite adequate", "not adequate" and "NA". Respondents who opted for "NA means I don't know" and missing data were excluded from computation. Survey data from Q12 and Q13 is presented in terms of percentages, as described above. Word count of related qualitative student responses will be carried later, after the group student interview.	I will likely pursue the main theme 3 further during student interview because few students offered suggestions of 'quality teaching/ learning/ assessment practices that your school might need to emphasize more to prepare you for lifelong learning and skills mastery' through Q14 of student survey.

1.5 Phase 5

"Defining and naming themes: Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme." (Braun and Clark, 2006)

Having analysed the data from the student survey and interview, I refined the Level 2 themes, and proposed the following key themes as tabulated below. I included word counts and key student quotes from the survey, and key student quotes from the interview to substantiate the importance of these themes from the research data. To ensure anonymity, I identified each student quote from the interview with two alphabet eg. ZJ. A time reference of the recorded interview eg. 1:50 (or 1 min 50 sec) was included. Where needed, I had also rendered quotes or excerpts of transcript not traceable to their schools or the individuals by replacing these words in the original quotes or excerpts with [...]. For simplicity, I was identified as GH.

Refined Level 2 themes
(I) Teaching, learning and assessment practices judged to be of "quality" by students
Main theme 1: key teaching practices that developed students' understanding of their chosen areas of studies From the student survey, there were 157 counts of student responses containing words: understand or understanding. I included the next six student quotes from the survey to highlight key examples of practices that helped and did not helped students to understand their subject content. Quote 1: "...Quality teaching is when a teacher is able to deliver the curriculum in the shortest and simplest to understand way and is able to make most of the students understand what was taught." (Respondent 20180324-225736.117, student survey) Quote 2: "Must focus more on allowing students understand well. If lecturers are just going to go through the slides without giving more or something extra or even explain well, then we might as well skip lectures and read on our own. More beneficial that way." (Respondent 20180509-215719.698, student survey) Quote 3: "Quality teaching is when lecturers ensure that all students understand what he/she is trying to say. It is also when lecturers are able to have make up lessons for the weaker students or to those who needs help. Lecturers shouldn't teach based on just reading off the lecture notes..." (Respondent 20180419-185608.514, student survey) Quote 4: "Students tend to learn better in an interactive setting where there it's more relatable to them and they'll be able to have a better memory and understanding of what's going on in class rather than just reading from the lecture notes." (Respondent 20180302-155307.745, student survey)

Refined Level 2 themes

> Quote 5: "I feel that the adequacy of quality practices is different for every module due to the different lecturers teaching the subjects. For some modules, I feel the lecturers can improve on the way they deliver certain subject knowledge. Instead of just reading off from the slides, one could rephrase sentences for better understanding or even better share their personal work experience with the students." (Respondent 20180305-170105.904, student survey)
>
> Quote 6: "Practical gives us a lot of hands on and complete understanding of applying theories we learnt." (Respondent 20180508-190222.927, student survey)

Arising from the above student quotes, key examples of helpful practices suggested were:

- Focus on students' understanding and not just going through the presentation slides
- Explain and rephrase sentences, and not just reading off the presentation slides
- Support lower attaining students with makeup lessons
- Teach in an interactive manner
- Teach in a simplest way possible
- Share personal work experience
- Opportunities for hands-on practice

In view of the survey data having the high 157 counts of student responses containing words understand or understanding, I did not explore this theme further in the student interview. But I planned to do so during staff interview to understand their views and experiences regarding quality teaching practices. For students, they seemed to value teaching practices that focused on helping students to understand the subject better.

Main theme 2: key learning practices that supported students to develop understanding of their chosen areas of studies

From the student survey, there were 51 counts of student responses with these words: provide (17), opportunities (7), opportunity (7), guide (4), guidance (4), support (4), interactions (4) and peers (4)

Sub theme 2.1: staff's extra lessons

During the interview, student IS (23:05) shared about staff who gave extra workload to help students to understand and contrasted these staff members with some others who taught students the minimum to pass. I believe student IS was referring to the broader spectrum of students in general. I included the next two quotes from the student survey focusing on the importance of staff to provide extra sessions to support lower attaining students to develop understanding.

Refined Level 2 themes

> Quote 1: "…Quality learning is when lecturers are able to give extra practices and going through them. Or ask the weaker ones whether they understand." (Respondent 20180419-185608.514, student survey)
>
> Quote 2: "…For the weaker students, it will be great if the educator can fork out time to organize remedial sessions specially for them. (Respondent 20180425-124248.719, student survey)

Sub theme 2.2: opportunities to learn from peers

In support of this sub theme, I included the next quote from student survey to underscore the importance for staff to provide learning opportunities for students to develop understanding of a topic of interest. Class discussion is one of these opportunities.

> Quote 1: "Having more classes that open a discussion, like using a topic and allowing people to speak about their perspective on the topic. This helps expand everyone's learning because someone may have taught of something that another person may not. This gives more learning with one another and understand where everyone is coming from." (Respondent 20180505-165500.125, student survey)

A related aspect arising from the opportunities to learn from peers was that it visualized what higher quality works looked like for students, and it could be motivating for some students, like DC. I enclosed the next quote from the interview to elaborate this point. But I had replaced the name of DC's school and discipline-related product in the quote to render it untraceable to any school.

> Quote 2: "I came from the generation before PBL. Similarly, we have projects in [name of module]. We are not told much, we have to search for stuff to do. What motivates us is that we see others do better than us. We work quite hard because you see others were doing so well. You see some make nice [discipline related product], you want to do that. You see other do nice presentation, we want to as well. It's competition." (DC; 7:00)

Sub theme 2.3: opportunities to apply knowledge and skills

Students elaborated that hands-on practice, real-life experience and practical assessments helped them to further develop their understanding of the subject knowledge and skills through practice and learning from the practice. I included the next 3 quotes from the student survey to highlight their views.

> Quote 1: "Practical gives us a lot of hands on and complete understanding of applying theories we learnt." (Respondent 20180508-190222.927, student survey)
>
> Quote 2: "…I felt I learned the most during the internship because I am constantly learning and applying techniques in the laboratory. Hence, I find that it would be good if

Refined Level 2 themes
there are more practical assessments or experience that allows the students to apply what they had learnt in the classroom to real life situation. This would allow the students to have better understanding of subject and learn faster and more efficiently than just learning things in classroom." (Respondent 20180305-170105.904, student survey) Quote 3: "...As for skills, frequent hands-on will definitely help the students to better their skills. This is because when provided with more hands-on (ungraded) means there will be more opportunities to make mistakes and learn from the mistakes..." (Respondent 20180425-124248.719, student survey) This main theme was not explored further in the student interview, but I planned to do so during staff interview to understand their views and experiences regarding quality learning practices for students. For students, they seemed to value the provision of learning practices, namely extra lessons, class discussion and practice sessions to further develop their understanding of the subject.
Main theme 3: key assessment practices that developed students' understanding of their chosen areas of studies From the student survey, there were 33 counts of student responses with these words: improve (15), check (10) and feedback (8) Sub theme 3.1: regular and useful feedback The next three student quotes from the student survey underscore the importance for staff to provide regular feedback for students to improve their works, which further developed students' understanding of the subject. Quote 1: "Teaching staffs could assist us better by giving us feedback on our work more regularly. They should also check and make sure of our understanding of the subject more often." (Respondent 20180421-005317.306, student survey) Quote 2: "...The lecturer also provides quality feedback to the students after marking or looking through their work." (Respondent 20180329-152945.614, student survey) Quote 3: "To receive useful feedbacks means you have a piece of information for you to work towards it, you get to improve and change your work and make it much better and you will understand where went wrong and how to correct the mistake." (Respondent 20180329-152945.614, student survey) Sub theme 3.2: appropriate checkpoints The idea of checkpoints or checking for students' understanding was evident in the next three quotes.

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Quote 1: "I find that assessment practice is the most important to me because at the end of the day, the most important thing is about whether you understand about certain subject and the ability of apply the knowledge you have learnt in practical situation. Hence, it is important to check for a student's understanding of subject knowledge and skills." (Respondent

20180305-170105.904, student survey)

Quote 2: "Lastly, assessment practices allow the teacher to check whether the student fully understands the subject." (Respondent 20180503-112652.29, student survey)

Quote 3: "'Quality' in assessment would refer to the educator being able to identify appropriate checkpoints to help note the areas the students aren't unsure in. E.g. after every chapter/sub-chapter or during tutorials, the educator can make Kahoot! quizzes or face-to-face questions to check on the students' understanding. This will help clarify the doubts of students immediately and these doubts would not be delayed till revision lectures to be clarified…" (Respondent 20180425-124248.719, student survey)

The above Quote 3 named two of these checkpoints, namely online quizzes and face-to-face questions that helped students to clarify their doubts. I presumed that the clarification helped students to better understand their subject content.

I did not explore this theme further during the student interview and plan to do so during staff interview to understand views and experiences of staff regarding quality assessment practices. For students, they seemed to value assessment practices that checked for and promoted their understanding of the subject.

(II) Categories of skills, deepened by key learning contexts, that were judged to be most useful to students

Main theme 1: most important skills deepened by key learning contexts in the polytechnic

The teaching approaches and learning contexts stated in Q4 of the student survey were problem-based learning, e-learning, skill-based practicum (eg. culinary, prototyping), student internship and project work.

Sub theme 1.1: What are these skills?

Since students cited many different skills in the student survey, I had listed only skills with double digit word counts (within brackets), namely hands-on (31), research (29), communication (25), thinking (23), people (20), team (18), presentation (17), application (14), problem solving (13), programming (12), technical (11) and laboratory (10) skills.

Sub theme 1.2: Why are these skills important?

From the student survey, I had broadly categorised students' reasons in three areas:

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- Skills for work
- Skills for future
- Skills for studies and further studies

To give a sense of the prevalence of the reasons, there were 189 counts of student responses containing these words: work (127), future (44), studies or further studies (18) from student survey.

Quality could be seen in terms of skills that were deepened and deemed to be most useful to students. The teaching approaches and learning contexts, taken collectively had influenced the development of these valued skills amongst students. I was not surprised that hands-on skills and research skills ranked highly because of the focus given to project work and problem-based learning in the curriculum. To me, it would be interesting to compare the list of top 10 skills from staff and alumni surveys, as such I did not explore this theme further during interview sessions.

(III) Contextual factors that influenced conceptions of quality and practices on the ground

Main theme 1: What are the contextual factors and how they influenced conceptions of quality and/ or practices on the ground?

Sub theme 1.1: curriculum related

From student survey, there were 20 counts of student responses containing these words: content (14) and curriculum (6).

I included the next two quotes from the student survey to clarify the influence of curriculum-related contextual factor on ground practices. The survey respondents described a curriculum that was suffocated with increasing content and imposed too much demand on students' time and energy.

> Quote 1: "Focus on the quality of learning and not instead on how much you are able to squeeze into the already suffocating curriculum, which is becoming more and more of a problem across the world, especially in countries like Singapore" (Respondent 20180303-173812.143, student survey)
>
> Quote 2: "Quality over quantity. There is no point in cramming students with hours of knowledge that they will hardly be able to or motivated to absorb due to the sheer mental and physical stress and fatigue that the overly demanding curriculum places on students on a regular basis." (Respondent 20180503-205543.213, student survey)

Students did not develop the curriculum-related contextual factor as much as the other factors during the interview. Student ZJ did mention that it was important for the curriculum to

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prepare students for the industry. This focus led to the use of different knowledge and skill across modules in a single project.

> Quote 3: "There is a lot of focus on industry preparedness… they try to link industry concepts. In Year 1, multiple modules are merged, and different skills complemented (sic; applied) in a single project." (ZJ; 1:57)

It would be interesting to explore this sub theme further with staff survey and interview. Since staff in the polytechnic contributed to curriculum development in various ways, it would be interesting to know how their conception of quality influenced the curriculum they developed for students.

Sub theme 1.2: key teaching approaches and learning contexts related

The extent to which various teaching approaches and learning contexts deepened their skills were presented in percentages from the study survey were included here for easy reference:

- Skill-based practicum (85%)
- Student internship (85%)
- Project work (85%)
- PBL (80.0%)
- E-learning (39.0%)

The student interview uncovered two reasons that could have led to the marked lower e-learning percentage than other teaching approaches and learning contexts.

