Blended Learning - the New Normal at Institutions of Higher Learning:

A Case Study from Singapore

Ganthimathi Viswanathan

Bachelor of Science (Computing) (Hons)

Master of Science (IS)

Master of Education

This thesis is presented in partial fulfilment of the requirements for the degree of Doctor of Education of The University of Western Australia

Graduate School of Education

2021

THESIS DECLARATION

I, Ganthimathi Viswanathan, certify that:

This thesis has been substantially accomplished during enrolment in the degree.

This thesis does not contain material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution.

In the future, no part of this thesis will be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of The University of Western Australia and where applicable, any partner institution responsible for the joint-award of this degree.

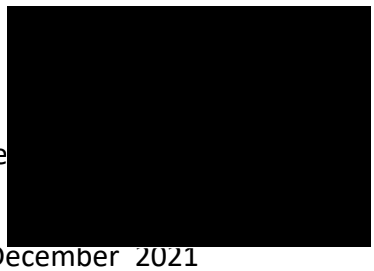
This thesis does not contain any material previously published or written by another person, except where due reference has been made in the text and, where relevant, in the Authorship Declaration that follows.

This thesis does not violate or infringe any copyright, trademark, patent, or other rights whatsoever of any person.

The research involving human data reported in this thesis was assessed and approved by The University of Western Australia Human Research Ethics Committee. Approval #: RA/4/20/5481

The following approvals were obtained prior to commencing the relevant work described in this thesis: Approval from the site institution's Internal Review Board

This thesis contains published work some of which has been co-authored.

Signature 

Date: 1 December 2021

ABSTRACT

Blended learning (BL) integrates on-campus (F2F) and online learning (OL) experiences and reflects the new normal in post pandemic educational landscapes. Pre-COVID, many brick-and-mortar institutions of higher learning (IHLs) adopted largely voluntary, mostly supplementary, interest driven approaches to BL implementation, resulting in pockets of innovation. Lecturers play the pivotal role in implementing BL. The new urgency for remote teaching caused by COVID-19 has propelled institutions worldwide to accelerate BL adoption. Successful and sustainable institution-wide BL implementation requires an in-depth understanding of lecturers' BL perspectives. This timely study presents the perspectives of lecturers at one Singapore IHL, as they adopted and adapted to a pre-COVID institution wide BL initiative and eventually OL Emergency Response Teaching (ERT) due to COVID.

The Online Learning initiative (OLi) was introduced in 2016 to leverage on BL to encourage self-directed learning skills and develop work-ready, digitally competent graduates. Concurrently, to ensure quality and sustainability, the OLi undertook to equip lecturers with skills to design and facilitate learning in BL environments through a phased three -year implementation plan. From 2019, all students experienced at least 7 profession specific courses online, with six at 25% and one at 100% fully online, during their three-year diploma program. This gradualist approach was hijacked in March 2020 by the national requirement to deliver all teaching and learning completely online.

This thesis presents a collective case study of the perspectives of twenty three experienced lecturers on their adoption and adaption to BL at the IHL research site. Teaching experiences of participants in this study ranged between seven and thirty-four years across thirteen national skills domain areas. Being part of the initial OLi phase, these participants had the most BL experiences at the site. Data collection

commenced in November 2019 and continued through the widespread COVID-19 outbreak from late February 2020 onwards. The timing was opportune. Data collection methods included pre and post-COVID interviews and verification, as well as examples of curricular materials and innovations.

What emerged from the data were five distinct BL models and a range of strategies to: address the needs of diverse learners; maximize engagement and humanize interactions; and map technology to pedagogical and socio-emotional needs. The analysis offers insights to professional development and institutional support aspects and the expanding role of lecturers in the face of technology proliferation. A significant factor shaping participants' perspectives was the impact of COVID-19 on the design and delivery of these models and the inevitable future implications for the institution, lecturers, and students.

Although this is a small scale study, the grounded theory inquiry approach, the analysis of an institution-wide BL initiative, and the authentic voices of experienced cross-disciplinary lecturers may collectively provide insights for institutions involved in post-COVID reculturing efforts. The study contributes to existing BL literature by proposing refinements to conceptual models; generating explanatory theory to represent participants' sense-making of BL design and delivery and providing local theory about institutional support. The seven recommendations of this study have implications for practice and policy as institutions work on transforming curriculums, reshaping pedagogical practices, redefining "work" and workloads for lecturers, forming new partnerships with industry and reviewing provisions for technology, professional development support, and resources.

Keywords: flipped learning, blended learning models, institutional adaption, institutional reculturing

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF VIGNETTES

ACKNOWLEDGEMENTS

This thesis would not have been possible without the support of many.

I would like to express my gratitude and thanks to:

My supervisor, Dr Marnie O'Neill, for her invaluable feedback and guidance.

The participants of this study, for generously and enthusiastically sharing their experiences.

My partner Ravi and children Varun and Mallika, for their love and support always.

The many colleagues and educators I have had the privilege to work with and learn from over the last 20 years.

AUTHORSHIP DECLARATION: CO-AUTHORED PUBLICATIONS

This thesis contains work that has been published.

Details of the work: Conference Paper Presentation: Viswanathan, G., & O'Neill, M. (2021). The role of the lecture in post pandemic institutions of higher learning: Possibilities and implications from a Singapore case study. In Gregory, S., Warburton, S., & Schier, M. (Eds.), Back to the Future – ASCILITE '21. Proceedings ASCILITE 2021 in Armidale (pp. 267277). https://doi.org/10.14742/ascilite2021.0139 The findings related to lecture replacement strategies adopted by participants was presented as six Flipped Learning models in this full conference paper.
Location in thesis: Chapter 4.2 BL Models and Pedagogical Strategies. This chapter presents the findings as five blended models with variations. The chapter includes additional details that were not relevant to the paper presentation's focus on lecture replacement strategies.
Student contribution to work: I proposed and crafted the paper. My co-author and supervisor, Dr. Marnie O'Neill provided suggestions to improve the discussions, specifically to include adaptations to an existing framework. Dr. Marnie also edited the paper for readability. The framework adaptations as reflected in the conference paper and thesis are my contributions.
Co-author signatures and dates: [redacted] 30/11/2021

ABBREVIATIONS

BL – Blended Learning

CABLS – Complex Adaptive Blended Learning System

CET – Continuing Education and Training

CF – Conversational Framework

COI – Community of Inquiry

COVID -19 - Coronavirus disease 2019

FL – Flipped Learning

OL – Online Learning

OLi – Online Learning Initiative

PCC – Peer Communication Cycle

PD – Professional Development

PET – Pre-Employment Training

PK – Pedagogical Knowledge

PMC – Peer Modelling Cycle

TCC – Teacher Communication Cycle

TK – Technological Knowledge

TMC – Teacher Modelling Cycle

TPACK – Technological Pedagogical Content Knowledge

TPC – Teacher Practice Cycle

TPK – Technological Pedagogical Knowledge

CHAPTER 1

INTRODUCTION

1.1 Introduction

Blended learning (BL) integrates on-campus (F2F) and online learning (OL) experiences. This thesis, *Blended Learning - the New Normal at Institutions of Higher Learning: A Case Study from Singapore* comes at a time when BL has become an imperative for IHLs to move forward in the post-COVID digital era. It presents a collective case study of the perspectives of experienced lecturers on the shift to BL as part of a phased Online Learning initiative (OLi) and eventually post-COVID, Emergency Remote Teaching (ERT), at an institution of higher learning (IHL) in Singapore. The OLi was launched in 2016 to intensify the institution's commitment to promote the use of technology enabled learning (TeL). The OLi aimed to develop students' self-directed learning skills and work-ready, digital competencies. Concomitantly, the OLi expanded lecturers' skills to design and facilitate learning in blended learning (BL) environments.

As the primary curriculum design and delivery agents, lecturers' play a pivotal role in ensuring the quality and sustainability of OLi at the institution. BL adoption extends the learning environment across modalities adding further complexities and additional roles and responsibilities for lecturers. Despite their critical role, lecturers receive significantly less research attention within the complex BL environment (Wang et al., 2015; Torrisi-Steele & Drew, 2013). As an academic staff developer at the institution, I, the researcher, saw an imperative need to understand BL adoption from the lecturers' lenses to enable successful adoption of BL practices.

opted to achieve this study's aim to discover, interpret and make sense of lecturers' perspectives in designing BL. Participants for this study were 23 lecturers who were involved in the initial phase of OLi and had the most OLi experience at the site. The relatively small number of participants was offset by the range of experience across domains and years of teaching experience. Although the data collection method was limited to semi structured interviews, multiple rounds of interviews, verification and informal discussions were conducted. Participants also presented examples of resources and innovations during these interviews.

This study commenced in late 2019. As with campuses worldwide, COVID-19 forced the site institution to shift to fully OL mode from late February 2020. The timing proved opportune, the online interviews that ensued, gave me, the researcher, the privilege to listen and probe further as participants tried to make sense of their experiences from a fully F2F environment to a gradualist BL approach to fully OL.

Participants adopted iterative BL design approaches informed by an understanding of students' social emotional needs in addition to technological, pedagogical, content, contextual and industry knowledge and skills. Design thinking, problem solving skills and a personal enjoyment of learning emerged as key enabling attributes. Institutional efforts that emerged as enablers to adoption included: a phased implementation approach collaboratively led by school representatives; communication campaigns to highlight rationale, guidelines and assurance that adopting BL would not displace lecturers; team development approaches for pilot courses; and non-evaluative initial OLi phases that promoted experimentation. COVID-19 and the inevitable future implications to all aspects of the BL environment was a significant factor in shaping participants' perspectives.

Although this is a small scale study, the grounded theory inquiry approach, the analysis of an institution-wide BL initiative, and the authentic voices of experienced cross-disciplinary lecturers may collectively provide insights for institutions involved in post-COVID reculturing. The study's recommendations have important implications for practice and policy as the institution works on transforming curriculums, reshaping pedagogical practices, redefining "work" and workloads for lecturers, forming new partnerships with industry and reviewing provisions for technology, professional development (PD) support, and resources.

This introductory chapter provides the research context , background related to the OLi initiative at the institution, the COVID induced ERT period and its implications to T&L practices at the site institution. This chapter establishes the impetus for this research, presents the central research question and lists original contributions to knowledge. This chapter concludes with an outline of the thesis structure.

Definition of Terms

For the purposes of this study, the following definitions apply:

- Blended Learning (BL) - blend of purposefully designed on-campus (F2F) and online learning (OL) (Graham et al., 2014) as part of the site's OL Initiative (OLi)
- Continuing Education and Training (CET) – industry skills focused part-time or short courses for adult learners (Skills Future SG, 2020).
- Emergency Remote Teaching (ERT) – "a temporary shift of instructional delivery" to fully OL due to crisis circumstances. (Hodges et al., 2020)
- Flipped Learning (FL) - Content traditionally delivered through F2F lectures is replaced with asynchronous online segments; F2F sessions focus on active learning strategies to deepen learning (Jenkins, et al., 2017). FL approaches are examples of BL.

- Institutional reculturing – refers to the process that involves “changing the norms, values, incentives, skills, and relationships in the organization to foster a different way of working together”. Fullan (1998, p.6)
- Learning Analytics – “measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs” (Siemens et al., 2011, p.4).
- Lecturers (Teachers) – Lecturers at the institution who have designed online learning modules since the first year of implementation (Academic Year 17/18) and have completed at least 6 runs of these modules
- Online Learning (OL) - learning online, asynchronously (anytime, anywhere) or synchronously (realtime) as part of formal T&L practices, with students and lecturers physically separated (Singh & Thurman, 2019; Rapanta et al., 2020).
- Online Learning Initiative (OLi) – refers to an initiative where all students at the institution will experience at least one fully online remote learning module and at least 6 modules that replaces at least 25% of the curriculum as online learning experiences from 2017 (over the course of a three year diploma programme).
- Perspectives are frameworks through which people make sense of the world. (Woods, 1992, p.7)
- Pre-employment Training (PET) - educational programmes that prepare post-secondary students for the workforce (Skills Future SG, 2020).
- Polytechnic – Institution of Higher Learning (IHLs) in Singapore that offers three-year diploma programs to prepare post-secondary students for industry or further studies and part time diplomas to upskill adult learners (MOE, 2021a). There are five polytechnics in Singapore. This study is situated at one such polytechnic.

- Technology is simply defined as software tools or web applications.

1.2 Background to the Study

Online education has grown exponentially, due to various technological and economic factors including global adoption of the Internet and the need for skills to thrive in an increasingly digital world (Palvia et al., 2018). Even before COVID-19 forced the widespread move to OL, a quarter of US higher education students (over 6 million) were enrolled in online distance courses (Palvia et al., 2018; Global Shapers Survey, 2016). Anecdotal evidence over the past two decades has suggested widespread adoption of BL which integrates F2F and online instruction (Graham, 2006; Norberg et al., 2011). However, quantifying the adoption of BL continues to be a challenge (Graham, 2019). Graham (2019) points to the varied definitions of what constitutes BL, institutional practices that do not formally identify BL courses and the lack of institutional oversight on lecturers BL decisions as reasons.