Firstly, students struggled with long-winded e-lectures and having too many curated videos as seen from the next two quotes from the interview.

> Quote 1: "In semester 1.2, I had Lynda.com lectures - a total of more than 100 lecture hours <of curated videos>. No! We were not going to watch them." (ZJ; 38:10)
>
> Quote 2: "…E-lecture was not useful, it's too long, nobody bothers. Teachers could go on and on, and not to the point." (NC; 37:20)

Secondly, students deemed face-to-face consultation with tutor to be more important for their learning in project-based learning context. I included the next two student quotes below to underscore students' view.

> Quote 3: "It was during time of our major project. We had daily consultation any way, even though we did not study from lectures <from the learning management system>, we learnt stuff from consultation, it was fine." (DC; 20:02)
>
> Quote 4: "In [name of school], there was four-hour lab: first two hours, staff used it to conduct lecture and last two hours for lab although it was four-hour lab on the time-

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table. It diminished practical lab aspect because staff needed to cover the lectures… We wasted a lot of time doing the lecture <in class>, the consultation time was very short. This was project based, so consultation was important." (ZJ; 18:20)

I included four quotes here because students had lots to share to their e-learning experiences. None of the students in the interview shared about positive aspects of e-learning except for one reference about online assessment, which I would discuss in the next segment. There were few positive references from the student survey as well. To students, e-learning experienced on the ground could be better. To further extend the discussion, I planned to explore this sub theme further using data from staff survey and interview, which I will describe later under thematic analysis of staff data.

Sub theme 1.3: assessment related

From student survey, there were 35 counts of student responses containing these words: test (19), quiz (7), examination or exams (9)

I enclosed a quote from the student survey and a short segment of the interview transcript (13:00 – 13:15) to clarify a possible influence of assessment related contextual factor on assessment practices. Students shared by the high level of stress was due to the uneven spreading of summative assessments in the student survey, and students from the interview referred to this stressful experience as 'Hell Week'.

Quote 1: "Assessment practices SHOULD NOT cause unnecessary amounts of stress. Assessments should be spaced out and weighed evenly. Exams should not be the sole indicator of the student's ability. Although I agree that exams are important it should not be a life or death thing. Teachers should also be objective in their assessments" (Respondent 20180503-153929.488, student survey)

During the interview, students shared about crammed test and project deadlines during a period of the semester, which they referred to as 'hell week', and the way that week affected them. I had included a short segment of the interview transcript because this part of the interview resonated strongly with all students during the interview.

Transcript 1 (13:00 – 13:15):

"To me, project deadlines are very close. All tests are crammed the same period." (NC)

"The hell week!" (ZJ)

(A burst of laughter from all)

"Yay, the hell week. Students lack sleep and they are pretty much unhappy. They don't have time to rest. They fall out with group mates. They don't have same working style… For me, the weightage of each paper is too high. If you screw up, you cannot get

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> your <grade> A. One of my friends messed up and needed to get more than 100% in exams to get <grade> A. Then they don't care about the subject anymore." (NC)

Besides the 'hell week', students made references to cramming to meet project deadlines and heavy workload, and their suggestions to alleviate the situation during other parts of the interview. I included the next four student quotes to highlight students' views and suggestions from different schools.

> Quote 1: "In [name of school], it has no exams approach, all based on projects. No need to cram for exams. It's also a bit weird, people crammed for projects…" (ZJ; 9:05)
>
> Quote 2: "Heavy workload, and how teachers expect you to start earlier. But we also expect teachers to give them to us earlier. Don't cram all deadlines together. If you give it to us early, then we can have **d**ifferent deadlines in different weeks." (NC; 46:10)
>
> Quote 3: "Lessen the other assignments; have more practice in [name of school]. When you cram for exams during study week, you forget what you learn. Better to practice more, it will help you to remember it." (IS; 47:00)
>
> Quote 4: "It's good to spread out the submission… I once got 8 -10 submissions or 10 in 8 weeks, too many, it was hell." (DC; 48:00)

During the interview, students offered little about the positive aspects of exams and assessment in general except that smaller assessments prior to that helped students to prepare for the final high-stake exams or do better in assessment overall.

> Quote 5: "Nobody bothers about projects, 10% only. But exam is structured really well because term test covers for example topics 2 and 3, and exams cover (2 more) topics 4 and 5. You need to study a few more topics for the final exams." (IS; 14:47)
>
> Quote 6: "Online quizzes do help students to do better but e-lecture is not useful." (NC; 37:20)

Sub theme 1.4: staff related

From student survey, there were 69 counts of student responses containing these words: lecturer (44), staff (14) and tutors (11).

I included the next four quotes to summarise students' experiences with caring and passionate staff, active industry professionals and knowledgeable staff in their course of learning. Taken together, staff profiles and practices would either positively or negatively influenced teaching and learning practices on the ground.

> Quote 1: "Passionate lecturers who are very keen to help the students and enrich their learning experience." (Respondent 20180422-170340.293, student survey)

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> Quote 2: "Encourage lecturers to have more personal involvement in the class and support them to ensure he/she gives cares more about what the student is learning so that they can easily know what students are struggling with and take appropriate action." (Respondent 20180503-000913.994, student survey)
>
> Quote 3: "Furthermore, we are also given classes on the software we use, for example, in our modules that teach us software like [name of software] we are taught by active professionals in the industry." (Respondent 20180429-003624.790, student survey)
>
> Quote 4: "... It also means that he is very knowledgeable in his field of expertise, and it shows that he or she is prepared to teach and impart the knowledge onto the students. Also, being competent is another quality I find very important: know what you can and cannot teach. If your knowledge is rusty, brush up before teaching it because students know when you don't prepare well for class." (Respondent 20180502-215820.608, student survey)

To further the analysis, I chose to highlight three unhelpful incidences to illustrate the negative impact of staff-related contextual factor on how teaching and learning were experienced. I deferred to group them as a sub theme for now unless alumni survey and interview generated more supporting data.

Incidence one: staff changed student's project scope eight times. In my opinion, changing the project scope eight times within three-month project duration was an unusual practice, as seen from the student quote below:

> "Yes, Major project is very good if it is done properly, yes (ha, ha, ha). If done properly, it is very nurturing... In my Major project, my teacher, the lazy one changed our major project eight times... Major project is very good if it is done properly. More properly defined project; ensure project can be done in three months. I was pretty upset." (IS; 31:30)

Incidence two: student completed the practical lesson in a short time. This report was unusual for a practical session, which typically lasted for two to three-hour session to be completed within ten to thirty minutes on a regular basis, as elaborated in the student quote below. To me, lesson design did not provide enough challenge to the student involved:

> "I had a module last semester. If not for the fact that I needed 85% attendance, I would not have gone <to class>... The teacher did not teach. All steps were already there online. I just followed the steps; I finished in thirty minutes; I could go already. Once, I came and finished the lab in ten minutes. I only had that lesson on that day, I came to school for ten minutes." (ZJ; 25:05)

Incidence three: staff teach us (just) enough to pass the subject. As seen from the quote below, the issue surfaced by student was about particular staff members who should teach students

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more to understand rather than just to pass the subject. This quote is congruent with the main theme that alluded to students judging teaching practices to be of "quality" when they focused on helping students to understand the subject matter:

> "<NC> is right, the <staff's> biasness does not affect our grades. But my concern is that some staff are not bothered to teach us properly. Some staff give extra tuition and extra workload so that you understand. Some <other> staff cannot be bothered <to do more> so long they teach you enough to pass." (IS; 23:05)

To end the analysis of this sub theme on staff-related contextual factor, I included conflicting data from the student survey and student interview regarding unfair and bias staff practices. While Quote 1 from the student survey gave a sense on the gravity of the issue in terms of students' confusion and unhappiness but Quote 2 from the student interview seemed to have mitigated the issue because staff's biasness did not affect the assessment practices as much.

> Quote 1: "Fairness. This is because there are many times different Teachers teach their students differently / providing hints for exams differently. Similarly, Teachers marking varies as well. This actually caused a lot of confusion and unhappiness in students." (Respondent 20180509-105901.310, student survey)
>
> Quote 2: "Our school, I do not think teachers' biasness will affect our GPA <abbreviation for Grade Point Average>. At most, for Class Participation there might be <bias>. But there is guideline, teachers need to justify why they give this and that mark to a student. I do not have issue with biasness in marking. There are marking criteria, it can't go very wrong. In terms of teacher' biasness, I do not have a big opinion on it." (NC; 22:13)

(IV) Student preparation for skills mastery and lifelong learning

Main theme 1: What student preparation for skills mastery and lifelong learning should entail?

From student survey, there are 149 counts of student responses containing these words: future (44), research (29), interest (23), studies or further studies (18), I believe (18), self-directed/ self-learning (9), curious or curiosity (8).

The following aspects could be considered:

- Cultivating mindset/ belief of students that believe in deepening their knowledge and skills for now and future;
- Enabling students to research/ learn by themselves for now and future; and
- Nurturing subject interests and curiosity of students for now and future.

Survey and interview data related to the main themes 1 and 2 were analysed together because I took the position that what deemed to be desirable student profile by the polytechnic would find their ways into the student preparation programmes offered by the polytechnic or

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schools. Besides, I was drawn to the conception that quality in teaching, learning and assessment should "transform" students.
Main Theme 2: Desired student profile fostered by quality practices From student survey, there are 44 counts of student responses containing these words: improve (15), confidence or confident (12), mind (9), curious or curiosity (8). The word counts for various skills were described earlier. The first two quotes gave focus to cultivating mindset amongst students that believe in deepening their knowledge and skills for now and future. Quote 1: "I believe that the school needs to focus on giving more quality assessments. Some tests from some modules right now do not promote understanding at all and does not give us the mindset to ensure lifelong learning and skills mastery." (Respondent 20180509-225609.785, student survey) Quote 2: "Learning doesn't end in school, as I believe learning is a lifelong journey" (Respondent 20180308-222925.718, student survey) The next two quotes alluded to the importance to enabling students to research and learn by themselves for now and future. Quote 3: "Apart from grades, I believe experience is also a highly sought-after skill by employers as [students] being able to apply knowledge learnt in school will help companies greatly. Another skill that I find useful would be lifelong learning whereby students are taught to research on their own and keep themselves updated with latest trend and technology even after graduating from school." (Respondent 20180419-174302.913, student survey) Quote 4: "Self-learning. It is important when I future my studies in university because there will be a lot of self-directed learning." (Respondent 20180502-231243.140, student survey) The following three quotes underscored the importance to nurture students' interests and curiosity in subject matter for now and future. Quote 5: "'Quality' is producing students who graduate with greater interest in the diploma that they have pursued. Meaning to say that they either want to further their studies in the subject or are keen in doing research to better the work sector that they are posted to." (Respondent 20180228-005917.655, Q student survey) Quote 6: "Quality learning would be to account for the nitty-gritty things in a topic and going deep into the topic of interest, to the endpoint where the person who learnt is able to teach the concept learnt." (Respondent 20180420-175732.486, student survey)

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Quote 7: "Please not only focus on the content but grow them as individuals. Influence them, make students curious, don't spoon feed us with all the answers." (Respondent 20180311-153850.762, student survey)

Last two quotes highlighted the importance to prepare students to be future-oriented.

Quote 8: "Materials given are only specific to the subject of study, it does not help us in the future where we will work with all sorts of things and be exposed to a completely different environment." (Respondent 20180325-012739.505, student survey)

Quote 9: "The use of other real-life scenarios that we will be tested or need to use in future." (Respondent 20180325-004525.902, student survey)

To end the analysis of the two main themes, I enclosed an interview transcript (43:00 – 43:45) in support of the conception of quality that teaching, learning and assessment practices should transform or change students positively in terms of their interest, curiosity and motivation to learn:

DC: "In [name of school], no definite answer, coming up with new things, consulting. It piques your interest to do things better. Be better. Growing up as a child, I never study in my life before, I take a text books and sleep immediately. Now, I pick up a book to see how others do their [name of discipline] concepts."

GH: "Now you pick up a book to read about [name of discipline] concept. Why this change?"

DC: "Now I'm genuinely interested. You see others do it, you want to also try."

IS: "We want to be curious and motivated."

From the quantitative data, it is interesting for me to understand why 25.0% to 28.6% (or about a quarter) of student respondents judged that they were "somewhat adequate" prepared for skills mastery and lifelong learning? (A possible main theme 3)

I pursued the main theme 3 further during student interview because few students offered suggestions of 'quality teaching/ learning/ assessment practices that your school might need to emphasize more to prepare you for lifelong learning and skills mastery' through Q14 of student survey.

From the interview, students offered various suggestions for quality teaching/ learning/ assessment practices in general. I had included three student quotes about various ways to increase students' interest in, and motivation to learn the subject matters. In doing so, I believed students would be more prepared for lifelong learning and skills mastery:

"… Make them feel curious, motivated, think out of the box. Feed some info, don't give them everything, don't leave them, throw them out alone." (IS; 42:00)

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"In [name] school… you can't teach everything, should encourage people to go online to explore certain things." (ZJ; 42:10) "Like the [name of module] class, <explore> interesting way and come up with improvement. I like the flexibility in [name of school], I feel there are many learning opportunities." (DC; 45:00)

At this point, I had not dropped any key themes distilled from the thematic analysis of the student data. To produce an overall report (phase 6 of the thematic analysis), I carried out the thematic analyses of the alumni and staff data from surveys and group interviews following similar process as detailed in the thematic analysis of the student data. In view of the word count constraint of the thesis, I only showed phase 5 of the thematic analyses of alumni and staff data here. After which, I analysed main themes from the student, alumni and staff surveys data in phase 6. Unique main themes found only in student/ alumni/ staff survey had their places as well because different views amongst students, alumni and staff were expected.

2. ALUMNI DATASET

2.1 Phase 5

As discussed earlier, the alumni data comprised survey data involving 142 alumni questionnaire respondents from schools A to E and three alumni interviewees – one from school B, school C and school D. The fourth interviewee from school A did not turn up for the group interview because of urgent work, and none of school E's alumni shortlisted from the alumni survey responded to my invitation for interview. Since the three interviewees were from diverse disciplines and contexts, I went ahead with the group interview. The alumni data seemed rich, as seen the key themes presented below.

Refined Level 2 themes
(I) Teaching, learning and assessment practices judged to be of "quality" by students
Main theme 1: key teaching practices that developed students' understanding of their chosen areas of studies From the alumni survey, there were 96 counts of alumni responses containing words: understand or understanding. I included the next four alumni quotes from the survey to highlight key examples of practices that helped and did not helped students to understand their subject content. Quote 1: "Is when teacher explains intricate theories in simple terms for us all to understand" (Respondent 20180510-133709.450, alumni survey)

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Quote 2: "…Guiding the student to understand the concepts and to enjoy the entire process of taking each failure or success as a learning opportunity." (Respondent 20180306-183347.835, alumni survey)

Quote 3: "Lessons should avoid just reading out what is shown on the screen and on the notes given to us. It helps us more when examples related to real life experiences are given and show how the things we are learning now will help us in future." (Respondent 20180414-212102.776, alumni survey)

Quote 4: "Teaching staff that have actual interactions with their students & not just going through the curriculum for the sake of it. Students are able to feel when teaching staff engage with them and appreciate such genuineness." (Respondent 20180502-185609.393, alumni survey)

Arising from the above alumni quotes, key examples of helpful practices suggested were:

- Guide student to understand and not just going through the teaching materials
- Teach in an interactive manner
- Explain in simple terms
- Share real life experience and not just reading off the presentation slides

In view of the survey data having a high 96 counts of alumni responses containing words: understand or understanding, I did not explore this theme further in the alumni interview. However, I planned to do so during staff interview to understand their views and experiences regarding quality teaching practices. For alumni, they seemed to value teaching practices that helped them to understand and relate the subject to real life.

Main theme 2: key learning practices that supported students to develop understanding of their chosen areas of studies

From the alumni survey, there were 78 counts of alumni responses with these words: provide (15), self (12), own (12), guide (12), guidance (11), interaction/interactions (8) and peer/ peers (8). I proposed three sub themes 2.1 to 2.3 with the next six quotes from alumni survey.

Sub theme 2.1: involving staff

Quote 1: "Quality in teaching would be teachers who show an interest in a student's learning. Not in terms of one final and absolute grade. But guiding the student through the semester and polytechnic life to ensure that the student learns from their mistakes made. Guiding the student to understand the concepts and to enjoy the entire process of taking each failure or success as a learning opportunity." (Respondent 20180306-183347.835, alumni survey)

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Quote 2: "There must be interaction between the staff and students. Preferably more hands-on teaching." (Respondent 20180325-093731.724, alumni survey) Sub theme 2.2: involving peers Quote 3: "The quality in teaching is when the teacher can get the student's attention and fully provide an avenue for discussion for students to want to understand the subject that is being taught. Allowing questions and providing a safe avenue for the students to seek help and assistance from the teacher. Discussion opens room for suggestion and improvement, clear understanding of matters. This is essentially important in the working world, where you have to work with your team and cooperate with one another." (Respondent 20180331-215536.952, alumni survey) Quote 4: "Get to learn from peers and improve together." (Respondent 20180524-171043.318, alumni survey) Sub theme 2.3: involving self (only) Quote 5: "Self-learning. It is mostly required in work as on-the-job training may be limited. Foundation is more important." (Respondent 20180523-215245.305, alumni survey) Quote 6: "Those approaches have helped me to be independent especially at my workplace as those approaches such as internship have made me practice to learn new things on my own." (Respondent 20180517-220813.397, alumni survey) I did not explore this theme explicitly in the alumni interview but planned to do so during staff interview to understand their views and experiences regarding quality learning practices for students. Alumni who participated in the survey and interview seemed to value interactions with peers and staff and learning on their own helped to further develop their understanding of the subject.
Main theme 3: key assessment practices that developed students' understanding of their chosen areas of studies From the alumni survey, there were 85 counts of alumni responses with these words: apply or application (46), improve (20), check (10) and feedback (9). The next five quotes from the alumni survey underscored the importance of an assessment focus and checking on students' understanding of the subject. Sub theme 3.1: assessment focus Quote 1: "Assessment- give open-ended questions and application questions rather than questions that require student to regurgitate what they have memorised without being selective on what to write to answer the questions." (Respondent 20180503-101207.123, alumni survey)

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Quote 2: "…Well balanced of both content/memory-based questions and application-based questions to broaden guided and independent thinking skills of students. Mixed of different assessment models, projects, quizzes, assignments." (Respondent 20180502-165057.511, alumni survey)

Quote 3: "Instead of testing on memorizing skills, testing on understanding would be more relevant. I feel that students are drilled to memorize notes and not know the key points of the subject taught. Making a paper difficult to see how intelligent a person is makes them a good student but not an adequately skilled employee." (Respondent 20180502-184454.216, alumni survey)

Sub theme 3.2: regular checkpoints/ staff feedback

Quote 4: ""…Quality in learning practices means being able to help students to learn subject knowledge and skills through problem-solving scenarios in a working environment as well as providing a platform for 2-way communication between teacher and students. 2-way communication whereby there is a time of inquiries, feedback and check of understanding on the learning subject. Quality in assessment practices means being able to check for students' understanding or attainment of subject knowledge and skills through project works, pop quizzes and test papers if need be." (Respondent 20180305-081618.797, alumni survey)

Quote 5: "…In assessment practices, is to check on students one by one to better know their capability of understanding the subject taught." (Respondent 20180325-080838.496, alumni survey)

I did not explore this theme further during the alumni interview but planned to do so during staff interview to understand views and experiences of staff regarding quality assessment practices. To the alumni, an assessment focus that emphasized more on application and understanding would help students to better understand of the subject.

(II) Categories of skills, deepened by key learning contexts, that were judged by alumni to be most useful to students

Main theme 1: skills deepened by key teaching approaches and learning contexts in the polytechnic that are most useful in workplace

The teaching approaches and learning contexts stated in Q5 of the alumni survey were problem-based learning, e-learning, skill-based practicum (eg. culinary, prototyping), student internship and project work.

Sub theme 1.1: What are these skills?

Alumni cited many different skills in the alumni survey. I had listed only those with double digit word counts - people (30), team (30), hands-on/ hands on (27), communication (27),

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thinking (18), application (18), research (17; excluding one count from the survey item), problem solving (16), laboratory (16; excluding one count from job title), presentation (11) and technical (10; excluding 4 counts from the job titles) skills.

Sub theme 1.2: Why are these skills useful in workplaces?

From the alumni survey, I had broadly categorised reasons cited by alumni in three areas:

- Skills needed to do their jobs
- Skills for future or further studies

To give a sense of the prevalence of the reasons, there were 249 counts of alumni responses containing these words: work (218; excluding 4 counts from the survey items), studies (18) and future (13) from alumni survey.

Quality could be seen in terms of skills that were deepened and deemed to be most useful in workplaces by alumni. The teaching approaches and learning contexts, taken collectively had influenced the development of these skills valued by alumni. I was not surprised that alumni ranked soft skills such as people, team and communication skills highly because these skills were useful for them to work with colleagues or get work done in workplaces. To me, it would be interesting to compare the list of top 10 skills from staff and student surveys, as such I did not explore this theme further during interview sessions.

(III) Contextual factors that influenced practices on the ground

Main theme 1: What are the contextual factors and how they influenced conceptions of quality and/ or practices on the ground?

Three sub themes were further explored during the alumni interview: key teaching approaches and learning contexts, assessment and staff related contextual factors. Curriculum-related contextual factor was not explored further since the references regarding search words, 'content' and 'curriculum' were mostly related to staff, and key teaching approaches and learning contexts. Alumni involved in the group interview proposed a fourth sub theme, which is student cohort related contextual factor. Each sub theme would be further described in the next few segments.

Sub theme 1.1: key teaching approaches and learning contexts related

The extent to which various teaching approaches and learning contexts deepened skills of alumni surveyed were presented in percentages and included here for easy reference:

- Student internship (94%)
- Skill-based practicum (90%)
- Project work (87%)

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- PBL (87%)
- E-learning (46%)

I opted not to conduct words count for this sub theme because the above examples of key teaching approaches and learning contexts in the alumni survey question (Q5) might encourage alumni to mention these approaches and contexts more often in their qualitative responses in the survey.

I included the next three quotes from the alumni survey to clarify views of alumni regarding the influence of these teaching approaches and learning contexts on teaching and learning practices in terms of preparing for workplaces, developing skills, becoming an independent learner. The three areas are key elements in the mission of the polytechnic.

> Quote 1: "Student Internship allows me to broaden my perspective and gain a first-hand experience when interning at the company. I have learnt a lot through practical skills and also understand better of what it takes for the job position." (Respondent 20180305-234047.686, alumni survey)
>
> Quote 2: "Yes, theoretical knowledge is important as well but that just widen our knowledge base if there isn't any form of follow up to what is taught in the classroom. To excel in hands on skills, practice is important. Skill-based practicum is essentially teaching students to put what they learn in theory into practice. When learning a through a hands-on approach, students are able to grasp a better picture on what are they learning as they are able to touch, feel and understand better. This method of teaching and learning also allow students that may be slightly weaker in theory learn in a more effective way, giving them a chance to catch up rather than just lag behind. As [name of] Polytechnic strive to teach and pass on skills that are relevant to the current industry, students will be able to apply what they learn in school if they go on and do an industrial attachment or pursue a career in an industry relevant to their course of study." (Respondent 20180530-143917.257, alumni survey)
>
> Quote 3: "Having to go through Project Work meant going through real scenarios. By being prepared, we can be ready for the real work place. Therefore, when we go to work, we are aware of the process, function, roles and thus be able to carry it out based on what we have learnt. Problem Based Learning worked well on me. The lecturers usually answer my question with another question. For some people, they would be lost and not continue. However, the question stimulates my own thinking and craving to find out more on my own. Thus, making me more independent, flexible and creative by pushing me to my own limits." (Respondent 20180513-194348.194, alumni survey)

During the alumni interview, one alumnus (RR) spoke of the importance of internship and project work for skills-focused training, as seen from the interview transcript (51:35 to 52:44 and

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my pseudonym was GH) below. The names of industry, job titles and discipline-specific skill were replaced to keep quotes untraceable to any school.