In Singapore, the Smart Nation movement and the in.LEARN2020 initiative were introduced in 2015 to promote lifelong learning efforts through digitization. Adopting blended and online approaches make learning more flexible, just-in-time and relevant to individuals and enterprises (Smart Nation, 2021). These nation-wide, cross sector initiatives expanded the role of technology enabled learning beyond the classroom to the online environment and the daily lives of Singaporeans. As of 2020, the national skills movement requires 75 percent of the Singapore Workforce Skills Qualifications (WSQ) courses to be delivered via blended learning (a combination of face to face and online) (Gog, 2017). In line with these national directions, to prepare students for the future workplace, institutions of higher learning (IHLs) in Singapore have also introduced BL initiatives.

During the COVID-19 pandemic, UNESCO estimated that nearly 1.4 billion students experienced disruptions in their education. The pandemic forced educational institutions around the world to move teaching and learning to virtual classrooms. The pivot to OL has forced a change in "the way we think about the provision of education in the future" (UNESCO, 2020). Post-COVID, contributors to Lim & Graham's (2021) collection of BL case studies highlight that adopting a fully OL modality at IHLs, specifically in the South and North Asian context is impractical. Full OL has it has its own set of limitations, ensuring equitable access to technology and quality education for all students remains a challenge. Ewing's (2021) study of educational leaders across nine Asian/Australasian countries noted that educators forced to adopt online learning are now increasingly convinced that BL with its potential to maximize flexibility and engagement is preferable to physical attendance. The pandemic necessarily accelerated the agenda for more digital learning to prepare students for the workplace, provide flexibility and encourage students to be more independent learners (MOE, 2020a; Ewing, 2021; Times Higher Education, 2021).

Compared to fully OL, or fully F2F, several large scale meta-analysis studies suggest blended modes to be most effective in achieving learning outcomes (Palvia et al., 2018; Means, et al., 2014). BL maximizes the hi-tech benefits of online and hi-touch of traditional F2F approaches. Moving forward, Singapore's Ministry of Education envisions blended learning as a key feature to develop students' abilities to be self-directed, passionate, and life-long learners (MOE, 2020a). Continuing pre-COVID debates on whether BL or OL is a fad or can be as effective as F2F is futile for many reasons (Lim & Graham, 2021; Zhao, 2020; Nguyen, 2015). BL has become an imperative at IHLs in Singapore. The next segment outlines the history of technology enabled learning in Singapore, particularly at the site of this study.

1.2.1 Blended Learning in Singapore: A Brief History

Singapore's Ministry of Education (MOE) has purposively leveraged technology for learning since 1997 through Masterplans' for ICT in Education (MOE, 2015). Schools and IHLs in Singapore have used technology enhanced learning in face to face (F2F) classrooms for over two decades with initiatives like Notebook Ownership Schemes, which enabled each student to own a notebook computer as early as 1999 (Ngee Ann Polytechnic, n.d). Today, IHLs require full-time students to own a notebook PC to access learning. Financial aid for IT devices is available to students who are unable to afford one (for example, at Ngee Ann Polytechnic, 2021). Due to its geographical area, public education institutions in Singapore do not have a long history of distance or fully online learning programs. The SARS pandemic in 2003 prompted Singapore to introduce annual remote online learning or home-based learning days (Singapore Government Press Release, 2003; Chandran, 2011). Remote or home-based learning refers to students learning online from home or other venues outside the institution in lieu of attending physical classes. This strategy ensures that learning can continue in the event of a school closure due to pandemic diseases or environmental situations like haze.

Beyond emergency readiness, 21st century workforce requirements, globalization and technological advancements propelled the need for lifelong learning and digital skills development at the national level (Smart Nation, 2021). To support these national mandates, the Singapore government has invested in increasing connectivity and digital infrastructure. Singapore is considered the digital capital of Asia (Economic Development Board Singapore, 2021) with 88.5 percent of the population connected to the internet (WeareSocial, 2020).

1.2.2 Context of the Study

Polytechnics in Singapore offer three year diploma programs that prepare post-secondary students for the workforce through Pre-Employment Training (PET) or further studies and industry skills focused part-time or short courses for adult learners through Continuing Education and Training (CET) programs (Skills Future SG, 2020) . Polytechnics are publicly funded, the site being one amongst five institutions. Polytechnics are internally organized as schools that offer domain related diplomas or short courses (example domains include Business, Engineering, Health Science, Information and Communications Technology). 21st century graduate competencies and core values underpin the polytechnic experiences. PET students (17-20 years of age) enrol in diploma programs on completion of secondary school equivalent qualifications. An increasing number of adult learners in Singapore are participating in skills training to meet the changing skill sets required by industry (Fung, 2020). To meet these demands, IHLs offer CET short courses or part time diploma programs. Unlike PET students, CET learners have heterogeneous educational backgrounds and are from different ages and stages of life and nationalities

In the pre-pandemic norm, key instructional methods at the institution included lectures, tutorials and/or practicals for small groups of up to 25 students or seminars that combine lectures and tutorials. A wide range of instructional strategies were implemented across the institution. Depending on the course domain, signature pedagogies like Project Based Learning, Experiential Learning, Problem Based Learning and Scenario Based learning were adopted during tutorials and/or practicals, performance assessment, and internships to developed industry relevant skills and competencies. Lectures have multiple purposes: to trigger interest, link prior knowledge to new concepts, teach factual, conceptual, and procedural knowledge and model thinking processes. Lectures are also used to share relevant industry examples to help students see application and significance of subject matter. Lecture activities may for example, include quizzes, peer discussion and role plays. Tutorials focus on deepening

conceptual and procedural understanding, for example, through discussions, practice problems, role plays, case study scenarios-and- problem solving activities. Practicals or laboratory sessions provide students hands-on application and support Project Based Learning pedagogies. Assessment activities (for example, projects, case studies, presentations, written reports and written exams) are closely aligned to the course outcomes and the applied, practice orientated focus of polytechnic education.

The institution as with other IHLs had embarked on several projects over the last 2 decades to promote the use of technology enabled learning (TeL). Over the years, technology tools and laptops have become a necessity. PET learners are required to own laptops and have easy access to financial assistance if needed. Some CET learners may not have access to personal laptops and rely on their mobile devices to access OL. Although the previous technology enabled projects yielded good practices and outcomes, it was not consistently adopted by all teaching staff. The institution did not have clear targets to support the development of student and staff digital competencies and lifelong learning skills as outlined in the national Smart Nation movement (Smart Nation, 2021). Additionally, all courses were offered in person. Formal OL experiences happened on designated days to test emergency learning continuity preparedness for pandemics or natural disasters (Chandran, 2011).

An internal review committee proposed a staged roadmap approach to facilitate the deliberate development of every student to be digitally competent for industry (Ng, 2019). This resulted in the conception of the Online Learning initiative (OLi), with a small scale pilot phase launched in 2016. The intention was to leverage technology for learning, develop students' digital literacies and encourage self-directed learning. The rationale: moving learning online would provide physical distance between the learner and lecturer/teacher, potentially creating a need for students to be more self-directed, independent learners. The term self-directed learner was not explicitly defined in the OLi guidelines.

Onah et al.'s (2020, p.4368) description of a self-directed learner as "actively ready and willing to prepare, execute, and complete a given task independently and on time" aligns with the OLi objectives.

Unlike previous voluntary, interest-based attempts to infuse technology for learning, the OLi impacted the entire student population of over 15,000 students. Courses to be included in the initiative were carefully selected based on course outcomes and student numbers to ensure maximum reach across the cohort. An implementation committee represented by lecturers from the different schools provided on the ground communication, planning, support, and monitoring of the initiative. The committee representatives had oversight of the OLi implementation within the school and scheduled colleagues' participation in the centralized compulsory PD sessions based on the roll-out plan. Several participants in this study were committee representatives or co-opted as school-based champions to support their colleagues. As part of a staged rollout, a small scale pilot was introduced in 2015, with full-fledged implementation in 2019. (There were plans to celebrate and recognize the contributions of the "pioneer" OLi lecturers who paved the way for peers, unfortunately, COVID hijacked these plans.) This phased approach allowed lessons learnt from each phase to help inform and shape OLi practices and guidelines (Ng, 2019). Figure 1 illustrates the guidelines as communicated to lecturers.

Figure 1

Summary of OLi Guidelines

All students to experience at least one course as 100% OL (effectively 80%) and six courses at 25% OL during the three-year programme
OL to replace face-to-face (F2F) experiences
OL segments should not be "re-taught" in the F2F class
OL segments should address essential and not supplementary topics
OL segments should maximize the affordances of technology for learning
OL segments should be offered as complete standalone "packages":
- with clearly indicated LOs, instructions, communication modes and duration required

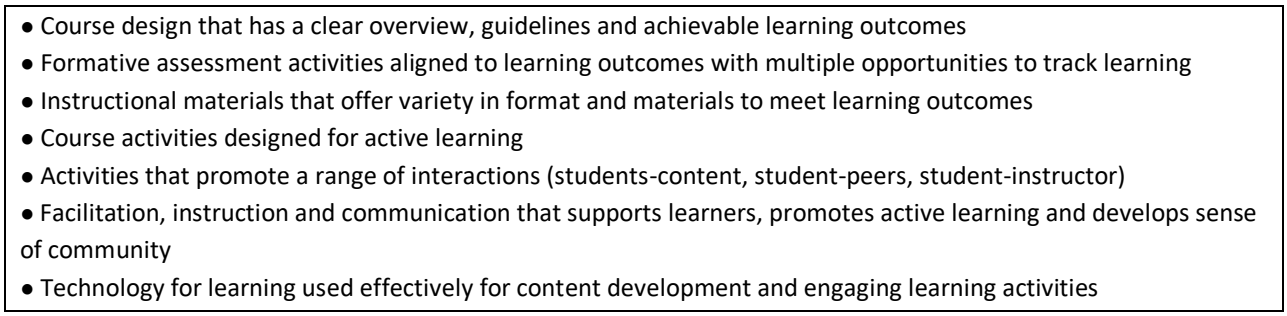
- designed as constructively aligned short bite sized segments
- enable students to learn anytime, anywhere (on any device)
- provide opportunities for students to check understanding through a range of formative assessments activities
- include provision for (at least minimal) immediate feedback

In line with technological advances and future work trends, the initiative aimed to equip lecturers with skills to design and deliver learning online. Communication and PD were emphasized to ensure all lecturers at the institution could design and facilitate OLi courses with at least baseline elements (Ng, 2019). Depending on OLi percentage, OLi courses were developed in phases over a few semesters. In addition to the OLi courses for full-time PET students, as of 2017, Singapore's national skills movement required all full-time CET courses at IHLs to offer at least 30% asynchronous components (Gog, 2017). This was to promote lifelong learning and make learning more accessible for adult learners. All CET courses were informed by the same OLi guidelines.

To enable and expand OLi adoption, all lecturers at the institution were required to attend a two-day boot-camp style, compulsory OLi workshop by the Teaching & Learning centre. The workshops were offered on a regular schedule over a few semesters to ensure sufficient training spaces. I, the researcher, led the design of this workshop which adopted a rapid prototyping approach, using evidence based OL design principles from well-established frameworks including the Community of Inquiry framework (Halverson et al., 2014), the Quality Learning & Teaching Framework (QLT, 2021) and Quality Matters Rubrics (QM, 2021). Figure 2 highlights the OLi design principles that encompasses aspects of these frameworks. These principles were communicated via the OLi committee, the PD courses and at various forums.

Figure 2

Design Principles of OLi Courses



For the initial phase OLi courses, staff were provided with close coaching and consultation support from assigned academic staff developers. For early phase OLi courses, a team of selected lecturers designed and developed the OL segments. For later phases, consultations with staff developers were on a request basis. Lecturers could also choose to attend short online or face to face workshops that offered strategies and potential technology tools to design online learning. Where possible, lecturers were encouraged to curate content from external platforms including library resources rather than recreate the wheel.

The institution had existing provisions for infrastructure updates and hardware support with a one-to-one student laptop policy in place. The institution had adopted an off the shelf Learning Management System (LMS) for the last two decades, Microsoft Office 365, Google Apps for Education, subscription to Padlet (a collaborative board), and a recently updated institutional video hosting site as institution wide platforms. For authoring tools, limited licensing of a PowerPoint based authoring tool was purchased. New student orientations included a self-help guide on the OLi and sessions to introduce technology platforms and library resources. Curriculum and content design approaches were adopted to scaffold

and ease students into OL aspects. Individual lecturers provided the direct learning support. These provisions were assumed as sufficient for the phased OLi implementation.