> RR: "The opportunity the poly offered was also very important. Especially for [name of industry] - it's very project focused - getting real-world project. For me, I had good internship that I learnt a lot - this kind of link was important for poly to have - something that was skill focused."
>
> GH: "You said about this very good internship opportunity and company experience, can you talk about it more: why was it so good - why it helped you so much?"
>
> RR: "Essentially, it taught me how to [name of diploma-specific skill] from the ground up. Under study a senior [name of job title], I picked up from a lot of things: how to [name of diploma-specific skill] in very robust way, a faster way, a more readable way. They emphasized to me how small little things could affect the whole big picture - the whole pipeline."

On the balance, one other alumnus suggested the internship practice in alumnus' school could be further enhanced in terms of:

> "Teacher in charge to make sure of the quality on internship." (Respondent 20180507-095815.791, alumni survey).

Another suggested that internship should be made compulsory for all students in his/her school:

> "Please make student internship compulsory for ALL [name of diploma] students (i.e. an internship in the [diploma specific training] industry). I have personally gained much insight into the work and skills required through my university internship and it was a pity not to have been given the opportunity to do so sooner." Respondent 20180504-184256.227, alumni survey).

(All students in the polytechnic had to complete internship as part of their graduation requirement. I inferred that the above alumnus was either kept within the school or not posted to an industry closely related to diploma training for internship.)

Next, data from the alumni survey indicated that e-learning ranked lowly in comparison to the other key teaching approaches and learning contexts used in the schools. There was only one qualitative comment related to e-learning specifically in the survey. I inferred that the alumnus had bad experience with e-learning as a student, and suggested for:

> "Less e-learning because I feel it's a waste of time to me." (Respondent 20180429-084433.131, alumni survey).

I gathered more data from the alumni interview to understand reasons that could have led to the low percent (46%) of alumni strongly agree/ agree that e-learning had deepened their skills

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while they were students in the polytechnic. As seen from the next 3 quotes, one from each alumnus who participated in the interview reported that their e-learning experiences were limited to learning lectures from video and presentation slides. They also shared that the e-learning experiences offered by their schools could have been of higher order of thinking and more interesting.

> Quote 1: "The [name of] course, the online courses that I watched from Stanford, I felt that was more interesting, of higher level of thinking, the professors in Stanford gave you a lot of higher order questions to think about compared to the eLearning lectures - staff just read off the slides. Stanford recorded the full module over there with complete assessment. You can take their full modules - their final project - all for free." (RR; 44:25)
>
> Quote 2: "Mine was the same as him <a fellow interviewee>. It's just slides, the question asked was the same word for word as the slides. You could find the answer and that's it. I didn't remember what I learnt." (JE; 43:25)
>
> Quote 3: "eLearning was redundant. Majority of us didn't even open it. Even if we bother, we skip and skip (sic). We didn't bother - google was faster - it trained us to use other alternatives than reading the eLearning - just so boring." (ZI; 44:05)

Sub theme 1.2: assessment related

From alumni survey, there were 31 counts of alumni responses containing these words: test (16), quiz (8), examination or exams (7). I enclosed quotes from the alumni survey and two short segments of the interview transcript to clarify influences of assessment related contextual factor on assessment practices. Alumni suggested that assessment practices should emphasize more on content application and understanding rather than content memorisation, as seen from the next three quotes.

> Quote 1: "Assessment- Give open-ended questions and application questions rather than questions that require student to regurgitate what they have memorised without being selective on what to write to answer the questions." (Respondent 20180503-101207.123, alumni survey)
>
> Quote 2: "…'Quality' in assessment practices means that adequate assessment is provided but the weightage/workload is distributed well, such that the students will not be swarmed with assessments and will not be overly stressed. Thus, assessment practices may include quizzes instead of simply tests and exams." (Respondent 20180430-111128.494, alumni survey)
>
> Quote 3: "…Well balanced of both content/memory-based questions and application-based questions to broaden guided and independent thinking skills of students. Mixed

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of different assessment models, projects, quizzes, assignments." (Respondent 20180502-165057.511, alumni survey)

In support of an assessment practice to go beyond written tests and examinations, two of the three alumni from the interview spoke about the negative influences of final examination on assessment practices. I included two segments of interview transcript below. The names of industry, schools and subject and discipline-specific domains were replaced to keep quotes untraceable to any school. In the first segment (16:18 – 18:21; my pseudonym was GH), alumnus ZI shared about the negative influence due to an over reliance on the model answers. It had constrained ZI's development as a creativity, confident and independent learner as seen below.

ZI:" Like written examination - I honestly feel that Singapore education system is all about written exam - like the result. I feel it's bad quality practice. In Poly, it doesn't encourage critical thinking, all lecturers give the answers - expect you to anchor to a particular answer - they expect you to answer the answer sheet. I moved on to [name of a local university], I struggled, I really struggled a lot. Ours <in the university> is seminar like - no right or wrong - I looked out for answer - I am not independent, I am not independent enough. The current system <in the Poly> - they hold on to us hand in hand, they encourage us, keep feeding us answer and the necessary information to pass the written examination. It's quite a bad practice - no critical thinking involved. "

GH: "Because of that model answer, that single answer- it kind of constraint your creativity. So, when you moved on to [name of univeristy], what is the difference over there?"

ZI: "In [name of university], they encouraged us to sit in circle - seminar like - in a given issue, there is no right or wrong answer. Of course, there are certain theories you have to memorize, but other than that - how do you feel about certain [domain specific name] - do you agree - no right or wrong. But I would not talk because I didn't know my answer was right or wrong. I shy a bit (sic) - when I heard others' answer - is it true - I didn't dare to talk. My lecturer just said - say whatever you want - it's ok - we are ok with controversy -just say whatever you want to say."

GH: "That makes you fearful by saying out what you think could be the answer, you don't know it is right or wrong."

ZI: (nodded)

In the second segment (18:25 -20:02), alumnus RR spoke against force fitting written examination on subjects that required students to remember specific details that are no longer required in industry practice.

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RR: "Two things I want to elaborate: one bad and one good. I will start with bad first. She <a fellow interviewee> mentioned something similar, it's about examination. I found it pretty dumb to have [name of module] examination on written paper. It feels like they forced an exam to fulfil the metric so that they can call it a conventional or foundation module. If it doesn't fit, they shouldn't force it- try to fit it in a mould. It's a basic, foundation module in the first year. You are penalized for not writing [diploma specific name]. The [discipline specific equipment] will pick it up for you. In industry, no one forgets it anymore because computer does the checks for you nowadays, the exam and assessment must reflect what is important in the industry right now. For [name of school], there's need for precision, you need to build physical things. For [discipline specific name] - software can check for you - even the grammar is checked by computer, like Grammarly. There isn't much merit to continue to penalize students, to drill them to always remembering that, the software will help to remember."

GH: "Doesn't mirror real world?"

RR: "(nodded) There is no value when students come out - it's very academic. Nothing to carry forward when you come out - academic to solve it - it's better to have actual projects for assessment in [name of school]."

On the balance, alumni RR elaborated on what he meant by the good assessment practice. To him, good assessment practice should mirror and train students to work in the real world. He went on to give an example of a student's project work that was assessed by three different but inter-related subjects. In this way, students had opportunities to apply different skills or domain knowledge used in real world practice.

Sub theme 1.3: staff related

From alumni survey, there were 52 counts of responses containing these words: lecturer (31) and staff (21; excluding 4 counts from job titles). From the alumni survey and interview, alumni shared about teaching staff who were passionate about their work, cared for them as individuals and related well with students socially as seen from quotes 1 to 3. On the other hand, alumni also remembered teaching staff who could have taught and explained better as seen from quotes 4 to 5. Taken together, staff profiles and practices could either positively or negatively influenced practices on the ground.

Quote 1: "Overall, my education at TP has been great. I felt I learned so much during my three years and there were great teachers, some very passionate about their line of work. This passion had rubbed off on me in some way and I feel that is most value-added experience any student can hope for." (Respondent 20180502-163910.661, alumni survey)

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Quote 2: "I am fortunate. Majority of my lecturers - not like teacher-student relationship - more like friends - good friends. Majority of them, they noticed every single student. There was one time, I was heartbroken. When they saw us in trouble - they noticed us - more than just a teacher's perspective. They approached us one to one, asked if we were ok, they gave <us> encouragement and motivation to do better. Like what <alumnus RR> said, their teaching style was very open. They didn't mind staying up late to meet us, hanging out us with us - very welcoming. Whatever problem we have with our education, because of that, we improved a lot in our learning." (Alumnus ZI; Interview; 26:43 which is the timing of the group interview)

Quote 3: "Must be easy to approach - there wouldn't be the environment where students were comfortable to ask questions and further their education." (Alumnus RR; Interview; 26:30)

Quote 4: "I encountered a few of them where I have asked some of them what's the point of learning this module and how it fitted in the overall picture. There was this module, it's really abstract, I wanted to know how it would affect the whole thing. When approached, the lecturer just said it's just like that - you had to learnt it - didn't bother to explain. Usually students leave on the bell, this other <example>, it's the reverse - the teacher was first to leave the room – could actually tell they were not interested in students at all, they were here just to get job done - it really killed student motivation." (Alumnus RR; Interview; 30:20)

Quote 5: "This particular lecturer - every day - seminar question - everyone's answer seemed to be so wrong. She relied on module answer - she couldn't control her temper - she could not explain properly - she relied too much on model answer, she didn't put herself in our perspective - put in lay man terms for us to understand. We struggled a lot in that module, in a way the quality not there, she didn't know what we wanted, we didn't know what she wanted - she relied very much on model answer. (Alumnus ZI; Interview; 31:25)

Sub theme 1.4: student cohort related

During the interview, the three alumni viewed that student cohort was a contextual factor that had positively influenced and enriched their learning while in their respective schools. They shared about peers and senior students who were part of their social and learning community. In this community, they bounced ideas with one another; spurred one another on to improve; supported one another through organised extra classes or study groups. I had included the next two segments of the interview transcript to elaborate the alumni's views.

In the first segment (32:55 - 34:59; my pseudonym was GH), alumnus RR shared about a curious and adventurous cohort that provided healthy rivalry and competition.

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RR: "The peer I went through the poly with - they were curious - they were adventurous. Often, we hang out after class, we explored further concepts brought up in lessons, we explore little games on the side. It's important that the cohort is passionate, if most of the people are disinterested, no one spurs each other on. If you have a motivated group - you have rivalry, you have competition, you have also a lot of cross learning and peer to peer teaching. Everyone has strengths and weaknesses - when you have a population who is keen to improving each other. My cohort started night study group, in the night study group, we explored beyond the curriculum concepts."

GH: "What do mean by cohort, do you mean your class?"

RR: "The senior batch and my batch, even the senior batch came to interact with us. In our department, all three batches intermingled in night study sessions. Activities were initiated by student interest group, so we had game jam where - under a short period of time you made games based on a theme - students were partnering - from different levels - got to share experiences with one another. Some were good in music - they focused on it - you got very good results."

GH: "By cohort, you meant three levels of students - year 1 year 2 and year 3 - the passionate students."

RR: "You need someone to bounce off ideas and spur you on."

In the second segment (35:10 – 36:20), alumni ZI and JE further elaborated alumnus RR's view of the nature of positive influences of their respective student cohorts on their learning.

ZI: "I meant there was competition - the thing about us - the whole cohort encouraged to share different perspectives and ideas. We learnt a lot from our cohort - our seniors. Our seniors planned gatherings together with us, the year 1. We learn a lot."

GH: "(nod) Learn a lot from the senior and junior interaction. Anybody else want to add anything?"

JE: "Other than cohort - can have also some support programme. For my batch, we had learning support programme. After class, some seniors volunteered - opened classes to help those who wanted to improve more. They taught again those topics that we learnt in class and went through more tutorials."

GH: "This learning support was initiated by students?"

JE: "I think the teachers asked student to volunteers. The teachers were the ones conducting, and students also volunteered. If you had questions, you could ask."