During the early phases, a bottom-up approach involving early adopters as change agents was adopted to promote institution- wide BL implemented (Carbonell et al., 2013). The pilot phase involved carefully selected lecturers including many teaching award recipients who were inclined to technology enhanced learning. The lecturers in the early OLi stages were provided close support and monitoring by Teaching & Learning centre staff. These lecturers were then invited to share their reflections and experiences at various platforms. During the staged implementation phase, to promote experimentation and reflection, lecturers were assured that their OLi courses would not be formally evaluated till the OLi was fully implemented. Evaluation and quality issues were addressed by close tracking and monitoring of on-going implementation efforts, student experience surveys and student performance data. One of the key objectives of the OLi was to develop students' self-directedness. As summarized by Brandt (2020) self-directedness is variedly defined in the literature and inherently complex. Self-directedness encompasses cognitive, intrapersonal, and interpersonal skills. To quantify the development of students' self-directed learning skills, the institution made the decision to track SDL based on performance indicators (student grades, OL activity data).

The OLi strategies were in line with Porter et al.'s (2013) recommendations for institution wide BL implementations. Porter and colleagues emphasized the need for BL advocates at various levels in the institution to promote a shared BL vision. Institutions were advised to define the BL structure but allow lecturers freedom to make pedagogical decisions through experimentation and collaboration (Porter et al.., 2013; Carbonell et al., 2013). As more institutions worldwide move towards BL as the new post-

COVID normal, the findings of this study could identify strengths and gaps of the OLi from the lecturers' perspectives and contribute to the literature on institutional level BL implementation.

1.2.3 COVID and the Pivot to Fully OL

When the COVID-19 virus hit the island state of Singapore on January 23, 2020 (Yong, 2020), the OLi had been fully implemented. Beyond the designated seven courses, other lecturers were voluntarily adopting short OL weeks in their courses. Having had previous experiences with the SARS pandemic, Singapore's Ministry of Education was on heightened alert. On February 5, 2020, the Ministry announced additional precautionary measures by suspending mass student gatherings (Ang, 2020). The Singapore government raised the Disease Outbreak Response System Condition (DORSCON) to Orange alert on February 7, 2020. In response, all IHLs in Singapore announced that large lectures of more than 50 would either be live streamed or made accessible online (Oh, 2020). The site institution was in the midst of its end of semester study and examination period. Staff were briefed that the April 2020 semester would be offered minimally within the Orange alert level but with possible conversion to full Home Based Learning (HBL). (Note: To avoid confusion for international readers, the term Emergency Remote Teaching (ERT) (Bozkurt et al., 2020; Hodges et al., 2020) will be used in future to refer to teaching and learning practices implemented during the lockdown, instead of HBL, the Singapore government term).

When Singapore announced its first lock down (circuit breaker) to curb the pandemic on 7 April 2020, all educational institutions were required to move to fully OL ERT (Kurohi, 2020). As all IHLs were adopting BL at varying degrees prior to the pandemic, to an extent, the institutional resources and infrastructure required for the sudden pivot was in place (Tan, 2020, Yang, 2015). IT infrastructure wise, Singapore was in a relatively good position for the move to ERT (Economic Development Board, 2021). Although the

site institution had a laptop ownership policy for all full-time PET students, as with other educational institutions, provisions for loan devices were available (Ang, 2020). Additionally, special arrangements were made for students who did not have conducive home environments, to return to school with safe distancing protocols in place (MOE, 2021a).

Depending on exigencies of other projects, staff worked through the semester holidays, over a four to six week time frame to revamp their sixteen week courses for full online ERT. Lecturers at the institution were strongly encouraged to adopt asynchronous modes for content delivery and synchronous delivery for tutorials. Lecturers were also encouraged to curate Open Educational Resources (OER) content and virtual simulations resources where available. Staff developers and OLi representatives created Toolkits and resource lists for easy access. For some domains, OER for virtual simulation practicals were not readily available. For these courses, lecturers were encouraged to design practical familiarization segments in preparation for post ERT F2F delivery. The rationale for these suggestions included: avoidance of technical/bandwidth issues during large synchronous classes; development of students' SDL skills; and provision of flexibility during the unprecedented lockdown period. Synchronous small group sessions could provide opportunities for deeper interactions, individual and social emotional support. Similar to OLi guidelines, constructively aligned designs with manageable chunks, clearly stated learning outcomes and instructions, a range of activities, formative assessment and feedback for learning, were stressed.

Table 1

From classroom based technology to Online Learning to ERT: Institutional Timeline

Timeline	Use of Technology at the Institution	Support and Considerations
1997-2003	▪ Launch of compulsory notebook ownership policy to encourage use of technology for learning. ▪ Technology for learning in the classroom (notebook computers, tablets, smartphones).	▪ Introduction of a Learning Management Systems (LMS). ▪ Access to a small number of F2F workshops on integrating technology in F2F classes.
2003-2014	▪ Increased adoption of technology for T&L activities ▪ elearning Week/Day (students learn fully online, remotely during specific days to ensure preparedness for emergencies) (Business Continuity Readiness - BCR). ▪ Staff created online learning experiences in combination with an outsourcing model for large scale eLearning development.	▪ Access to a range of F2F workshops on integrating technology in F2F classes. ▪ Increased number of institutional technology tools including video hosting platform. ▪ Maximized resources with funding for outsourced development of learning applications that address LOs of large student cohorts. ▪ Recognition of innovative T&L practices with TeL.
2015 onwards	▪ Use of technology for most production type activities, collaborative and exploratory activities. ▪ elearning Week/Day ▪ Online learning experiences that replace 25% - 100% of F2F contact hours. (Pilot launch of initiative in 2016), with institution wide implementation in 2019. ▪ Self-paced online learning modules for all polytechnic students and the general public to freely access online learning content across multiple sectors and disciplines on a common platform (“Polymall uses Blackboard”, 2018).	▪ Two day boot-camp style compulsory workshop with a focus on developing a prototype for selected OL segment. ▪ School selected representatives to monitor OLi course development and provide support. ▪ Range of short bite sized workshops to support BL design and development. ▪ Modelling use of TeL and BL through institutional PD courses. ▪ Structured coaching/consultation for courses selected for initial OLi phases. ▪ Consultation slots with academic developers open to all lecturers. ▪ Sharing of OLi reflections and key learning points by early adopters at the schools on a regular basis, organised by OLi committee.

Timeline	Use of Technology at the Institution	Support and Considerations
		▪ Increased tracking and monitoring of OL segment data to gather insights for future directions and support planning. ▪ To promote exploration, assurance that performance would not be judged by student feedback, evaluations on teaching and course experience feedback during the phased roll-out period. OLi experience surveys were administered instead.
April 2020 -	▪ Full OL (ERT). F2F lectures replaced preferably with asynchronous OL segments. Tutorials replaced with synchronous modes. Practicals replaced where possible with virtual simulations. ▪ Where tactical, hands-on experiences, or projects /group work where interacting with the public is necessary, F2F was permitted with strict adherence to the Safe Management Measures (SMM) and prevailing government requirements.	▪ Briefings, communications, workshops, self-help guides, consultations, and coaching sessions. ▪ Regular synchronous webinars and email communications for both lecturers and students, close monitoring of LMS analytics and data on learning. ▪ Procurement of licenses for additional platforms like Zoom and collaborative tools. ▪ Oct 2020 semester - provisions to purchase hardware/software to support teaching from home. ▪ Innovative ERT designs recognized and rewarded in place of annual academic awards

Note: Table 1 summarizes the progressive adoption of technology for learning at the site institution over the last two decades.

Post-pandemic, for institutions in Singapore and worldwide, BL has become the new normal and will continue to be mainstreamed. (MOE, 2020a; Zhao & Watterson, 2021). Shifting to this new normal and main streaming BL will require institutional reculturing. Fullan (1998, p.6) describes reculturing institutions as a process that involves “changing the norms, values, incentives, skills, and relationships in the organization to foster a different way of working together”. Lecturers are at the centre of this change as they adapt and adopt to an increasingly digital landscape.

Having provided the background context for this study, the subsequent segment provides my personal and professional motivations for undertaking this inquiry.

1.3 Research Rationale and Central Question

BL and technology related issues continue to be a key challenge for IHLs despite 20 years of practice (Thompson et al., 2019). Discussions on BL surfaced in the literature two decades ago with McCray (2000) suggesting the value of combining in-class with online environments to maximize learning. A decade later, Norberg et al. (2011 p.207) termed BL as the "new normal" in course delivery. Owston (2013, p.1) advocated for "research investigating why BL, despite its many inherent advantages, has not been scaled up successfully in very many institutions". Lim & Graham (2021) observed that although there was no shortage of good technology enabled practices at Asian universities, adopting BL at scale was hindered by various issues including the learning culture, alignment between institutional vision and individual BL practices and capacity building through PD. The study about a Singapore IHL's BL implementation from the perspectives of experienced lecturers may contribute to address this research gap.

Teaching is complex. BL increases this complexity as teachers must design and deliver an integrated pedagogy that maximizes the benefits of both F2F and online environments (Dzibuan et al., 2018; Gerbic, 2011). Although principles of good teaching and learning are not dependent on the medium, the online learning environment poses different challenges and considerations (Dunlap et al., 2007). A decade ago, Bliuc et al. (2007) advocated for research to focus on BL that combines and integrates F2F and online learning, rather than contrasting online learning with traditional approaches to learning. Some authors indicate there is still a lack of studies on blended approaches as a holistic model beyond

one form of BL, the flipped classroom (Adel & Dayan, 2021). Although online segments of a F2F course are not self-contained, many quantitative studies do not consider the relationship between online and offline learning activities (Means et al., 2014). This is largely due to the complexity of distinguishing between effects of what happens online versus F2F situations. This case study of experienced lecturers' perspectives on designing and facilitating BL could provide a holistic view of BL within the broader learning environment at the site institution.

Institutions have routine processes and avenues to gather student experience feedback. A survey of over 800 articles led Torrisi-Steele and Drew (2013) to describe the situation as a "severe deficiency of blended literature describing research into current academic practices" (p.380). Wang et al., (2015) and Halverson et al., (2014) pinpoint the large volume of literature on students accounts of blended environments in contrast to teacher factors and perspectives or institutional factors. This impacts the ability to plan PD and support. As Sun and Chen (2016, p.172) stress, the online lecturers "deserve more researchers' attention to explore their teaching journeys and PD needs". Verpoorten et al.(2020) concluded their quantitative study on Belgian IHL staff perspectives by emphasizing the need for more research on faculty intentions and factors that can facilitate or impair the diffusion of BL at IHLs. Post COVID, it has become an imperative to understand lecturers' perspectives to enable successful mainstreaming of BL. The local theory and related propositions generated from this qualitative study could shed light on such factors.

Many lecturers at the site have only recently experienced being online learners themselves. These experiential limitations make the task of designing BL even more challenging. My first attempt at designing and delivering an online course was in 2012 (at a previous position). The experience resulted in some student discontent and many learning points (Viswanathan, 2014). My personal reflections and

subsequent redesign efforts made me concerned and curious about how lecturers at the site would adopt and adapt to BL.

As an academic staff developer at the site, I the researcher, was part of the team responsible for designing and facilitating OLi related PD for all lecturers. Hands-on experiences, strategies, and reflections of pilot OLi adopters were a key aspect of the PD workshops and other OLi forums. Lecturers repeatedly emphasised the benefits of such sharing, “It serves as an example of what works within the institution and provides a benchmark of what effective online learning would look like” - feedback from a workshop participant in March 2018. Meyers (2018) stresses that vicarious learning can help organizations learn collectively. Sharing knowledge within the institutional context can promote reflective practice and help less experienced lecturers as they adapt and adopt to initiatives like OLi (Mei et al., 2019). The findings from this study can help promote this collective learning within and possibly beyond the site institution.

There are several publications on standards, benchmarks, and frameworks for the design and evaluation of blended and online learning, including Quality Learning and Teaching Framework (QLT, 2021) and Quality Matters Rubrics (QM, 2021). The Asian specific BL case studies in Lim & Graham (2021) highlight the need to take national, socio-cultural, institutional disciplinal issues into consideration for successful BL implementation. A highly contextualised implementation with clearly defined goals with specific guidelines for BL is necessary. Implementing existing generalized frameworks may not place the needs of the polytechnic learners first. The local theory developed from this study, could help shape, and inform the design and development practices, guidelines, PD, and support systems to enhance the quality of BL within the institution. As the COVID-19 virus persists, most IHLs have been forced to adopt BL for learning continuity. The wider education community could benefit from the F2F to OL journey

insights of experienced lecturers at this post-secondary, applied skills focused institution. The study could also potentially be replicated at other institutions with similar contexts.

The aim of this study is to generate local theory regarding polytechnic lecturers' perspectives on designing blended learning in Singapore. What follows is the central research question for this study: What is the most comprehensive theory that can be generated regarding the perspectives of lecturers on designing blended learning at a polytechnic in Singapore?

1.4 Original Contributions to Knowledge

Although the pandemic has resulted in an exponential increase in BL, it is largely unplanned and abrupt (Hodges et al., 2020). To inform and enable sustainable BL growth and effective implementation, teachers' perspectives are crucial. The findings and explanatory theory generated from this qualitative study and its clearly described BL context can contribute to making holistic connections between the OL and F2F learning aspects. Studying lecturers' adoption and adaption to OLi could support the planning and implementation of future initiatives at the institution, for example, artificial intelligence and immersive environments (Wiley, 2020). Thus, I see a pragmatic need to uncover, understand, interpret, and communicate the perspectives of experienced lecturers across the institution.

The literature review identified lecturer perspectives on designing BL as an under-researched area (Torrisi-Steele & Drew, 2013; Sun & Chen, 2016; Verpoorten et al., 2020). There are a handful of studies that examine the role of institutions in BL implementations within the Asian context (Lim & Wang, 2016; Wang & Han, 2017; Han & Wang, 2021). A review of the local and international literature has not located research that examines lecturers' perspectives on designing BL experiences as part of a compulsory institution-wide initiative in the Asian context.

COVID has accelerated the adoption of BL and OL. This timely and relevant study can add credence to the existing BL literature by making the following original contributions:

- This study generates explanatory theory about lecturers' adoption and adaption to BL at site institution in an area where no such theory exists.
- The findings and analysis from this ground-up inquiry support propositions
    - about factors that facilitate lecturer's adoption and adaption to BL
    - about professional development needs
    - about institutional support to inform future institution-wide technology enabled initiatives at the site and other IHLs with similar contexts
    - relevant to other IHLs, academic developers and lecturers in Singapore as BL becomes mainstream (Tan, 2020; MOE, 2020a).
    - which prompt further studies in the under-researched area of lecturers' perspectives on institution wide BL implementations
- Post-COVID, BL has gained "significant momentum" worldwide (Lim & Graham, 2021, p.vii). This study could potentially be replicated at other sites to test the generalizability of the local theory.
- Extending existing BL literature by proposing refinements to the Flipped Learning Matrix categorization.

1.5 Structure of Thesis

Chapter 1 introduces this thesis and its central research question. The rationale for this qualitative interpretivist study, the detailed background context for the study, possible contributions to the BL literature and thesis structure are presented.

Chapter 2 starts with the definitional step to unpack the term *blended learning* or BL at the site. BL concepts, frameworks, and relevant empirical literature are summarized and critically reviewed in the context of the site institution's practices. A selected synthesis of post-COVID research and publications in the educational arena are provided to highlight the T&L directions moving forward. The chapter concludes with a proposed conceptual framework that illustrates the relationships between theories and concepts relevant to the present study. The proposed framework shapes and informs the study's research methodology and guides the analysis and interpretation of findings.

Chapter 3 describes and justifies this study's qualitative research approach and its underpinning theoretical framework. The basis for the selection of the methodology, related instruments and methods used for data generation and analysis are clarified. The possible methodological and ethical issues and management measures are explained.

Chapter 4 presents the findings and related discussions that emerged from the grounded analysis stage. The findings and discussions are presented as six main themes with relevant sub-themes. Participants' intentions and strategies manifested as BL models that form the main discussion thread and underpin the discussions for other themes. This chapter concludes with a list of institution specific recommendations.

Chapter 5 completes this thesis by responding to the central research question and guiding questions in relation to the conceptual framework. An explanatory theory to understand lecturers' adoption and adaption to BL at the institution is put forth. Propositions generated from the analysis and interpretation of the findings are presented. The significant implications for practice and policy arising from the propositions are detailed as seven recommendations. This chapter also outlines the limitations

of this enquiry with suggestions for further research. The thesis concludes by listing possible contributions to advancement of BL knowledge, professional practice, and policy.

A note on the use of tenses in this study: statements of general principle or an ongoing condition are expressed in the present tense; examples (particularly in the literature) which report events or circumstances which are clearly in the past and may no longer be applicable are referred to in the past tense; quotes from participants have been retained in the tense used by the participant.

1.6 Conclusion

In a post-COVID educational landscape, BL is becoming the new normal (MOE, 2020a; Ewing, 2021; Zhao & Watterson, 2021). This chapter provided a broad overview of the thesis and its focus on lecturers' adaption and adoption of BL at a Singapore polytechnic IHL. A detailed contextual background for this study was provided. Empirical and conceptual literature related to BL and its adoption at IHLs will form the substance of the subsequent literature review chapter that culminates in a conceptual framework for this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter starts by outlining the literature review scoping strategy and provides the definition of BL in relation to the OLi initiative and the research site practices. The theoretical concepts, frameworks and relevant empirical literature critique and discussions that follow serve to situate the current study and shape the research design.

This chapter is presented in three main sections.

Key theories, frameworks, and BL models. This section discusses theoretical foundations and conceptual models used to review and interpret the BL literature relevant to the present study.

The role of BL in a post-COVID IHL landscape. Most experts expect BL to be the new norm in post-COVID brick and mortar IHLs. This section explores the literature and critically discusses the role of BL in a post-COVID IHL landscape.

The proposed conceptual framework. The framework integrates relevant theories and concepts identified in the literature. It communicates an overview of the study by highlighting relationships within the site's BL environment. The framework underpins the study's research design and aids the analysis and interpretation of findings.

2.1.1 Scoping the review

A search on Google Scholar for "blended learning in higher education" returned approximately 510,000 results (on 8 August 2021). This did not include possible variations or overlapping terms like "hybrid learning", "technology enabled learning" or "online learning" or "hyflex" a combination of hybrid and flexibility (Beatty, 2014). Vast amounts of literature permeate every aspect of teaching and learning. COVID-19 pandemic and pivot to ERT has contributed further to this explosion of interest in blended learning (BL). To ensure that the literature impactfully informed this study, scoping the review was essential.

In very simplistic terms, BL is a blend of F2F and online learning. This would imply that principles of fully OL would apply to the OL portions of the blend and likewise for F2F. Whilst Stein and Graham (2014, p.1) acknowledge this, they stress that "the overall approach in developing a course that is partly online and partly onsite is quite different". Designing BL requires the ability to maximize the pedagogical strengths of each mode and interweaving activities between both modes. Considering the aims and context of this study, this review focuses on BL (and not OL) at IHLs. The review included the role of technology within the BL environment as opposed to technology integration in the F2F classroom. The large body of student focused empirical studies discussing student perspectives and preferences was not included. A deliberate decision was made to exclude the numerous studies that compared the efficacy of F2F and fully online or BL practices (in line with rationale provided in Chapter 1). Based on this scoping strategy, Google Scholar and an IHL digital library site searches of related terms and citation numbers was used to determine the publications to review. Latest publications and COVID related practices may have less citations and to address this, the search was repeated for publications within the 2017-2021 range.

2.1.2 Defining Blended Learning

The term *blended learning* has featured in the educational research arena for the last 20 years and originated in corporate training (Bliuc, et al., 2007). Reay (2001) offered one of the earliest definitions of BL as a blend of online and face-to-face instruction; merging two distinct models of teaching, traditional F2F and distance learning which was made possible by growing popularity of the internet (Graham & Bonk, 2004). There has been continued debate on the exact definition of blended learning or hybrid learning (Graham & Bonk, 2004; Garrison & Kanuka, 2004; Oliver & Trigwell, 2005; Hrastinski, 2019). Blended is a broad term that could refer to the blending of almost any aspect in the learning environment. Some conceptions in the literature include blending of modalities (delivery media) or instructional methods (learning activities) or the use of online technologies in classrooms (Graham et al., 2003; Hrastinski, 2019; Picciano, 2021). The key issue with these various definitions is that teaching practices are multi-method and technology has become ubiquitous even in F2F environments. To avoid misinterpretations, Hrastinski (2019) emphasises the need to clearly define what blended learning means within the research context.

Blended Learning or BL in the definition adopted for this study, refers to the blend of purposefully designed on-campus (F2F) and online learning (OL) as part of the site's OL Initiative (OLi) . OL is simply defined as: learning online, asynchronously (anytime, anywhere) or synchronously (real time) as part of formal T&L practices, with students and lecturers physically separated (Singh & Thurman, 2019; Rapanta et al., 2020). The OL components can vary from 25% to 100% and are deliberately designed to replace F2F class time (see Chapter 1 for detailed explanations and purpose of OLi). The term *learning design* in this study refers to the act of designing for learning, aligned with Goodyear and Dimitriadis's (2013) view of teaching as 'design for learning'.

More than a decade ago, Graham (2006) identified four critical dimensions of interactions for learning in F2F, BL or fully OL environments: Space (Live - Virtual), Time (Synchronous - Asynchronous), Fidelity (Rich/all senses - Text) and Humanness (High Human - No Human/Hi-Tech). These dimensions exist on a continuum with live, synchronous, involving all senses and high human touch on one extreme and generally associated with F2F physical environments. But as Graham (2006) rightly argued, these perceptions of physical environments were largely due to media constraints of the time, when early BL practices focused on learner-materials and text-based interactions. Garrison and Kanuka's (2004) observation on the emerging trend in higher education "to blend text-based asynchronous Internet technology with face-to-face learning—often referred to as simply blended learning" (p.96) illustrates the dominant media practices of the time. The emerging virtual worlds and the "interesting things happening in mixed realities" signalled by Graham (2006, p.6) are now everyday possibilities.

Researchers have repeatedly asserted that BL should not focus on technology tools or re-packaging of content but rather on how to blend effectively and for what purpose (Picciano, 2021; Graham, 2013; Arbaugh, 2014; Garrison & Kanuka, 2004). Garrison and Vaughan (2008) emphasized that BL "is the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies" (p.148). Most BL studies identify three reasons to adopt BL: improved pedagogy, flexibility, and cost effectiveness.

The BL definition adopted for this study is necessarily open and broad. A broad definition enables the exploration of a variety of blended F2F and OL designs to facilitate learning at the institution. Considering this "openness", Garrison and Vaughan (2008) stress the role of theoretical frameworks to inform and shape the integration of F2F and OL; to facilitate reflection and evaluate outcomes. Graham et al. (2014) highlight the value of BL models and theory to: provide common terminology for both

educational research and practice; to influence and guide the design of solutions to big issues. The next segments explore the BL scholarship that shaped this study.

2.2 Key Theories, Frameworks and BL Models

BL literature tends to focus on the OL aspects while the F2F aspects receive less attention. A key reason could be the lack of a cohesive theoretical framework that addresses issues unique to BL environments (Graham, 2019; Arbaugh, 2014; Graham, 2013). SkryPnyk et al. (2015) noted that the growing body of BL research could address this gap by developing "a digital learning perspective in its own (BL) activities" (p.67). This section situates the two most frequently cited frameworks in BL literature (Graham, 2019; Halverson et al., 2014) in relation to the present study. Both Garrison et al.'s (2000) Community of Inquiry framework and Mishra & Koehler's (2006) TPACK model are not specific to the blended environment but can be applied to technology enabled F2F, fully OL or BL environments. The subsequent section discusses the Conversational Framework (Laurillard, 2002) which provides "an overarching theoretical design framework" (Miroshnikov, 2021) that "captures all the requirements of the learning process" (Laurillard, 2007).