Sub theme 1.5: curriculum related

From the alumni survey, there were 22 counts of alumni survey responses containing words, namely content (16) and curriculum (6). Most of the alumni survey responses were related to

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teaching and learning of content. My gut feel was that, to alumni, this sub theme might not be a key contextual factor that influenced ground practice. To elaborate, there was a reference that alluded to a curriculum that required students to learn on their own:

> "Overall, I think that the curriculum forces students to learn by themselves. However, I think that he best way to encourage lifelong learning Is to use their free time to learn something different." (Respondent 20180414-170705.356, alumni survey)

But it seemed to me that the influence of curriculum on learning was probably due to the choice of key pedagogies and learning contexts by the schools rather than the curriculum per se. In the polytechnic, project work and problem-based learning would require students to learn and apply knowledge on their own.

To extend the discussion, I agreed with the alumnus that student internship (a learning context) in workplaces was probably more suited to provide experiences for employment than the classroom learning:

> "Being adaptable could not be taught in normal curriculum and through the student internship, I had a chance to experience what the job and the workplace demands were like. I also learnt to be professional in my work through the internship." (Respondent 20180503-172211.161, alumni survey)

To end, it was true that curriculum decisions were made earlier to cultivate students' self-directed learning and prepare students for workplace as key learning outcomes. However, the main influences on ground practice here was probably due to the choices of key pedagogies and learning contexts rather than the curriculum per se.

(IV) Student preparation for skills mastery and lifelong learning

Questionnaire survey and interview data related to main themes 1 and 2 were analysed together because I took the position that what deemed to be desirable student profile by the polytechnic would find their ways into the student preparation programmes offered by the polytechnic or schools. Besides, I was drawn to the conception that quality in teaching, learning and assessment should 'transform' students.

Main theme 1: What student preparation for skills mastery and lifelong learning should entail?

From alumni survey, 66 counts of alumni responses containing these words: university/ studies (26), interest (21), research (16; excluding 2 counts from job title and survey item) and future (13).

Main Theme 2: Desired student profile fostered by quality practices

From the alumni survey, there were 29 counts of alumni responses containing these words: improve (20), mind (9; excluding 1 count from survey item). The word counts for various skills were described earlier.

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Sub theme 1.1: future oriented

The next three quotes from the survey clarified alumni placed premium on ground practices that prepared them for jobs and workplaces in the future.

> Quote 1: "More hands-on experiences and real-life scenarios that would better prepare the students for future work matters." (Respondent 20180430-105431.113, alumni survey)
>
> Quote 2: "By doing work that is closely related to the industry, I am able to understand the nature and demands of the industry." (Respondent 20180430-111128.494, alumni survey)
>
> Quote 3: "Being adaptable could not be taught in normal curriculum and through the student internship, I had a chance to experience what the job and the workplace demands were like. I also learnt to be professional in my work through the internship." (Respondent 20180503-172211.161, alumni survey)

I enclosed an excerpt of the interview transcript in support of this sub theme. Alumnus JE (56:24 – 57:39) shared about training received in a specialized facility in JE's school that prepared JE for the workplace.

> JE: "The training - you felt like you were working in the industry - what we needed to do during working. We learnt before - before starting maintenance of an [discipline specific machine] - we needed to find specific manual - we took whatever tools needed, and we do the maintenance of [discipline specific machine]."
>
> GH: "Whatever they trained you here is very similar to outside, very similar to the industry. Started honing your skills here, you felt good about it."
>
> JE: "Ya, some skills like [diploma specific skills] - need to hone. They taught us a bit - when I worked there - much easier to pick up these skills further."

Sub theme 1.2: interests of students

The next two quotes from alumni survey underscored the importance for schools and teaching staff to spur students' interests in terms of picking up new skills and pursuing their chosen fields of studies.

> Quote 1: "The school might need to encourage students to pick up new skills during their holidays to further equip themselves or at least introduce the concept of lifelong learning. This will prepare the students when they graduate and understand the value of life-long learning, even as an alumnus in the workforce. It will be useful to have industry-related talks or cross-disciplinary talks offered to all students at the start of the first semester in the final year. This might help spark interest in students to pick up a

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variety of skills, which can be an asset to have when looking for employment." (Respondent 20180503-172211.161, alumni survey)

Quote 2: "Encouraging student's willingness to learn. If the teacher is teaching a subject in a really boring manner, that doesn't encourage the students to keep pursuing this field of studies. Especially for hard majors like [name of diploma 1] and [name of diploma 2] where students have to be really eager to learn to succeed." (Respondent 20180502-164126.944, alumni survey)

During the interview, alumnus RR's motivation to pick up new skills was to remain employable in a fast-changing workplace. To do so, RR viewed that Singapore in general needed to emphasize more on lifelong learning than paper chase, as seen from the excerpt of the interview transcript (57:42 - 1:00:04) below.

RR: "It depends a lot on the specific domains. For [name of domain], I will say that there is less emphasis on skills mastery because, while in poly level, there is no way you can attain skills mastery. People need 10 to 15 years before they are proficient in [name of domain]. Also, the technology is changing too fast, even [discipline specific term] have different [discipline specific term], different schools of thoughts. For [name of domain] specifically, I think - the poly needs to emphasize is lifelong learning because when you developed skills in lifelong learning - you are equipped with the skills for lifelong learning - so that [name of domain] students can pick up technology on their own, outside in the workforce. You have more survivable graduates compared to the rest. If you learn an obsolete technology, by the time you graduate, no one uses that technology anymore - nobody wants you anymore."

GH: "You mentioned lifelong learning in terms of being able to pick up new skills."

RR: "Skills mastery is a bit hard <sic; difficult to attain> - it's really changing too fast - within a year, something can become obsolete."

GH: "Since you talk about lifelong learning, was the preparation by the school adequate? Is there anything more that your school can do?"

RR: "Not just the school, but Singapore in general - don't emphasized enough on lifelong learning. They focused a lot on getting that certification, getting that high score. After that, ok if high score - high scorers can go [name of university] - you can get hired by someone. In reality, it doesn't work out that way. I think the general population has this misconception - it's a paper chase."

GH: "I see, there was not much emphasis?"

RR: "Very little emphasis, that's why I said half the battle depends on the individual."

Sub theme 1.3: able to research for learning and work

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From alumni survey, 17 counts of alumni responses containing the word, research (16 excluding 2 count from survey item and job title). The next three quotes clarified the place of research for further learning and work preparation. Quote 1: "To me research skill is important as it allow me to research and learn more" (Respondent 20180404-211531.141, alumni survey). Quote 2: "In my workplace, before a meeting, we have to do our due diligence by researching and preparing for the materials that are needed to discuss during the meeting. Being responsible for preparation is important." (Respondent 20180304-220039.397, alumni survey). Quote 3: "In a marketing position, I'm required to conduct internet research on various topics, analysing social media trends, etc. The [name of] module helped me to conduct efficient researches online." (Respondent 20180306-124846.881, alumni survey) I concurred with the survey responses on the importance to be able to research for learning and work purposes. To me, lifelong learning and skills mastery would require one to research or find out more about the field of studies or skills. I did not prioritize this sub theme for further discussion in the interview.

I had initially planned to ask alumni for their suggestions of new Balanced Score Card (BSC) indicators for skills mastery and lifelong learning. Upon reflection, I decided not to do so because alumni interviewees were not be familiar with the BSC information in the polytechnic, but they could recall if school practices had indeed prepared them for skills mastery and lifelong learning in the workplaces. Hence, I refocused the interview to uncover their views related to the adequacy of student preparation for skills mastery and lifelong learning, as discussed above.

3. STAFF DATASET

a. Phase 5

As discussed earlier, the staff data comprised questionnaire survey data involving 150 staff respondents from schools A to E and four staff interviewees – one from schools A, B, C and D. I had selected only teaching staff without management responsibilities because, in my context, teaching staff might be more measured in their sharing in the presence of a management staff. Although I had invited one staff and a replacement from school E, neither was available for the group interview. Since the staff interviewees available for the group interview were from different disciplines and contexts, I went ahead with it. The staff data seemed rich, as seen the key themes presented below.

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(I) Teaching, learning and assessment practices judged to be of "quality" by staff
Main theme 1: key teaching practices that developed students' understanding of their chosen areas of studies

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From the staff survey, there were seventy-one counts of staff responses containing words: understand or understanding. I included the next nine staff quotes from the survey to highlight key examples of practices that helped and did not helped students to understand their subject content.

> Quote 1: "SIMPLIFY A CONCEPT, DELIVER IN A WAY STUDENTS CAN VISUALIZE/RELATE TO, THUS UNDERSTAND" (Respondent 20180301-091245.526, staff survey) <respondent provided feedback to all qualitative items in uppercase. I was unsure if the respondent meant to emphatic about it.>
>
> Quote 2: "Lecturers should always be prepared. He/she should have the end in mind and understand what the purpose of this training is." (Respondent 20180306-181132.423, staff survey)
>
> Quote 3: "IF students can understand the basic concepts, it will help them in their learning. No so much to depend on memory." (Respondent 20180305-124124.858, staff survey)
>
> Quote 4: "Quality in Teaching - Deliver in a manner that generates students' interest and makes them want to know more about the topics. Quality in Learning - Teaching practices which are up-to-date and practice by the industry with as much practical (hands-on) as possible. Quality in Assessment - Mini quiz after few lessons to check for students understanding. Students get the chance to solve real life problems and present to the class." (Respondent 20180305-140347.608, staff survey)
>
> Quote 5: "Increase the amount of hands-on which will help students remember and understand better." (Respondent 20180305-140347.608, staff survey)
>
> Quote 6: "Important to explain difficult concepts concisely so that students can understand; important to create a relaxed environment for their learning and provide encouragement during lessons; important to incorporate demo as part of the assessment in order to confirm their knowledge and understanding" (Respondent 20180511-120712.475, staff survey)
>
> Quote 7: "Staff demonstrates and subsequently get student to participate in the exercises also checking understanding of knowledge taught through test. The practise will help students internalise the content and have a strong understanding of the knowledge taught" (Respondent 20180420-093520.489, staff survey)
>
> Quote 8: "A lecturer may have a lot of industry experience and knowledge, but if he is unable to pass down this knowledge to his audience in a lecture, it is considered low quality teaching. A lecturer must be able to make his audience understand what he is trying to convey, no matter how complicated a theory is, he must know how to make the audience relate to it. A good assessment should be testing on application, and not

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memory. Students should never be given ""practise questions"" to prepare for exam, but we know that is impossible when they are trained in the ""10 years series"" era. That is why our workforce rely heavily on existing templates, with no innovation." (Respondent 20180420-103910.115, staff survey) Quote 9: "Approach student personally to check individual work and understanding, encourage and motivate them." (Respondent 20180420-100957.230, staff survey) Arising from the above staff quotes, key examples of helpful teaching practices suggested were: • Focus on students' understanding of basic concepts • Explain difficult concepts • Simplify concepts and theories so that students can relate to them • Demonstrate how to do certain exercises • Help students to visualise and relate to the learning materials • Generate students' interest about the topic • Encourage and motivate students in the course of teaching • Opportunities for hands-on practice to help students to better understand concepts In view of the survey data having seventy-one counts of staff responses containing words: understand or understanding, I did not explore this theme explicitly in the staff interview. To staff, they seemed to value teaching practices that focused on helping students to understand the subject better.
Main theme 2: key learning practices that supported students to develop understanding of their chosen areas of studies From the staff survey, there were 222 counts of staff responses with these words: apply/ application (95), self (37), provide (32), guide or guidance (20), opportunity or opportunities (20), peer or peers (12), and interaction or interactions (6). Sub theme 2.1: Students' guidance by staff Quote 1: "In my view, the teaching/learning practice is very much dependent on the content of the subject. For the quantitative subject, to help the student learn, you need to guide them step-by-step. For the qualitative subject, discussion and sharing of real-life experiences help the students to relate and understand better. For the more technical subject, being able to do hands-on will be useful to help students learn. Besides these, quality teaching requires the teacher to be physically present to facilitate the teaching & learning, being there to answer queries or doubts, asking prompting

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questions to get them thinking, giving a smile to encourage them - all which is absent in e-learning." (Respondent 20180227-091639.563, staff survey)

Quote 2: "Students are given space and time to consolidate and/or apply their learning with some supervision and guidance from the tutor." (Respondent 20180326-095235.599, staff survey)

Quote 3: "...Have smaller class sizes so that more individual attention can be given to students, especially the weaker ones." (Respondent 20180428-174910.193, staff survey)

Quote 4: "Face to face engagement with students in the classroom provides the best opportunity for students to clarify their doubts on the spot." (Respondent 20180331-103956.258, staff survey)

Quote 5: "Develop self-confidence and knowing where and what to source for solving problems on their own is a good quality trait to have. Feedback from the guided facilitated session provided suggestion for their improvement." (Respondent 20180420-084742.547, staff survey)

Sub theme 2.2: opportunities to learn from peers

In support of this sub theme, I included the next quote from staff survey to underscore the importance for staff to provide learning opportunities for students to develop understanding of a topic of interest. Class discussion, peer instruction and peer feedback are some of these opportunities to learn from peers.