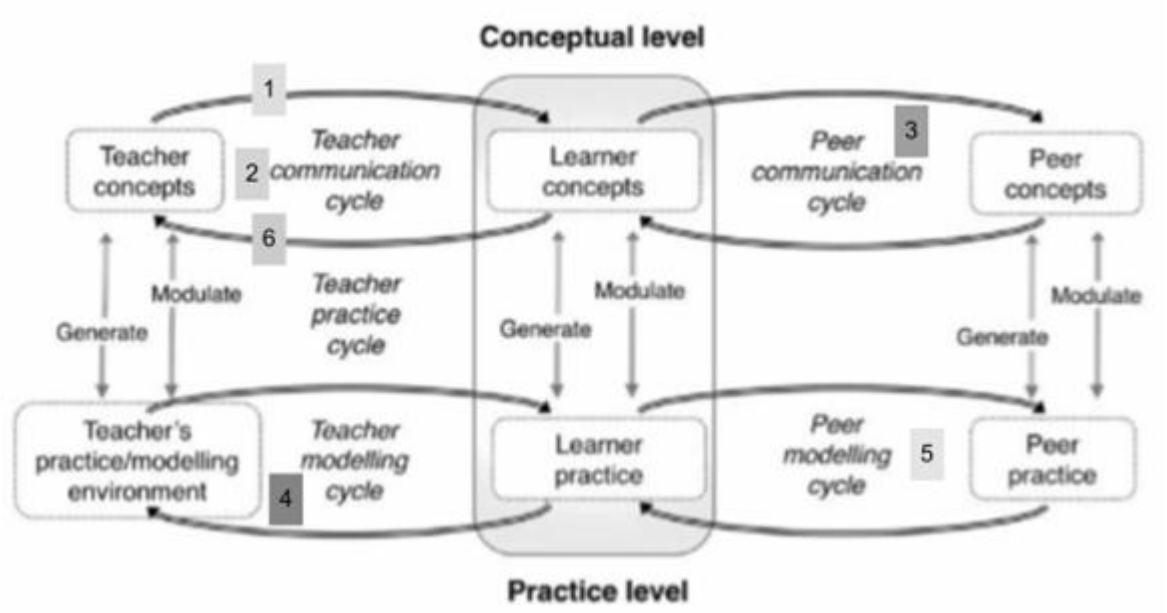
2.2.1 Laurillard's Conversational Framework

Laurillard's (2002, 2012) widely cited Conversational Framework (CF) emphasises the roles and dialogues between teachers, students and peers in the formal learning environment supported by technology. The model attempts to "capture the complexity of the collective ideas in the literature on what it takes to learn, and therefore what it takes to teach" (Laurillard, 2012, p.108). Laurillard summarizes the formal learning process in two levels: the conceptual discursive level that focuses on theoretical knowledge, concepts and description-building, and the practice experiential level that focuses on practice, activity, and procedure-building (Laurillard, 2002). CF emphasises iterative

"communication cycles" between the teacher, student, and peers supported by interactive learning activities or 'micro-worlds' to continually prompt the learner to generate and modulate their concepts and practices (Laurillard, 2002). The different types of communication between these actors are made possible through deliberately designed activities and supported by technology to promote learning. Laurillard identified six types of learning activities that correspond to the different communication cycles "commonly found throughout education" (Laurillard, 2009). The ideal learning environment would be a combination of all the learning activities, and is applicable to F2F, blended or fully OL environments.

Figure 3

The Conversational Framework and Types of Learning Activities (Laurillard, 2002), Adapted from Laurillard & Masterman (2010).



Note. Laurillard and her UCL colleagues have developed a free learning design tool (http://learningdesigner.org) based on the CF and the six learning types represented by action verbs. The key activities in Figure 3 and the associated action verbs are: (1) acquiring (read, watch, listen), (2)

inquiring (explore, compare, critique to reflect on concepts), (3) discussing (articulate ideas/questions, challenge/respond to the ideas and questions from the teacher and/or peers) , (4) practice (activity that provides immediate feedback to adapt and improve their next action), (5) collaborating (includes discussing, producing with peers), (6) producing (consolidate learning by articulating conceptual understanding and practice). The sequence of activities in Figure 2 is contextualized to OLi practices at the site based on the researcher's observations.

Table 2 attempts to categorize activities at the site, based on the six learning types and communication cycle. The categorization is for illustration purposes. Depending on technology tool features, the activities may overlap. For example, acquisition and practice activity could be combined using video narrated content with embedded quizzes and automated feedback. The focus is on the type of learning activities not the technology tool.

Table 2

Common Learning Activities at the Site Mapped to the CF Cycles (Summarized and Adapted from Laurillard, 2012)

CF Cycle	Activity Descriptions
Teacher Communication Cycle (TCC)	Activities that enable access to the lecturer's concepts (*Acquisition).* Typical examples would be narrated presentations, video lectures, lecture notes accessed via the LMS Activities that allow students to explore/compare/critique concepts and receive feedback from the lecturer. Examples include online research activities or critique of resources. *(Inquiry)* Activities that enable students to consolidate learning though articulating concepts and practice (*Production*). Examples would be creation of artefacts including projects, presentations, essays, videos reports. These artefacts may also be collaboratively created. At the site, technology is used extensively for the creation of these artefacts.

CF Cycle	Activity Descriptions
Teacher Practice Cycle (TPC)	Students can receive extrinsic feedback from lecturers for the TCC production or inquiry activities or TPMC practice activities. Feedback could be provided online asynchronously through text or multi-media comments; or through real-time discussions to address learning gaps. TPC helps students make the connections between conceptual understanding and applied practice by supporting student's internal reflection and modulation cycle. The TPC also allows lecturers to use the feedback generated from activities to reflect and modulate the practice learning environment. For example, lecturers can use data analytics generated from a quiz activity to reflect on possible learning gaps and adjust practice activities or communication (Kennedy, et al., 2014).
Teacher Practice/Modelling Cycle (TPMC)	Lecturers create or curate *Practice* type activities including automated feedback quizzes (most common), games, virtual simulation environments. The purpose is to enable students to receive immediate feedback and independently adapt their actions to achieve learning outcomes. Feedback could include intrinsic/ self-reflection or automated feedback or extrinsic from lecturer/peers or even curated platforms. The use of data analytics could provide personalized learning opportunities e.g. personalized adaptive quizzes.
Peer Communication Cycle (PCC)	Students share conceptions and reflections to receive extrinsic feedback from peers' *(Discussion)* through communication tools or F2F experiences. Examples would be discussion forums activities, collaborative web2.0 tools that support peer-peer communication. During ERT, instant messaging tools were used extensively to support PCC.
Peer Modelling Cycle (PMC)	Facilitates practice through creation of artefacts *(Production)* with peers *(Collaboration)* and/or access to peers' artefacts as reference. PMC supports students internal learning cycle through comparing and reflecting on peer's artefacts. Examples could include group projects or Web 2.0, LMS platforms to share and critique peer artefacts/projects.

Note. CF and the activity types above are viewed from the student's learning perspective. From the lecturer's perspective, the activities and supporting tools must allow the lecturer to access and review students' developing conceptions and practices to provide students constructive feedback. Learning analytics refers to the "measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs" (Siemens et al., 2011, p.4). Kennedy et al. (2014) highlight the role of learning analytics to

provide data on what students are doing to support teachers in closing the feedback loop. Clow (2012) suggests that the use of learning analytics could enable the iterative communication cycles between the teacher, student, and peers with adaptive feedback. Examples of these have been included in the table.

Goodyear (2002) argues that the CF framework may have a restrictive view of learning at IHLs which deal with large student cohorts or courses that focus on the development of generic skills rather than academic learning outcomes. More than a decade ago, Mayes and de Freitas (2004) raise questions on the possibilities for the use of technology to offer a reasonable level of individual dialogue in a situation where there are too few tutors and too many learners. These questions -continue to be of relevance to date, as at the research site, there are foundational modules that involve large cohorts of students. Dzibuan et al. (2018) highlight the role of advanced tools and processes like AI, learning analytics and essay marking to allow teachers to invest more time and resources on personal communications.

The strength of the six activity types is the focus on student actions necessary for learning (in line with Bloom's cognitive domain outcomes). Reflection is required for modulating learning, however, it is not explicitly listed as an activity in the CF framework. Reflection is a key activity in Experiential Learning and Project based Learning pedagogies which are widely adopted at the site and as such was included as a key learning activity. The associated action verbs were adopted and adapted to scaffold learning design activities and communicate learning design examples. This practice has helped lecturers visualize the activities and the possible technology tools to support the learning process in a BL environment. Many lecturers on site use these action verbs to share design ideas. CF informs the conceptual framework for this study and will be used to discuss and communicate the findings.

2.2.2 The Community of Inquiry (COI) Framework

Garrison et al.'s (2000) seminal paper "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education" has been cited approximately 8000 times (based on a Google Search on 9 August 2021), excluding self-citations by Garrison and colleagues. COI, the most widely used theoretical model on online learning (Halverson et al., 2014; Anderson, 2016) identified three interdependent *presences*: teaching presence, cognitive presence, and social presence. The three presences are represented by three intrinsic circles to create a "deep, engaging and meaningful learning" experience through a technology mediated collaborative-constructivist environment (Halverson et al., 2014). Teaching presence refers to the teacher's roles prior to and throughout the course but it can also refer to student-peer teaching (Anderson, et al., 2001). Cognitive Presence is required for students to construct meaning through interaction with teachers, peers, and content. Social Presence is associated with the degree of participation and social interaction between each student and the community (Kreijns et al., 2014). Garrison et al. (2000) elaborate on the role of "computer mediated communication" (technology tools) to facilitate deep and meaningful learning by addressing the three presences. Validated research has found that the presences do interconnect and influence each other as posited (Garrison et al., 2010).

Learning is a social endeavour. Lecturers who question the value of OL, usually point to the lack of human engagement attributed to the lack of physical presence. The COI model has been widely applied to evidence that designing an online course by maximizing the three presences will result in interaction, active engagement, and student learning (Castellanos-Reyes, 2020; Garrison, 2016; Swan et al., 2012; Vaughan, 2010). The COI model equally informs the BL environment where interactions in both real and virtual communities can complement each other (Garrison, 2016). The elements of the COI model have provided the theoretical background for published guidelines and quality frameworks that promote

effective and engaging online learning, such as Online Learning Consortium's Quality Scorecard (Online Learning Consortium, 2021), Quality Online Teaching & Learning (QLT, 2021) and Quality Matters 2014 5th Edition (QM, 2021). At the research site, aspects of the COI instrument (Castellanos-Reyes, 2020; Arbaugh et al., 2008) have been adapted to inform the OLi student experience survey.

The COI model and its instrument has its share of critics too. Shea and Bidjerano (2010) have called for the inclusion of learning presence as a critical construct in COI. Rourke and Kanuka (2009) highlight that many studies adopting the COI model capture only students' perception of their learning; there is a lack of a robust assessment of learning. Several authors also question the equal importance of the three presences. Goeman et al.'s (2020) study also found adult learners in a BL environment were not in favour of social presence initiatives. Garrison and Arbaugh (2007) had suggested earlier that social presence may become "transparent" during the duration of the course as students' progress from familiarizing themselves with each other online to focusing on the academic work in the course. These conclusions are noteworthy for this study's BL environment at a brick and mortar institution. Unlike fully OL, students will have opportunities to meet face to face and interact with their peers during the OLi course and over the three years at the institution. Social presence online may not be as crucial to develop in this context.

Cognitive presence is based on an inquiry driven approach to learning which requires "facilitating the analysis, construction, and confirmation of meaning and understanding in a community of learners through sustained discourse and reflection" (Garrison & Anderson, 2003, p.55). This would require adopting a range of Laurillard's CF learning activities. Bates (2015) cautions the need for teachers' conceptions of knowledge to be aligned with the COI's constructivist-collaborative approach and may be domain dependent. In the context of the institution, OLi courses are parts of larger diploma programs.

Depending on the year of study, not all COI elements are equally important for all courses at the site. Year 1 course outcomes may be focused on developing foundational skills and eventually applied to more complex problems in subsequent years. In summary, the strength of this framework is the identification of the three elements of COI necessary for the design of any optimal constructivist learning environment. COI provides a foundation to discuss strategies and address the lack of physical presence concerns of lecturers new to OL during OLi PD sessions and communications. To foster this community of learners, lecturers will require expertise in several areas including pedagogy, content and technology.

2.2.3 The TPACK model

A complex web of factors come into play to create an ideal BL environment that promotes deep, engaging, and meaningful learning experiences (including the CF activities with the COI presences). Besides student characteristics, Entwistle and Peterson (2004) identified key factors in the teaching and learning environment that impact quality of learning: teacher's subject knowledge and pedagogical beliefs; pedagogy of teaching and learning in the subject (signature pedagogies) and institutional policies and guidelines. In today's context technology based learning has become ubiquitous, the teacher's technological knowledge and beliefs have invariably become critical factors.

Mishra & Koehler (2006) proposed the TPACK model to capture the essential qualities of knowledge necessary to integrate technology into education in specific contexts. Technological (TK), Pedagogical (PK) and Content (CK) are the three primary forms of knowledge, but the emphasis is on the areas that lie at the intersections between the three forms, with TPCK at the core. The TPACK model (expanded from Shulman's 1986 model) has had a profound impact on the field of educational technology (Halverson et al., 2014; Rosenberg & Koehler, 2015). However, TPACK's lack of clarity in communicating

the complexity of educational context has been repeatedly raised in the literature (Koehler & Mishra, 2008; Porras-Hernandez & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015; Tseng et al., 2019). Attempting to address this, Rosenberg and Koehler (2015) advanced the works of Porras-Hernandez and Salinas-Amescua (2013) to include a more complex conception of context and actors (namely, the teacher and student).

To communicate the context around teachers' TPCK, Rosenberg & Koehler's (2015 p.189) adaptation takes into account the micro, meso and macro layers. (Note: Mishra (2019) updated the model to include ConteXtual Knowledge (XK). XK, the knowledge of the organizational and situational constraints within which teachers work, surrounds the three forms of knowledge). The literature provides a diverse range of contextual factors including teacher dispositions, social interactions, institutional resources, and support that affect teaching with technology (Rosenberg & Koehler, 2015; Tseng et al., 2019; Greene & Jones, 2020). As with most polytechnics, beyond content, technology, pedagogy and institutional context, lecturers require knowledge of industry developments and skill sets to design curriculum and assessments that prepare industry ready graduates. Hence, for the context of this study, industry knowledge forms a critical part of the micro layer necessary to operationalize TPCK.

TPCK and beliefs about technology and pedagogy are intertwined and dynamic (Boschman et al., 2015). The model lacks specific details about how the seven knowledge domains individually facilitate the practical integration of technology at scale to support BL practices in complex environments such as the research site (Cox & Graham, 2009). Knowledge of TPCK and how the elements can collectively address problems lecturers face is essential for academic developers (like the researcher). Having conversations with lecturers to determine current TPCK is necessary to support holistic staff development through reflective discussions, coaching and targeted PD activities as lecturers implement BL.

COI emphasizes the elements necessary to support inquiry based learning in socially supported environments. TPACK provides a frame of reference to discuss and reflect on knowledge necessary to design optimal BL environments. An adapted version of the six learning types informs the BL design templates (Laurillard & Masterman, 2010). There are numerous guidelines for designing and developing technology enabled learning, suggesting the generic-ness of such principles (QLT, 2021; QM, 2021). It is of utmost necessity to contextualize these practices to lecturers, students, course, and institutional levels. Collectively these frameworks and models have been adapted and expanded as discussed to inform the institution's PD guidelines for OLi, the research study's conceptual framework and provide the theoretical underpinning to analyse participants' perspectives on BL. However, the frameworks discussed so far are focused on pedagogical design specifically. BL environments are inherently complex and will need to interact and be shaped by different aspects of the learning environment beyond pedagogy, technology and content. The inclusion of context XK in TPACK is one attempt to take this complexity into account when communicating complex educational systems, Wang et al.'s (2015) CABLS framework is another.

2.2.4 Complex Adaptive Blended Learning Systems (CABLS)

Based on the notion of learning as a complex system, Wang et al. (2015) propose a BL framework grounded in the complex adaptive systems theory with its origins in physics, chemistry, and mathematics. Complex adaptive systems are inherently able to self-organize, adapt to, and evolve with their environment to maintain a balance between stability and turbulence (Wang et al., 2015, p.382). Wang et al.'s Complex Adaptive Blended Learning Systems (CABLS) is a six dimensional framework consisting of: Learner, Teacher, Institution, Content, Technology and Learning Support. CABLS places the learner at the centre of the six overlapping dimensions that act in a "dynamic non-linear fashion."

Although each of the six subsystems has "individual characteristics and "*internal driving forces*" it relates and interacts with other subsystems to maintain its vitality" (Wang et al., 2015, p 382).

Wang et al. (2015) apply this framework to 87 empirical studies to discuss each component and the relationships between components. The authors observed that Learner and Content component receive the most attention from the research community, whilst the Teacher-Institution relationship is under-studied. Wang et al. emphasize the need for institutional support and PD to adapt to changing roles and Teacher relationship with the Technology component. Wang and colleagues concluded that none of the studies cover all the six components or the non-linear interactions between the six. CABLS places students at the heart of the system as any learning environment should. For the present study, while lecturers play the central role, the components remain relevant. In the context of the site, curriculum needs to be responsive to industry requirements within the national context. The role of industry partnerships needs more prominence and has been proposed as an addition.

Table 3 summarizes the components based on the Wang et al.'s analysis with proposed adaptions to the site institution's context and environment.

Table 3

CABLS Components Description and Adaptation to the Research Site

CABLS component	Description and research site application
Learner	Learners and their satisfaction with BL receive the most researcher attention (Wang et al., 2015; Torrisi-Steele & Drew, 2013). Many research studies focus on the Learner interactions with the Content and Technology aspects. Learners at the institution include post-secondary school leavers (17-20 years) and increasingly large numbers of adult learners. The OLi was initiated in line with existing evidence on the role of BL in transforming passive learners to active participants, developing 21st century competencies and skills.
Teacher (Lecturer for this site context)	Polytechnic lecturers are required to be dual professionals who continuously stay abreast of changes and developments in their domain/industry and in the educational landscape (Leong et al., 2016). As educators of young adults, lecturers take on a larger role in transferring values, mentoring, and providing pastoral care. Unlike university faculty, lecturers are not required to contribute to domain-specific research. However, lecturers oversee other aspects of curricula for full time programmes, development of skills focused industry specific short courses, organizing and supervising internships, and industry partnership development. Appendix B provides details of study participant profile. The changing roles of educators in OL environments has been reported over the years (Berge, 1995; Bennett & Lockyer, 2004; Goodyear et al., 2009; Munoz, 2013; Ma'arop & Embi, 2016; Houlden & Veletsianos, 2020). Lecturers' roles in BL environments will need to evolve and adapt to the changes in the technology component. More than a decade ago, Berge (2009) posited that new technologies and learning environments, for example virtual worlds, will "shift the focus to informal education, collaborative work, reflexive learning, and user generated content" (Berge, 2009, p.412).
Learning Support (to adapt to the site context, this component is merged as a role in the Lecturer component)	This component refers to the support Learners require to develop effective learning strategies (time management, collaborative skills) and technical support to improve digital literacies. Wang et al. (2015) highlight a distinct lack of empirical research in this area. The authors conceived a separate sub-component to underscore the impact of Learning Support on successful BL.

CABLS component	Description and research site application
	At the site, Lecturers provide learning support and are also assigned as mentors for PET students. PET students have prior experiences with OL at primary and secondary levels (MOE, 2015). Institutional support from other departments (e.g., Special Educational Needs support, counselling) is initiated when necessary. Hence, for the purposes of this study – Learning Support will be placed as sub-roles in the Lecturer and Institution component.
Content (adaptation for the site context, this component is referred to as Curriculum and Content to communicate a broader perspective).	Content includes curriculum design and delivery emphasising a shift from content transmission to 21st competencies development in alignment with the national skills movement (see Chapter 1). At the site institution, the OLi was initiated to develop digital literacy and lifelong learning skills through core curriculum and assessment. This is in addition to other initiatives including Signature Pedagogies that underpin all aspects of programmes including assessment.
Technology	Technology continues to proliferate and provide increasing possibilities to augment the role of lecturers. For instance, Ifenthaler & Yau (2020) highlight the use of the technology component to provide Learner Support through data and analytics (2020). Wang et al. emphasize the emergence, adoption, adaption or abandonment of technologies within CABLS. Eventually, through interaction with the other components, technologies that best facilitate blended learning are retained. Chapter 1 discusses the technology tool provisions at the site institution. At the site, course specific tools are shaped by industry practice. Lim et al. (2019) highlight the value of external partnerships to explore varying education technologies and inform the strategic direction of BL.
Institution	For sustainable BL, Wang et al. (2015) emphasize the need for institutions to have support mechanisms including strategies, policies, support, and service to address learners' and teachers' needs. Wang et al. reported very few empirical studies examine relationships of the Institution with Learner, Teacher and Technology components. Lim & Wang (2016), Lim & Graham (2021) provide cases of programme level and institutional BL strategies from the Asia Pacific region. At the site institution, the OLi s co-lead by the Teaching & Learning Centre and school representatives. There are several mechanisms in place to support Lecturers' as they adopt technology and OLi (as discussed in Chapter 1).

CABLS component	Description and research site application
Industry (proposed addition for this site)	Developing Industry-ready graduates is a mandate for Polytechnics. The IHLs play a crucial role to meet the needs of Industry 4.0 workforce (Singapore's Minister for Trade and Industry as quoted in Teng, 2020; Young, 2021). Beyond professional eLearning platforms or industry content, industry partners also play the role of mentor/coach to Learners for compulsory internship or workplace based courses at IHLs including the site, see Teng (2021).

CABLS provides a holistic and realistic overview of BL components and complex situational contexts. The TPACK model guides PD and reflective discussions with lecturers as they adopt and adapt to BL. COI and CF guide BL design to maximize learning in a collaborative constructivist environment at the site institution. Integrating OL and F2F to create meaningful blended models are dependent on all these factors and actors. Flipped learning is one BL model that offers multiple ways of harnessing these factors and actors, some of which are explored below.

2.2.5 Flipped Learning

There are numerous BL models in the literature (Halverson et al., 2014). Flipped learning (FL) or flipped classroom is the most well-known form of BL. FL is more than merely reversing the place and time of homework vs in-class activities. Jenkins, et al. (2017) describe FL as the process where content traditionally delivered through F2F lectures is replaced with asynchronous online segments; F2F sessions focus on active learning strategies to deepen learning. In a meta-analysis of FL efficacy, Bedrow et al. (2021) concluded that FL optimizes learning opportunities by enabling learning at an individualized pace, leading to better retention. FL reduces in-class cognitive complexity. Students can focus on applying their knowledge to deepen learning and develop skills through constructive activities (DeLozier & Rhodes, 2017).

The concept of inverting (Lage, Platt & Treglia. 2000) or flipping classroom practices has been around for many years. The proliferation of technology tools including the abundance of video content has advanced the practice in recent years. Although videos are commonly used to consume pre-class content (Bergmann & Sams, 2012), a wide range of technologies including mobile applications can be used to support pre-class OL, F2F class and post-class OL segments to deliver content, facilitate active,

collaborative learning, monitor learning, and provide feedback (Hwang et al., 2015). Several large IHLs across the world including Singapore's Nanyang Technological University and DUKE NUS have adopted the flipped model for whole programs or at an institution level (Yang, 2015; Compton et al., 2016; NTU, 2018). Partial FL methods are widely adopted at the site institution. The ERT and post-COVID requirements to reduce large lectures have resulted in a proliferation of FL adoption (Sankey, 2021; Nerantzi, 2020).

There are various flipped design methods, for example: mastery flip approach (Bergmann & Sams, 2012); cooperative learning flip (Munir et al., 2018). Jenkins et al. (2017)'s 'Flipped Learning Matrix model' is an adaptation of Goodyear's (2005) pedagogical framework, Kolb's experiential cycle and the COI framework. The matrix has two dimensions: content-focused to process-focused and teacher-led to student-led to emphasise the design intentions of FL. However, recent developments in the educational landscape suggest the need to relook learning partnerships beyond the teacher-student models. One polytechnic in Singapore has collaborated with industry partners to develop a flipped curriculum with access to industry eLearning platforms and certification (Lau, 2020). Such partnership suggests the need to expand learning environments beyond traditional teacher or student-led models and conventional notions of a "classroom" to include industry and possibly even future-focused technologies like intelligent agents.

2.3 The Role of BL in a Post-COVID IHL Landscape

COVID was estimated to have disrupted the education of 1.7 billion students worldwide (UNESCO, 2020). In March 2020 as most of IHLs around the world made the unprecedented move to fully OL, Hodges et al. (2020) asserted the need to adopt the term emergency remote teaching (ERT) for this COVID induced OL response. Effective OL required carefully planned, deliberate design and

development of learning experiences OL. Hodges et al. rightfully pointed out that teachers needed at least two to three semesters to become confident with OL teaching. It was inevitable that the sudden conversion impacted the quality of OL. In many situations, the improvised approach to ERT was based on possibly limited infrastructure support (Rapanta et al., 2020). The authors argued the need to distinguish the emergency response ERT from OL to avoid comparing the outcomes of the two different approaches to moving online.

2.3.1 A Brief Synthesis of Education Research and Publications During and Post Pandemic

The sudden pivot to ERT has resulted in many teachers and experts using research studies and the written word to reflect and process their experiences. A search for "COVID higher education teaching" returned 229,000 results on Google Scholar (as of 30 August 2021). In the first few months of the ERT pivot, numerous context specific surveys with a focus on immediate needs were administered (including at the site institution). The purpose was to understand how teachers were coping with the move to ERT and to plan for additional support (see for example, American Council of Education, 2020). Think tanks and other influential experts were also looking ahead at the longer-term impact on lock-downs and ERT (see for example, Vlachopoulos, 2020; Eyles et al., 2020). Technology providers also stepped in during the unprecedented time to offer free access to their tools for educators (Gallagher, 2020; Hanoa, 2020; Informa, 2021). Looking beyond the emergency pivot, researchers discussed opportunities for positive change as a result of the COVID OL experience (Zhao, 2020; Zhu & Liu, 2020)

The pandemic also resulted in increased collaborative efforts to understand, support, share resources and best practices amongst the worldwide education community. Examples include: Bozkurt et al.'s (2020) collaborative reactions, reflections and lessons learnt from 31 countries; Valsaraj et al.'s (2021) study of ERT experiences of faculty from United Arab Emirates, Oman, India and Malaysia; Onyema et

al.'s (2020) study of stakeholders across Nigeria, India, Bangladesh and Saudi Arabia; Rapanta et al.'s (2020) insights on effective ERT for learning drawing on expertise from Portugal, Switzerland, Spain, Australia and Canada; Cochrane et al.'s (2020) collaborative development of an evidence based practical guide to design and facilitate distributed learning from various IHLs across Australia. These studies herald a future where increasing use of online affordances will allow lecturers, students, and educational researchers to collaborate seamlessly across borders to facilitate rich learning experiences. Table 4 provides a summary of COVID related literature categorised by the purpose to highlight key themes and directions moving forward.