Quote 1: "Facilitating class discussions. It allows for sharing and learning in a peer to peer environment." (Respondent 20180426-142607.57, staff survey)

Quote 2: "Students are able to solve PBL problems based on their independent research and peer teaching." (Respondent 20180227-094810.921, staff survey)

Quote3: "It is important for students to be able to provide objective feedback (assessment) to fellow peers in a group. In the workplace, it is all about working as a team and there is a need to learn how to provide objective and constructive feedback to fellow group members tactfully and truthfully." (Respondent 20180403-135731.11, staff survey)

Quote 4: "Students not only learn from lecturers, sometimes they learnt more by teaching their peers and it also allows them to retain the knowledge better and build up their confidence." (Respondent 20180504-165934.802, staff survey)

Sub theme 2.3: opportunities to develop knowledge, skills and attitudes

Staff elaborated that hands-on practice, real-life experience and practical assessments helped students to further develop their understanding of their chosen areas of studies. Staff

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emphasised the importance of going beyond knowledge to also develop students' skills and attitudes. I included the next 3 quotes from the staff survey to highlight their views.

> Quote 1: "Ability to apply the concepts in real-life situations/applications." (Respondent 20180324-232107.749, staff survey)
>
> Quote 2: "Learning enterprise. Students have the opportunity to apply what they have learned in a real-life working experience. (Respondent 20180326-090926.228, staff survey)
>
> Quote 3: "Quality in teaching can mean beyond the content delivery but to allow students to have an opportunity to experience 'actual learning' to happen in a [diploma specific facility]. Students can learn various values, attitudes and qualities while doing a project in addition to the knowledge. It is a mock-up environment of actual design studio in the industry and tutors' job is to integrate their knowledge and facilitate the studio for student to actually 'apply' and 'do' their work." (Respondent 20180423-093236.888, staff survey)

Sub theme 2.4: self-learning

To staff, it was important for students to be more self-reliant in learning, reflective about their learning, and self-directed in their own learning of the subject outside of the classroom. Self-learning would help students to continue to educate themselves for their current and future learning needs. In support of this sub theme, I included the next 6 quotes from the staff survey to underscore their views.

> Quote 1: "Self-learning skill. If students know how to learn, they will be able to go further after poly. (Respondent 20180328-180016.415, staff survey)
>
> Quote 2: "In their final year, we should introduce a subject that purely for SDL<or self-directed learning>. This will give them opportunity to learn by themselves, take their own responsibility." (Respondent 20180326-094231.703, staff survey)
>
> Quote 3: "Self-learning skill is useful to students as they can continue to educate themselves in the life-long journey of learning continuously." (Respondent 20180227-172604.532, staff survey)
>
> Quote 4: "When students are at school, we would like to prepare them for the future, so the ability to find and judge information is important so they can be a life-long learner. Another ability that is important is self-reflect. It is especially important to learn skills, because students learn better only when they know what to learn." (Respondent 20180306-181132.423, staff survey)
>
> Quote 5: "Students need to be trained to be independent, resourceful and self-reliant in looking for solutions to a certain problem/issue. These skills will help them later on,

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when they are in working in the industry - employees much sought after as they will become effective problem solvers." (Respondent 20180324-232107.749, staff survey) Quote 6: "Student achieve the capability and confidence in the subject and to be self-directed in their own learning of the subject outside of the classroom." (Respondent 20180420-093302.207, staff survey) This main theme was not explored explicitly in the staff interview, but I planned to do so during staff interview to understand their views and experiences regarding quality learning practices for students.
Main theme 3: key assessment practices that developed students' understanding of their chosen areas of studies From the staff survey, there were 153 counts of staff responses containing these words: apply or application (95), improve (21), feedback (25) and check (12). Sub theme 3.1: regular and useful feedback The next three quotes from the staff survey underscore the importance for staff to provide regular feedback for students to improve their works, which further developed students' understanding of the subject. Quote 1: "Ensuring feedback on student understanding. Otherwise, you may not understand whether the student has indeed learnt." (Respondent20180228-160455.549, staff survey) Quote 2: "1. Teaching is not one-way direction. we should stimulate a platform that students will have interaction with us and their peers as much as they can during class. 2. Formative assessment is the key. When student get back the feedback from us that is the way that they will learn from their mistake." (Respondent 20180326-094231.703, staff survey) Quote 3: "We teach students how to learn new subjects. We teach students active learning, work together and solve problems. We feedback to students the grade and mistakes. We teach the students how to improve." (Respondent 20180227-094801.702, staff survey) Sub theme 3.2: appropriate check points The idea of checkpoints or checking for students' understanding was evident in the next five quotes from staff survey. Quote 1: "Checking of the understanding of students during lecture" (Respondent 20180227-091316.169, staff survey)

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Quote 2: "Quality in teaching means delivering the content and skills in ways that enable students' learning; quality in learning practice again focuses on the learner and how the tutor is able to engage the learner to learn well and apply the skills. This may mean more time outside of class to check on learning. Quality in assessment practices has a little to do with learning practices as well. These go together. We monitor and check the learning to ensure that there's understanding. We test to check understanding and application. Ensuring that assessment practices are appropriate to the learning is also important." (Respondent 20180227-093516.43, student survey)

Quote 3: "Staff demonstrates and subsequently get student to participate in the exercises also checking understanding of knowledge taught through test…" (Respondent 20180420-093520.489, staff survey)

Quote 4: "Approach student personally to check individual work and understanding, encourage and motivate them." (Respondent 20180420-100957.230, staff survey)

Quote 5: "There is a framework guiding how lessons should be conducted, but yet not too rigid. There are opportunities for the learner to learn on their own under the guidance of the tutor. The learners will be prepared for the assessments if checkpoints are well-placed in the course of learning." (Respondent 20180427-150848.589, staff survey)

I did not explore this theme further during the staff interview and plan to do so during staff interview to understand views and experiences of staff regarding quality assessment practices. For staff, they seemed to value assessment practices that checked for and promoted students' understanding and application of the subject knowledge.

(II) Categories of skills, deepened by key learning contexts, that were judged to be most useful to students

Main theme 1: most important skills deepened by key learning contexts in the polytechnic

The teaching approaches and learning contexts stated in Q4 of the staff survey were problem-based learning, e-learning, skill-based practicum (eg. culinary, prototyping etc), student internship and project work.

Sub theme 1.1: What are these skills?

Since staff cited many different skills in the staff survey, I had listed only skills with double digit word counts (within brackets), namely specific domain skills (22), hands-on skills (17), non-specified technical skills (16), problem solving skills (16), project work skills (15), team/interpersonal skills (10) and independent/ self-directed learning (10).

Sub theme 1.2: Why are these skills important?

From the staff survey, I had broadly categorised staff members' reasons in three areas:

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- Skills for work
- Skills for future
- Skills for studies and further studies

To give a sense of the prevalence of the reasons, there were 171 counts of responses from staff survey containing these words: work (139), future (18) and studies (14).

It seemed to be a prevalent view amongst staff that developing skills for work would be most useful for students. The teaching approaches and learning contexts, taken collectively had supported the development of these skills amongst students. I was not surprised that staff viewed domain specific skills, hands-on skills, technical skills, problem-solving skills and project work skills ranked highly given the focus of skills-based training, project work and problem-based learning in the curriculum. To me, it would be interesting to compare the list of highly ranked skills from staff, student and alumni surveys, as such I did not explore this theme further during interview sessions.

(III) Contextual factors that influenced conceptions of quality and practices on the ground

Main theme 1: what are the contextual factors and how they influenced conceptions of quality and/ or practices on the ground?

Sub theme 1.1: curriculum related

From staff survey, there were 32 counts of student responses containing these words: content (28) and curriculum (4). I included the next two quotes from the staff survey to clarify the influence of curriculum-related contextual factor on ground practices. The survey respondents opined that curriculum should not be too packed or try to cover too much so that there could be time for deeper student engagement and learning.

> Quote 1: "MUST NOT PACK TOO MUCH INTO THE SYLLABUS. GIVE ADEQUATE TIME TO ENGAGE ON A TOPIC AT DIFFERENT LEVELS SO THAT DEEP LEARNING CAN OCCUR. NOT JUST A SUPERFICIAL BRUSH WITH A TOPIC" (Respondent 20180301-091245.526, staff survey)
>
> <The respondent provided all his/ her responses in the open-ended survey items in uppercase, I was unsure if the respondent meant to be emphatic about it.>
>
> Quote 2: "Quality does not equate to extensive coverage but rather coverage that establishes foundation of a subject. Through a deep understanding of it, students are able to apply learning to various contexts." (Respondent 20180420-112353.472, staff survey)

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During the staff interview, staff II shared about the challenge of keeping the curriculum updated in the light of fast changing educational landscape and industry practices as seen from the excerpt of the interview transcript (5:10 – 6:46) below:

> "…If we are looking at curriculum per se, quality would really include our ability to be able to keep our curriculum really updated. The rate things are changing now, the educational landscape has changed, even industry practices, industry landscapes across many industries, not just business. It does necessitate for us to be mindful of how updated our curriculum is, because that will impact the quality, at least in terms of equipping of technical competency. That's is related to updated curriculum as well."

That said, staff shared about meeting or achieving the learning objectives in the lessons in staff survey as seen in the next three quotes.

> Quote 3: "Quality is achieved when students achieve the learning objectives and are able to retain and apply knowledge learned in real work situations." (Respondent 20180428-174910.193, staff survey)
>
> Quote 4: "The learning objective is met well." (Respondent 20180328-180016.415, staff survey)
>
> Quote 5: "Quality means to deliver the lesson in a way that will facilitate the students understanding of the learning objectives and outcome." (Respondent 20180227-112551.559, staff survey)

Sub theme 1.2: key teaching approaches and learning contexts related

The extent to which various teaching approaches and learning contexts deepened students' skills presented in percentages from the staff survey were included here for easy reference:

- Project work (98%)
- Skill-based practicum (96%)
- Student internship (92%)
- PBL (78%)
- E-learning (45%)

The qualitative data from staff questionnaire survey and interview clarified further why the e-learning percentage was marked lower than other teaching approaches and learning contexts. There are few qualitative responses in the staff survey related to eLearning, a staff surfaced his/ her reservation for more eLearning in view of students' readiness for e-learning as seen below:

> I think we need to emphasize less e-learning because 1) students lack the discipline to take their e-learning seriously 2) students' feedback that they prefer face-to-face 3)

> doubts and queries get answered right away during face-to-face. (Respondent 20180227-091639.563, staff survey)

To clarify this sub theme further during the staff interview, and staff participants surfaced two related implementation issues that could have led to fewer staff survey respondents giving 'strongly agreed' or 'agreed' ratings that eLearning deepened students' skills, as compared to other teaching approaches and learning contexts. The first implementation issue: more time and effort to design "good" eLearning, as opined by staff MK (23:42 – 25:00):

> "Perhaps, it has to do with the way it was delivered. As what PP <another interview participant> had said, it takes time and effort to do good eLearning. It is minimum effort, for example if I just read from the slides, published it without explanation – just wholesale it to free up my hours. <Good> eLearning can be something that you put video, animation, you ask question to check understanding, after that you give feedback, then you give another video, and you do something else. To have the tutor presence felt online is very important to students as well, you do a number of things. I think that with a sound pedagogy in mind to design the eLearning, <the percentage> will definitely go up."