Table 4

A Selective Overview of Key COVID Related Themes in the Educational Arena

Purpose	**Selected Literature with Brief Descriptions**
Immediate positioning of COVID-19 induced OL practices	Hodgkins et al. (2020) established the term Emergency Remote Teaching (ERT) distinguish between the unplanned OL implementations in response to COVID and planned OL practices. With the adoption of fully OL models, Martin et al. (2020) advocated for "bichronous online learning" referring to a blend of synchronous and asynchronous elements in OL. Bichronous modes offer the advantage of self-paced learning and immediate feedback and interactions. Pre-COVID, this approach has been referred to more generically as blended online learning (Power, 2008). Vlachopoulos's (2020) position paper highlighted four important pillars that require institutional attention for COVID ERT: policymaking, access to resources, training opportunities, and ongoing evaluation and monitoring. Eyles et al. (2020) discussed school closure and possible long term impact on educational achievements.

Purpose	Selected Literature with Brief Descriptions
Professional development, guides, toolkits, and resources to support ERT	De Paul University's Daniel Stanford collated a list of URLs of over 400 ERT guides from institutions around the world at http://bit.ly/rtresourcelist (Stanford, 2021). Examples of guides include: The National University of Singapore's "Quick Guide to Online Teaching" (NUS, 2020), Singapore's National Institute of Education's "Tips for Faculty & Teachers for Home-based learning (HBL)" (NIE,2021) , Joint Information Systems Committee (JISC) UK's guidelines and resources for educators (Bailey, 2020). Rapanta et al. (2020) observed that the mountain of guides and toolkits lack usefulness if teachers do not have the pedagogical content knowledge to determine whether the strategies would be appropriate for their own contexts.
Pulse checks of student experiences and ERT practices (Examples of studies conducted in April 2020)	Sun et al. (2020) reported on a survey of more than 30,000 Chinese undergraduates' experiences with the sudden move to fully OL. The paper included discussions on the impact of ERT on lab based physical science domains. Shim and Lee (2020) described students' experiences at Korean IHLs and discussed students' suggestions moving forward. Wargadinata et al. (2020) found WhatsApp was a useful early response tool for learning continuity at an Indonesian IHL. A study that included stakeholders (parents, teachers, students and policy makers) from Nigeria, Bangladesh, India and Saudi Arabia (Onyema et al., 2020) concluded that "inaccessibility and unavailability" of technology and internet and a lack of digital skills were the hindrances to ERT.
Studies of teachers' ERT experiences	A survey of over 800 US faculty members (Johnson et al., 2020) listed assessment methods, reduced volume of student work and switching to binary pass/fail models as the key changes made for ERP. The faculty highlighted the need for additional support with student support aspects, access to digital resources and guidance for working from home mode during ERT. Trust and Whalen (2021) published the results of a survey on US teachers' preparation and support strategies for remote teaching. In Bailey and Lee's (2020) study, South Korean language teachers' with OL experiences expected less challenges and adopted a wider variety of activities during ERT. Van der Spoel et al. (2020) discussed the significant perception changes on ICT use pre and post-COVID, amongst 200 Dutch teachers in a Netherlands study.

Purpose	Selected Literature with Brief Descriptions
	A study of Indian Optometry educators' ERT practices (Rajhans et al., 2020) reported an increase in student-centred teaching approaches with a shift to more competency-based models beyond physical attendance as a learning indicator.
Making sense of ERT practices: opportunities, challenges, and recovery approaches	An expert-interview study at the start of the pandemic (Rapanta et al., 2020) observed a tool based or content conversion based approach to ERT amongst inexperienced teachers with a lack of pedagogical content knowledge for the OL modality. The experts in this study asserted that these two approaches lack the critical element of effective F2F teaching, "teachers' support for students, including through monitoring their learning processes". (p.927) Based on survey findings from over 400 IHLs worldwide, the International Universities Association (IAU) categorized the impact of COVID-19 and ERT into three dimensions: a) Technical infrastructure and accessibility; b) Distance learning competences and pedagogies of students and teachers; and c) The field of study (domains reliant on specific equipment) and implications for continuity during COVID (Marinoni et al., 2020). Continuing teacher training during the pandemic for pandemic teaching was discussed by several authors including Donitsa-Schmidt and Ramot (2020). Lim (2020) reflected on the five weeks move to full HBL at the Singapore Institute of Technology with an emphasis on clear, frequent communication and a range of faculty training. There are numerous case studies on preparedness for COVID ERT and impact of ERT on students and teachers. See for example: Malaysia (Sia & Abbas Adamu, 2020), Indonesia (Rohman et al., 2020), Philippines (Moralista & Oducado, 2020), Thailand (Petchprasert, 2020), India (Joshi et al., 2020). Tan (2020) took stock of the OL status in Singapore IHLs pre and post-COVID. Based on interviews with students and faculty, Tan posited that the BL approaches that were already being adopted pre-COVID across all IHLs would become even more prevalent.
Moving forward - BL as the new norm, policies, and long term planning.	Darling-Hammond and Hyler (2020) discussed the need for policy to support educators in a Post-COVID landscape. Zhao and Watterson (2021) asserted the need to move forward rather than revert back to pre-COVID educational designs. The authors argued for the adoption of dynamic personalized curriculum and student-centred pedagogies that maximize both OL and F2F delivery modes. Ewing's (2021) study of educational leaders across nine Asian/Australasian countries noted that educators saw the potential of OL to maximize flexibility and engagement beyond physical attendance.

Purpose	Selected Literature with Brief Descriptions
	Throughout this period, multilateral organizations like UNESCO, OECD and the World Bank advocated for the prioritization of education through: policy responses, continued access to education and strategies to recover from learning loss to move forward in a digitized educational landscape (UNESCO, 2021; Beteille, et al.,2020, OECD, 2021).
Re-positioning IHLs, transforming educational practices	At the start of the pandemic, international educational expert Yang Zhao urged educators and institutions to reflect on the COVID induced disruption and re-imagine education to develop global and digital competencies (Zhao,2020). The CEO of edX MOOCs (http://www.edx.org), Anant Agarwal, stressed that BL models were here to stay, "Blended learning increases business continuity and has unique pedagogical benefits which increase learning outcomes. It is the future of higher education" (Agarwal, 2021). In Singapore, industry leaders emphasized the need for IHLs to stay relevant by embracing technology more effectively for: personalized assessment, data driven learning, and tighter industry partnerships. Shorter feedback loops with all stakeholders were required to stay responsive (SAP, 2020). In a report that projected the impact of COVID-19 crisis on education in the short to long term, PwC anticipated a move towards "digital-first" institutions where F2F would be for essentials (PwC, 2020). Similarly, Ernst and Young Australia predicted COVID-19 changes to university experiences with potential students opting for digital first campuses. These changes will have a significant impact on international student numbers in Australian universities affecting funding (EY Oceania, 2021). In contrast, whilst acknowledging the role of OL in reaching more people across geographical boundaries, a UNESCO International Institute for Higher Education (IESALC) report underscored the value of networking experiences afforded by shared physical spaces. If digital divides persist, physical IHLs will continue to exist. The report emphasized the need for IHLs to strategically repurpose their physical spaces (Sabzalieva et al., 2021).

2.3.2 Post-COVID Education: Moving Forward with BL

Increased risks of global pandemics and environmental calamities may require future pivots to emergency teaching modes (DeVaney et al., 2020). In view of possible future pandemics, Singapore's Senior Minister, Tharman Shanmugaratnam advocated the need to build "pandemic memory" (as cited in Lee, 2021). Pre-pandemic, Singapore's Ministry of Education had already embarked on trialling adoption of AI and other advanced technology tools to automate certain teaching and learning process including marking (Yip, 2018). Inevitably, such discussion will bring to question the role of educators and possible displacement by technology. However, Singapore's then Education Minister emphasized that teaching was a "highly personalised, values-transmission process" and therefore education in Singapore would remain a "personalized model" (Yip, 2018). Post pandemic, the current Minister has renewed this call, with an emphasis on the need to proactively disrupt and revitalise IHLs through new thinking and technologies. (Davies, 2021). BL is seen as the best possible solution moving forward, addressing the need for increased flexibility and meaningful learning engagement whilst addressing rising costs (Agarwal, 2021).

The study site is a publicly funded polytechnic that plays a crucial role in ensuring training to meet dynamic industry needs for Singapore's economic development (Bhunia, 2017). COVID has accelerated the need for polytechnics to move to the next phase of training a future ready workforce. Educational models that deliver cross-disciplinary, personalized learning experiences to develop human and digital competencies in partnerships with industry will be required (Jahanian, 2020). At one Singapore polytechnic, a new flipped curriculum model with competency units linked to completion of real-life tasks has been developed in collaboration with US industry partners (Lau, 2020). "The pandemic has given us a huge opportunity." (Nanyang Polytechnic Principal on the new curriculum transformation plans as cited in Lau (2020)).

The replacement of in-person large lectures as an instructional method emerged as a persistent theme in post-COVID literature. F2F lectures are likely to become less frequent and focus more deliberately on engaging students and deepening learning (Times Higher Education, 2021, PwC, 2020). After COVID restrictions were lifted, IHLs in Singapore continued to hold large lectures online (Ang, 2020). Only 10 leaders of 43 institutions in Australia and New Zealand surveyed by the Australasian Council on Open Distance and eLearning (ACODE), indicated a return to on-campus lectures post-2021 (Sankey, 2021). More than half the institutions highlighted sound pedagogy as one of the main reasons for the decision to discontinue F2F lectures.

Pre-COVID, several studies discussed the challenges teachers faced when implementing BL: technology issues; academic workload; institutional support (PD, infrastructure, communication of purpose, incentives); operational (student communications, access issues); providing learner support (for technical and OL skills); teachers beliefs, attitudes, and technology skills (Ocak, 2011, Poon, 2013, Brown, 2016; Graham, 2019). Increased BL adoption and the inevitable changes will have an impact on teachers and their already heavy workloads (Houlden & Veletsianos, 2020). The demands of ERT and the subsequent blended approaches had a significant toll on the physical and mental well-being of teachers in Singapore and worldwide (Qing, 2021; Allen et al., 2020). A World Bank report emphasized the need to provide teachers with pedagogical and technological support as well as support to build resilience to maintain and enable teacher effectiveness during COVID (Beteille et al., 2020).

Despite the many ERT challenges, teachers persevered, with evidence indicating increased confidence and the development of coping mechanisms over time (Al-Freih, 2020; Johnson et al., 2020). Pre-COVID studies found OL experiences: increased teacher acceptance of OL; boosted confidence with technology; increased student-centred learning design approaches with changes in conceptions about T&L (Kearns, 2016; Scott, 2014; Torrisi-Steele & Davis, 2000). As with the site institution's experiences, in institutions

and countries where resources were available, many teachers transitioned to ERT supported by additional PD, increased access to a variety of technology tools, sharing of best practices by experienced teachers and support from learning technologists (Zhu & Liu, 2020). Despite increased confidence with technology post ERT, participants in Al-Freih's (2020) study preferred BL approaches over fully OL to maximize student learning. Within the South Asian context, Wang (2021) argues for BL as the new normal post-COVID as it "unrealistic" to adopt fully OL which has its own limitations, including ensuring accessibility for all students.

> the pandemic has tremendously accelerated the process of mainstreaming online and blended learning in higher education. We cannot return to the old normal where in-person learning was the dominant modality and online learning only playing a supplemental or marginal role. (Wang, 2021, p.vi)

It is inevitable that all aspects of the BL system will need to adapt and evolve when traditional notions of in-person physical classrooms, timetables, lecturer-student roles are disrupted. As the key delivery agents, lecturers play the pivotal role in mainstreaming BL. Institutional reculturing will have a seismic impact on the teaching profession and lecturers as individuals. Geijsel et al. (2007) summarize the key ideas in the literature on leading the process of reculturing, to suggest that "a collaborative culture and teacher participation in decision making accompanied by transformational leadership are conditions that enhance professional learning and educational change in schools" (p.136). Similarly, findings from a US secondary schools' context not specific to BL, suggest student learning achievements increased with collaboration between institutional leaders and teachers, specifically with teacher involvement in decision making and resource and support processes for instructional change (Stosich, 2020). The site institution to an extent, had already initiated change through the introduction of the phased, collaboratively led OLi. This study on perspectives of lecturers as they adopted and adapted to BL can

provide valuable insights to the site institution as it moves towards mainstreaming BL and reculturing institutional norms.