The second implementation issue: more resources to design "interactive and engaging" eLearning alluded by staff II, as seen from the excerpt of the interview transcript from (25:01 – 26:54):

> "I do agree. Our students are really, we think they are savvy, but they are only savvy for social network tools. When it comes to education tools, they may really not be as savvy as we have thought they would be. Our students now, they really do appreciate the ability for them to interact. When we talk about quality eLearning type of materials, the level of interaction cannot be just a set of audio-notes uploaded, that is zero interaction. And so, when learners, our adult learners were to be confronted with a set of audio-notes as well, they will not find the level of engagement, they would think that eLearning is not meaningful. It really boils down to, I think to the eLearning resource: the ability to put in the teachers' presence, the ability to put in interactivity and engagement, the ability to help students to understand what they are doing like the amount of feedback given. So, eLearning itself is <u>again</u> a good pedagogical approach, really, it is own target own time, it is self-paced, it appears to be the direction to go. <u>Again</u>, it comes down to implementation."

To end, the interview data seemed to suggest a lack of resources (time, effort and ability of staff) for staff to design engaging and interactive eLearning, and it could have influenced their views regarding the extent to which eLearning deepened students' skills. As discussed earlier, there was also staff's reservation about students' readiness for more eLearning, although staff in the interview were generally in favour of eLearning for students.

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Sub theme 1.3: assessment related

From staff survey, there were 104 counts of staff responses containing these words: assessment (93; excluded 4 counts of the words found in survey question stems), tests (6), quiz (3), exams (2). For some of the schools in the polytechnic, students would need to sit for a final written examination paper. I included the next six quotes from the staff survey seemed to suggest a view amongst staff that more assessments should emphasize more on application and understanding of knowledge, and less on memorisation to pass the examination. The weightage of the final examination could also be reduced for more skills and hands-on assessments.

> Quote 1: "... A good assessment should be testing on application, and not memory. Students should never be given ""practise questions"" to prepare for exam, but we know that is impossible when they are trained in the ""10 years series"" era. That is why our workforce rely heavily on existing templates, with no innovation." (Respondent 20180420-103910.115, staff survey)
>
> Quote 2: "...Lastly, assessment practices need to focus more on the skillsets, and how the students are able to apply the knowledge and skills learnt, rather than their ability to memorise and regurgitate what they have been taught." (Respondent 20180427-142817.505, staff survey)
>
> Quote 3: "...Quality learning is when students can understand and apply the concepts learned not just for the purpose of passing exams but also for future work. Quality assessments should be able to ascertain the amount of student's understanding of the breadth and depth of the subject matter. In the case of practical skills, assessment should also include whether students take into consideration safety aspects of the practical work." (Respondent 20180305-142844.886, staff survey)
>
> Quote 4: "Assessment of hands-on skills is not adequate for now." (Respondent 20180420-130928.625, staff survey)
>
> Quote 5: "Would be good to implement what [School Director] has been advocating - pass/fail for initial theorical assessment, grade them on skills subsequently." (Respondent 20180227-111045.504, staff survey)
>
> Quote 6: "I suggest to put less weightage on final exams and term tests. we must take serious to students' assignments and projects. The formative assessments could help students learn more, and the final exams like a closing huge door would eliminate the knowledge from their minds." (Respondent 20180227-120520.400, staff survey)

In view of the high number of responses related to assessment from staff survey, I had not explored this sub theme explicitly during the staff interview.

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Sub theme 1.4: staff related

From staff survey, there were 43 counts of staff responses containing these words: lecturer (17) and staff (26; excluding 2 counts from survey items). Respondents in the staff survey alluded to passionate or caring staff, active professionals, knowledgeable staff, domain experts who would positively influence quality practices on the ground.

> Quote 1: "...I think being genuinely concern for students could be an important point that is overlooked. Majority of people responds well to people who cares for them, doesn't have to be nice guy type. I think it's just plain human nature." (Respondent 20180329-134636.887, staff survey)
>
> Quote 2: "...From what I read the students need three types of teacher, the one that introduces a love of the topic, after that a teacher that utilises this love to harness basic ability, and the third teacher spurs motivation by the student to do more than the basic requirements based on specific interest points that the student wishes to develop and flourish in individually. The Poly should focus on the first. However, if we try to do all in Poly we might just nip any chance of development in the bud." (Respondent 20180325-185538.200, staff survey)
>
> Quote 3: "... Probably learning Journey or even a short experiential camp which related to the subject/topic by experts." (Respondent 20180328-165846.464, staff survey)
>
> Quote 4: "...Use our expertise to develop skills and knowledge in students and to support sustainable progress. Provide feedback to help students build confidence." (Respondent 20180325-223438.122, staff survey)
>
> Quote 5: "Teacher themselves are industry practitioners who have the know-how and life-long learning spirit, that will be a good role model for our students." (Respondent 20180507-155547.544, staff survey)

Next, I included three excerpts of the interview transcript where staff interviewees elaborated on how and why some staff could make a difference to student learning in a classroom. Staff PP (2:35) was not in favour of staff who read from his/ her presentation slides, and contrasted this teaching practice with other examples, as seen below:

> "If a staff reads from the <presentation> slides, you can see that it's different from a staff who elaborates, gives example, makes the room, makes the class excited about the topic, and motivates them to want to learn more and crave to learn more. You can see the two drastic difference between these two staff."

In support of staff PP's view, staff MK (3:40) shared about the pivotal role that teaching staff played in the classroom and lecture setting:

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> "Whatever they do, it influences the student learning. It either brings life to the subjects or just monotonous, not too sure will students understand or be interested in the subject."

Staff MK (4:30) further elaborated how a staff could bring life to a subject:

> "The staff, for a topic, brings in contextual learning – it means why is it relevant, why do we need to learn this, why is it important to learn the topic, how can you apply it, how do you relate it to the industry <practices>. There are things that bring life to the subject."

To sum it up, staff OO (8:07) underscored the importance of how staff viewed his/ her job influenced their teaching practices:

> "…It depends on whether staff will think of it as just another job, I'm just doing it. Am I here shaping the welfare of my students in the future? It varies because they are different people who <view> this is just a job – I do this, I carry out and I go home. <To others,> I'm training the students – I'm training them for a better future. That's why it will vary."

During the interview, staff interviews shared about two other sub themes, namely management related, and cohort related contextual factors that would influence quality practices on the ground, which were not surfaced from the staff survey would be elaborated in sub themes 1.5 and 1.6.

Sub theme 1.5: management related (new)

Staff spoke about management's focus being a key contextual factor here, as seen from excerpts of the interview transcript. Staff OO and PP (16:58 -20:23) shared about the loop-sided focus of the School Management on industry projects as compared to teaching practices because industry projects were viewed by management to be more glamorous or in short form, 'glam' as seen from the excerpt of the interview transcript.

> OO: "…In fact, it is an un-written policy that your teaching has to be up a certain mark, beyond that it really doesn't matter, you reach the mark, which is you show up for class, your survey results are ok, that's fine already. Beyond that, there is no motivation actually. The management tends to push more on how successful your project are – other factors which are more measurable, which bring more, not sure what to say"
>
> PP: "More 'glam' (laugh)"
>
> OO: "More 'glam', glamorous to the thing. Unfortunately, teaching is not something that brings glam to the school, it is one of those things that gets forgotten."

Although there was focus from the Management to promote quality teaching in terms of teaching awards, staff PP cited the number of photographs and memorandum of

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understanding (MOU) as a proxy indicator of management's focus that emphasised on projects over teaching practices:

> "So many photos and so many MOUs being signed <for projects> versus maybe 3 to 5 photos in a year on teaching awards. So, I agree with OO in the sense of the balance and the focus – it is not because we defocus it, we do – it is not given as much emphasis as it should be because we are an education institution."

Sub theme 1.6: cohort-related (new)

Staff OO (9:11) shared about student cohort with higher aggregate scores (i.e. with poorer GCE 'O' subject scores) having more attitude problems and not showing up for classes, as seen from the excerpt of the interview. Staff OO underscored the need of caring staff and Care Person (i.e. staff mentor) for students, which was earlier discussed in the segment under staff-related contextual factor.

> OO: "For example, [name of school] is a bit at the bottom side, it is actually at the bottom [laugh] in getting students. We have a lot of students with attitude problems."
>
> GH: "Bottom as in, attracting the…"
>
> OO: "Our cut-off point is twenty something for most of our students."
>
> GH: "The <Cambridge General Certificate of Education Ordinary Level > "O" level cut-off point is high."
>
> OO: "We are getting generally weaker students. You can see that for some staff, when students do not show up for class, they could write email to Care Person that this person has not shown up for class. This caring part about the students, the staff worry for the students."
>
> GH: "When staff care for the students, it is a mark of quality."
>
> OO: "Yeah, I mean they are not obliged to inform the Care Person, but it depends on whether Care Person would act on the students and talk to students."

The sub theme on cohort related contextual factor was also highlighted during alumni interview, which I would discuss later when I discuss key themes from student, alumni and staff thematic analyses in phase 6.

(IV) Student preparation for skills mastery and lifelong learning

I proposed two different themes: what student preparation for skills mastery and lifelong learning should entail? What desired student profile were fostered by quality practices? I analysed these themes together because I took the position that what deemed to be desirable student profile by the polytechnic would find their ways into the student preparation programmes offered by the polytechnic or schools. As mentioned in the student and alumni

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thematic analyses, I was drawn to the conception of quality in teaching, learning and assessment that 'transformed' students and I would continue to uncover what staff had to say about it in the survey and interview.

For the theme – what student preparation for skills mastery and lifelong learning should entail? – there were 90 counts of staff responses containing these words from staff survey: interest (23), research (21; excluding 2 counts from name of diploma team/ section and survey item), future (18), university/ studies (15), mistake (6), role model/ mentor (5) and habit (2).

For the theme – what desired student profile were fostered by quality practices? – there were 44 counts of staff responses containing these words from staff survey: improve (21), confidence or confident (12), mind (9; excluding 1 count from survey item) and curious or curiosity (2).

From the staff survey, the following aspects could be considered:

- Cultivating mindset/ belief/ habit of students that believe in deepening their knowledge and skills for now and future;
- Enabling students to research/ learn by themselves for now and future; and
- Nurturing subject interests and curiosity of students for now and future.

The first two quotes gave focus to cultivating mindset/ belief/ habits amongst students that believe in deepening their knowledge and skills for now and future.

> Quote 1: "Positive nurturing consultation and feedback without hurting the feeling and without judging the students' ability limits, focus on encouraging growth mindsets." (Respondent 20180325-185538.200, staff survey)
>
> Quote 2: "I think the school is exposing students to different pedagogy, e.g. PBL, SDL etc. It is a good start to inculcating lifelong learning habits in students. Skills mastery requires SDL, constant practice and passion. It requires students to be motivated." (Respondent 20180325-230258.560, staff survey)

It was important that staff helped students to grow in the mindset of not being afraid of making mistakes while learning as seen in next two quotes.

> Quote 3: "It is when we allow the student to make mistakes and correct his or her own mistakes while learning. Under assessment, there must be ample time before the test to allow the student to learn at his or her own pace so as to allow the student to truly take ownership of the work produced. Learning in theory cannot be defined by a test but by the many small lessons" (Respondent 20180427-084532.541, staff survey)
>
> Quote 4: "Provides most immediate platform for students to apply what they have learnt in class. This helps to consolidate their learning, and also to deepen their understanding of their diploma. As the saying goes, we learn best by doing. It also

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provides a safe environment for students to make mistakes and learn from these mistakes." (Respondent 20180404-094112.560, staff survey)

The next two quotes alluded to the importance to enabling students to research and learn by themselves as lifelong skills for now and future.

Quote 5: "Research skill is needed to explore beyond what is being taught in class and have deeper understand of the subject contents. Therefore, students are able to contribute positively and significantly to their project or work. That will bring them to a higher height in terms of learning and grades. This skill is a lifelong learning skill that one should have even one is no longer studying." (Respondent 20180227-083924.278, staff survey)

Quote 6: "...Once you are in the practicum situation, when things don't go smoothly (which is reality), you have to fix it. And if there are other knowledge-gap that arises, then learn it on your own (just search for it on the web and student would be on the path for self-directed learning)" (Respondent 20180329-134636.887, staff survey)

The following three quotes underscored the importance to nurture students' interests and curiosity in subject matter for now and future.

Quote 7: "When the lessons are interesting, students will start to explore and learn by themselves. If not, they would start to lose interest in the subject contents and finally would not learn well." (Respondent 20180305-164923.365, staff survey)

Quote 8: "Projects which allow them to explore their capability and interest." (Respondent 20180420-130549.592, staff survey)

Quote 9: "The learner: gains interest in a particular field that provides more sustained motivation; gains knowledge; and gains skill" (Respondent 20180523-151033.435, staff survey)

Next, I included three quotes highlighted the importance to prepare students to be future-oriented, and therefore, a need to keep up with learning.

Quote 10: "With the dynamic changes in our working environment, it would be more useful and meaningful to develop life skills in our learners. Learners with strong life skill sets are likely to respond positively to changes around and ahead of them. It would suffice for us to equip our students with foundation knowledge of their selected curriculum at polytechnic level. With the rapid speed at how things around us are changing, any deepening of technical or domain skills would have to be picked up along the different stages of a learner's life. Hence, if they have sound life skills like being self-directed learners or resilience, they would be more aware of the need to keep abreast of

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times, less fearful of uncertainties and changes and be more open to the need to be lifelong learners." (Respondent 20180328-140743.704, staff survey)

Quote 11: "Interns/graduates from our diploma are expected by the future employers to relate, perform and contribute. Our interns are expected not to land up in company just to take in instructions and perform routine tasks. They have to be team player, to relate and apply, learn fast, do and contribute to the team. To do this, they need both knowledge and skills." (Respondent 20180227-092418.121, staff survey)

Quote 12: "In the real life, our graduates will encounter many problems they never dealt with at school before. If they have the problem-solving skill, they will be able to solve all kinds of problems they would meet in the future." (Respondent 20180305-164923.365, staff survey)

Next, there was a view that teaching staff could be mentors and models to students in their journey for skills mastery and lifelong learning to motivate students to do likewise, as seen from the following three quotes.

Quote 13: "Teacher themselves are industry practitioners who have the know-how and life-long learning spirit - that will be a good role model for our students." (Respondent 20180507-155547.544, staff survey)

Quote 14: "Mentor to student procedure that is engaging. Opportunities to make mistakes and to correct them. Also, to ask questions anytime when in doubt. (Respondent 20180326-090547.547, staff survey)

Quote 15: "Good student engagement, motivate self-directed learning in students, to promote lifelong learning where they can learn, unlearn and relearn new things even after they graduate. Use our expertise to develop skills and knowledge in students and to support sustainable progress. Provide feedback to help students build confidence." (Respondent 20180325-223438.122, staff survey)

Next, I enclosed some excerpts from interview transcript in support of the conception of quality that emphasized transforming or changing students positively in terms of their behaviours, interests, curiosity and motivation to learn for now and future. Excerpt 1 (34:05) unpacked what transforming students meant to staff interviewees. The changes in students could be industry-related (e.g. having certain skillsets); academic-related (e.g. improving subject performance) and non-academic related (e.g. showing more empathy for special needs students).

MK: "Can I just clarify? Transform means it meets the outcomes in the industry?"

GH: "As in that the students are changed because of the education they received here."

II: "They have grown more mature."

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GH: "Yes, for example, they become more mature."

PP: "Not necessary in academic sense"

GH: "Need not be"

II: "They show more empathy for students around them, now that we take in more special needs students, they are more sensitive with students around them."

PP: "That's definitely be a sign of quality."

Excerpt 2 (36:22) suggested a change of students' behaviours after experiencing the workplaces through internships. The behavioural change was described in terms of being more sensitive in handling interpersonal relationship and becoming more polite in making requests.

MK: "For year 3, our student internship program is not at <semester> 3.2 but parked between 3.1 and ended between 3.2. So, we have a few weeks to observe the students before and after internship programme, they have matured a lot. In terms of thinking wise, they are more matured. Their behaviour changed in the classroom as well."

GH: "Behaviour changed, thinking wise changed"

II: "Maybe we can send them out in <semester> 1.1"

All: (Laugh)

GH: "Send them out early"

II: "Even before we equip them with anything, let them go out, try a few weeks, then they appreciate (laugh)."

GH: "When you mentioned that their thinking changed, could you give me some examples what you mean by that?"

MK: "Thinking changed because they have gone to the real world, they know how it functions. In terms of request wise, they become more polite (laugh)."

GH: "Wow, more polite in their request of tutors."

II: "More sensitive also, really in terms of the interpersonal relationship, the ability to be able to relate with people appropriately, really, they do."

From the excerpt 2, it was unclear about how students' thinking had changed, except that they had more matured after experiencing the real world during their internship. Nonetheless, being more adapt in handling interpersonal relationship, which is non-academic related aspect of student preparation, would be helpful for students now and future.

Refined Level 2 themes

Staff II elaborated (41:03) on non-academic related changes in students, namely self-awareness, coping with uncertainty, resilience and lifelong learning as being important attributes to foster during student preparation:

> "…A diploma is not going to make them a good [name of occupation] and I would have deemed that I have done a good job, if my student, even if this student does not end up as [name of occupation] but this student has skills that, for example, the self-awareness, the ability to be resilient, under the resilience and all of that. We are preparing not just for work per se but transforming them would also mean helping them to change their mindset, helping them to cope with uncertainty for example, helping them to be comfortable with not being the best all the time. So, for me, I have said a little bit even if this student does not end up as [name of occupation], does not end up being as [name of occupation]. If he or she is able to walk out there, know that it's ok to fail and to try. And student, this graduate knows the importance of lifelong learning, it sounds corny thing, it's truly is important. So, for me, I think, we would have already done a good job. It's not just the technical part of it."

On the other hand, not all staff interviewees agreed with the transformation point of view discussed above. Staff OO found it to very challenging to transform students who lacked interest and technical skills for a profession, as seen excerpts 3 and 4 below. It seemed to me that staff OO was more concerned about academic-related and industry-related aspects here.

Excerpt 3 (35:57)

> OO: "Transform? (..)"
>
> GH: "You can also disagree."
>
> OO: "I think (..) specifically to the school of [school name], it is very difficult part, more than any other schools because of this current situation. The problem is we are getting, for most of the time, students who are not interested in [name of discipline]. We have become the dumping ground. Now, it comes to a complicated problem, a whole bunch of students - they want to get a diploma, but they have zero interest in [name of discipline]. So, what can you do about it from the transformation point of view? To transform them to become [name of occupation]? You realised they are here because they get <GCE 'O' grade> C6 for science – you expect to be [name of occupation] – C6 in science and C6 in maths? You expect to be [name of occupation]? Transform them to become [name of occupation] that will be a lot more (.) almost an impossible challenge."

Excerpt (43:51)

> GH: "OO, do they improve in the technical part?"

Refined Level 2 themes

OO: "Not really."

GH: "Ok, for your students, it's challenging just to focus on the technical portion of the skill."

OO: "I mean they are generally there because they are poor academically. They are now in the most demanding[laugh] diploma around, it is a complete mismatch. When you talk about quality, how do you define quality? Train this people for this job?"

To end, there are clearly different views amongst staff interviewees on transforming students through the education they received in the polytechnic. My thesis asserts that different views of quality will find their ways to influence ground practices, and in this instance, student preparation for skills mastery and lifelong learning. To me, both industries related, and non-academic related aspects of student preparation will continue to be important for now and future. The place of academic-related aspect cannot be underestimated during job interview or university admission exercise, although societal value in placing high premium on academic performance is slowly shifting in the light of the SkillsFuture policy in Singapore.

From the quantitative survey data, it was interesting for me to understand why 23% to 33% of staff respondents judged that they were "somewhat adequate" prepared for skills mastery and lifelong learning? (A possible main theme 3). I pursued the main theme 3 further during staff interview to understand what school might need to emphasize more to prepare students for lifelong learning and skills mastery. From the interview, staff offered various suggestions to better prepare students for lifelong learning, as seen in the next few quotes.

Staff MK (48:56) opined that schools could inculcate the value and skills for lifelong learning:

"I come from another point of view, how does school prepare students for lifelong learning, in terms of value, in terms of economy that currently, there are changes, for the AI and technology changes, might impact on the way we learn, the lifelong learning because what they learn in these three years might change for the next three years. In terms of the skills for lifelong learning, perhaps the lecturer can help in inculcating the value to students, to tell more facts, to tell them how to cope with the changes."

Next, some staff alluded to staff to model in their journey of lifelong learning as seen from an excerpt of the interview transcript (50:03).

MK: "I'm saying about value; we can tell them about the value. It would be good if tutor can draw out his own personal experience, what OO said about the microlearning course, you have done it, presenting <yourself as> an example of a lifelong learner whom the students can look up too."

GH: "So, the modelling to be the lifelong learner"

All: (laugh)

Refined Level 2 themes

> II: "I was about to say that, if you think of it as a formal structure, it becomes another, you know <template>. Really, students learn through modelling, we do not have to necessarily share that I'm doing this certificate but say that I'm learning. Those teaching moments in class, I'm learning from my students, I'm learning from my students too, and when those opportunities arise, I can say, hey, I learn from you, I'm learning every day. They see through modelling."

From the interview, staff also offered various suggestions to better prepare students for skills mastery, as seen in the next few quotes.

Staff MK (53:34) shared about mastery of basic skillsets needed by the industry:

> "I'm thinking of, skills mastery as in mastery the basic skills in terms of lab techniques in [name of school]. The basic skills must be good, for example [name of discipline specific technique]. These are the basic skills that once you have acquired it, you can do other applications. That should the basic requirement for a [name of discipline], a [name of diploma course] student should have. So, skills mastery, school can focus on basic skills, make sure that they attain that requirement, that standard so that when they go out to industry, they require pipetting, you know that TP students have no problem in this."

Staff OO (54:45) urged schools to overcome challenges in preparing students for skills mastery needed in their vocations rather than subject grade A, as seen from the excerpt below.

> OO: "For myself, I have one of the challenges, students view polytechnic as an extension of secondary school, for academic purpose, not seen as training for job. So, the skills mastery part is bit dodgy because they are just wondering – I need to master the skill so that I can get an A for the paper, and not because I want to master the skill, truly master the skill. So, I need to do this to get an A; if I don't do this, I don't get an A. But this part is not graded, I still need to do it well, that's the part we experienced, that's one of the challenges that we do not do well yet."
>
> GH: "You are sharing about skills mastery beyond the grade A."
>
> OO: "Yes, it's part of their vocation."

Staff PP (56:15) underscored the importance for schools not to discourage students along their journey by managing the number of skills for skills mastery:

> "We cover the right number of skills, but each one, don't get too deep. If you get too deep meaning you have to spend a lot of time on it – students get affected; some of them get discouraged. In the second year, in your <specialised> area – you emphasize, I think it is fine. Our diploma structure – first year generic; in second year, you focus on an area. If you are in [name of discipline], then you focus on block chain all that stuff, then in third year, you go deeper before going out for attachment."

Next, I had not included a segment of the staff interview that dealt with perceptions of staff interviewees regarding adequacy of current indicators in the Balanced Score Card (BSC) for lifelong learning or skills mastery in the above thematic analysis. I would refer to this segment of the staff interview again when I discussed the development of quality indicators based on interview data with senior management in the polytechnic.

For now, I observed that staff could share much about current practices related to students' preparation for lifelong and skills mastery. They offered suggestions to enhance current practices, as seen from the analysis above. The interviewees seemed less familiar in relating ground practices to current BSC indicators. Staff interviewees identified the indicators, namely the graduate employment rate, the SIP performance rating, the number of industry certifications as proxy indicators for students' attainment of certain level of skills mastery for internship and employment. They also identified the (school specific) indicators, namely the number of students participating in international, national and TP level competitions was proxy indicator related to lifelong learning of students beyond their curriculum. I excluded a suggested proxy indicator for lifelong learning, CET number because it was beyond the scope of my thesis to investigate quality indicators for adult learners.

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