2.4 The Proposed Conceptual Framework

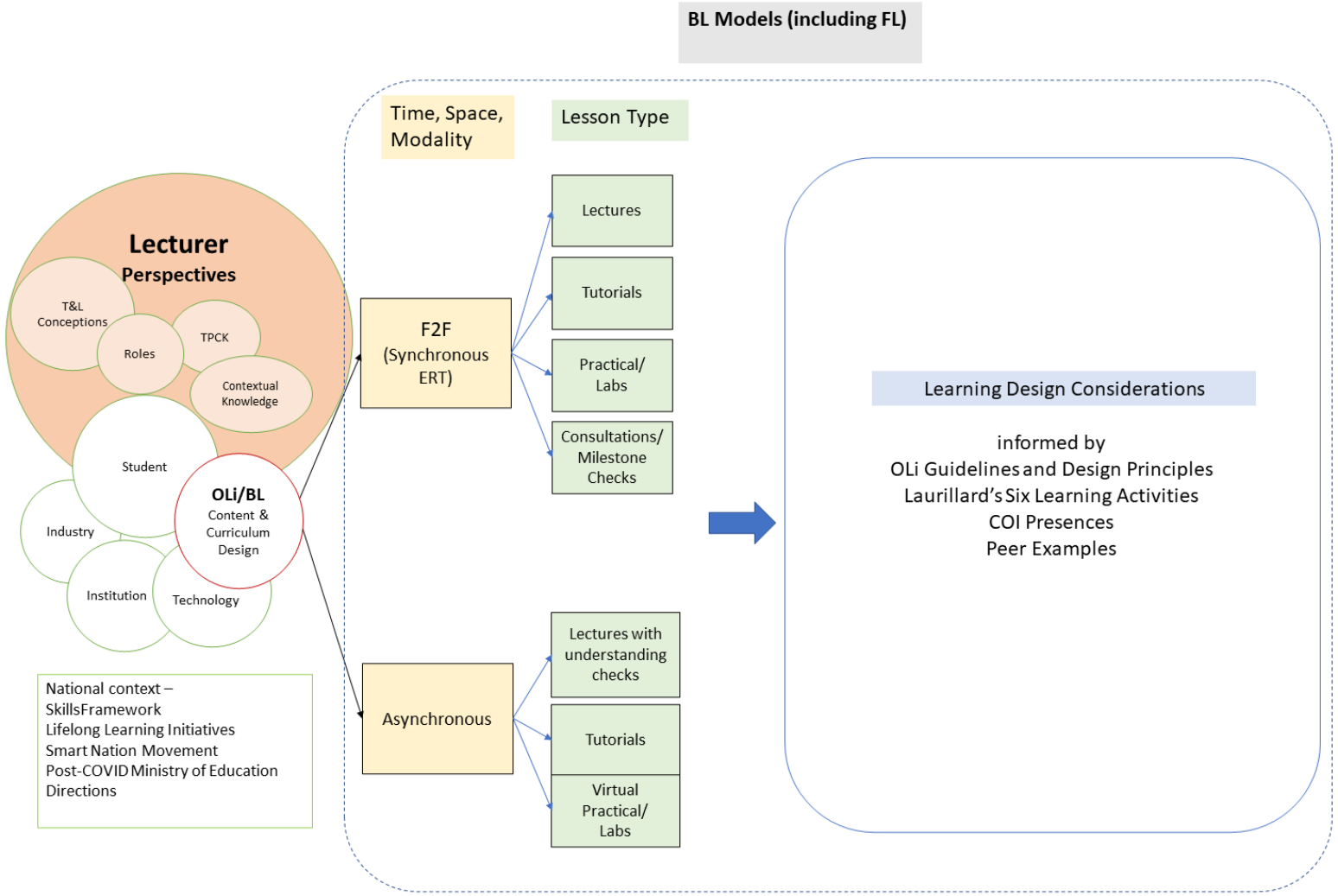
This study focuses on the lecturer's perspectives on adopting and adapting to BL. The literature review clearly indicates these perspectives will be shaped by relationships and interactions with the other components within the complex BL environment at the site. The proposed conceptual framework for this study (Figure 4) illustrates possible relationships between the frameworks and concepts from the literature review. The framework will be used to guide the collection and analysis of data, facilitate the interpretation of the lecturers' perspectives, and communicate the findings of this study. The following paragraphs provides the description and rationale for the conceptual framework components.

Based on the review of the literature, lecturers' perspectives about BL form and continuously evolve when interacting with the other components within the complex BL system. In this study's context, these other component aspects could include students, their profiles and learning needs; the institution's OLi requirements PD sessions and other academic guidelines; interactions with industry on current practices; access to and use of technology tools or interactions with peers. These examples are not exhaustive. Lecturers' perspectives about BL can evolve with their TPACK, contextual knowledge, the change in roles and reflection on experiences and interactions with other components. Lecturers develop OLi modules based on these perspectives. As discussed in Chapter 1, the OLi designs developed by lecturers may include varying percentages of F2F, synchronous or asynchronous experiences for the different lesson types. In this context the OLi designs could be shaped by lecturers understanding of the OLi guidelines, the six activity types, lesson planning templates with emphasis on COI presences introduced during the compulsory PD sessions, peer examples introduced through the OLi forums,

coaching by staff professional developers or availability of team members to co-design. The key aspects of this conceptual framework aid in the design of data collection methods and analysis processes.

Figure 4

A Conceptual Framework to Interpret Lecturers' Adoption and Adaption to BL



Adapted from Wang, et al.,(2015); inspired by Saghafi et al., (2014)

2.5 Conclusion

This study aims to interpret and make sense of experienced lecturers' perspectives on adopting and adapting to BL as part of an institution wide implementation. The context of this site is a Singapore polytechnic IHL focused on developing diverse cohorts of learners to be industry ready graduates. Applied industry focused curriculum, technology for learning, 21st century competencies and signature pedagogies for the professions (Shulman, 2005) are hallmarks of the institution's T&L practice.

Post COVID, the literature clearly suggests institutions worldwide will intensify adoption of blended and digital learning approaches to address the needs of future orientated work and prepare for potential emergency situations including pandemics, humanitarian crises or environmental catastrophes. The local and international literature reviewed in this chapter depicts the complexity of BL environments with its dependence on a multitude of dynamic factors and actors. It is evident that there is no one size fits all approach to BL. The review suggests the pivotal role of lecturers in the successful adoption of BL. Specifically, lecturers' TPACK knowledge, their ability to design learning that builds on evidence based CF activities to foster a community of inquiry, supported by their interactions with other components of the complex BL system. The conceptual framework proposed in this chapter visualizes the key components that impact lecturers' perspectives of the OLi within this complex context.

Despite the decisive role of lecturers, researchers have repeatedly highlighted gaps in the literature that focuses on understanding lecturers' BL perspectives (Torrisi-Steele & Drew, 2013; Sun & Chen, 2016; Verpoorten et al., 2020) especially within an Asian context (Lim & Graham, 2021). This understanding has become even more vital post pandemic. The Singapore government's move to make BL mainstream requires the site institution and possibly other similar institutions to urgently identify factors that can facilitate or derail the successful mainstreaming of BL.

To understand lecturers' perspectives about a complex phenomenon like BL, it is necessary to uncover the lived experiences of lecturers' as they adopt and adapt to BL. Hence the need to adopt a qualitative research methodology. Chapter 3 discusses this study's qualitative research methodology including the theoretical framework and design decisions taken to address the study's aim and central research question.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the study's underpinning theoretical framework, the basis for research design and selection of the methodology, related instruments, and data analysis process. The chapter also describes the participant selection strategy, the steps taken to manage possible limitations to ensure data quality and ethical considerations. My role as a researcher and research instrument are also critically reviewed.

3.2 Theoretical Framework

This study aimed to generate local theory regarding polytechnic lecturers' perspectives on designing blended learning in Singapore. As a theoretical position, interpretivism views the world and its multiple realities through participants' perspectives, actions and interactions of these perspectives and actions over time (O'Donoghue 2019; Creswell, 2013). Interpretivist paradigms are well suited for studying context-specific, "complex multi-faceted social processes", and enable theory construction in areas with no or insufficient a priori theory. (Bhattacherjee, 2012, p.105). I am working within the interpretivist position as I seek to understand and interpret reality from the perspectives and lived experiences of lecturers within an OLi at a polytechnic institution of higher learning.

In-depth, rich data is necessary to support an interpretivist approach. Qualitative research enables the researcher to explore, make sense of and interpret the meaning individuals or groups ascribe to a phenomenon in their natural settings (Creswell, 2013; Denzin and Lincoln, 2005). Qualitative methods allow for inductive, open-ended data gathering through a process that values deep attention and empathetic understanding (Punch, 2014). A qualitative methodology that supports a ground-up

inductive enquiry starting with participants' perspectives was most appropriate to achieve the aims of this interpretivist study.

Woods (1992, p.7) defined perspectives as “frameworks by which people make sense of the world”. Tabachnick and Zeichner (1980) defined teacher perspectives as the ways in which teachers think about their work (e.g., purposes, goals, conceptions of students, curriculum) and the ways in which they gave meaning to these beliefs through their actions. Both these definitions are based on Blumer’s (1969) symbolic interactionism theory. Punch (2014) succinctly describes symbolic interactionism as a general theory which stresses that people behave in terms of the way they define, interpret and give meaning to situations (p.139). Blackledge and Hunt (1985) expanded on Woods’s definition by listing the key components of perspectives from the point of view of a researcher working within the theoretical framework of symbolic interactionism. People’s perspectives can be unpacked as four interrelated strands: aims or intentions, strategies to achieve these intentions, outcomes expected from pursuing these strategies and the significance they attach to these outcomes, and the reasons for their intentions, strategies, outcomes and significance (Blackledge & Hunt, 1985)

3.3 Research Aims and Questions

Research Aim

The aim of this study is to generate local theory regarding polytechnic lecturers’ perspectives on designing blended learning in Singapore.

Research Question

What is the most comprehensive theory that can be generated regarding the perspectives of lecturers on designing blended learning at a polytechnic in Singapore?

For the purposes of this research, comprehensive theory refers to the explanatory theory that most

comprehensively encapsulates the perspectives of the participants as articulated in the data.

Guiding Questions

The guiding questions for this study was based on O'Donoghue (2019) unpacking of Blackledge and Hunt's (1985) framework. The four questions based on the four strands, provided the basis of interview conversations with participants:

i. What are the intentions of the lecturers with regard to designing for OLi? What reasons do they give for these intentions?
ii. What strategies do the lecturers say they adopt to achieve their aims and intentions? What reasons do they give for utilising those strategies?
iii. What outcomes do lecturers expect from pursuing their intentions and strategies? What reasons can they give for this?
iv. What significance do the lecturers attach to the outcomes? What reasons can they give for this?

Please refer to Appendix A for the interview guide with possible probing questions.

3.4 Research Design

Yin defines the case study research method as an "empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p.23). Creswell (2013, p.73) defines case study research as the study of an issue explored through one or more cases "within a bounded system" (i.e., a setting, a context). As this study seeks to provide an in-depth understanding of lecturers' perspectives about designing online learning within context of OLi

implementation at the polytechnic, a case study approach was deemed appropriate. In this study, the case of the lecturer's perspectives on designing online learning cannot be explored or considered without considering the institutional context and OLi.

A key criticism of the case study approach is that it lacks generalizability (Stake, 1995; Lincoln & Guba, 2000). This study does not seek to develop a generalized theory; the focus is on generating the most comprehensive local theory which could add value to existing literature. The theoretical framework of this study resonates with Stake (1995) and Lincoln and Guba (2000) on the value of naturalistic generalizations; people can infer and learn from everyday life experiences including reading this case study. To promote generalization by the reader, a detailed and descriptive context, thick descriptions, use of ordinary language to explain the methods and adequate raw data (participants' quotes) are all required to allow readers to make their own alternate interpretations (Stake, 1995).

Stake (1995) suggests that a collective case study (or multiple case study) can be used to illustrate the one issue or concern by selecting multiple cases to study. Purposefully selected multiple cases could highlight different perspectives on the issue through the analysis of individual cases as well as the similarities and differences between cases. Runeson et al., (2012) highlight that the objectives of case studies are two-fold; notably increasing knowledge (e.g., about lecturers, the institution and about the OLi phenomena) and informing change in the phenomenon being studied (e.g., informing change to the OLi). For these reasons, this research was approached as a single site collective case study of the perspectives of multiple lecturers from different schools (domains) at the institution. The unit of analysis is the individual lecturer. The boundaries for this case within the context was the experience of the participants: lecturers within the institution who have experiences of designing online learning for at least six semesters. This group of lecturers were part of the initial OLi roll-out plan, and they have the

most experience designing for BL at the institution. The collective experience, together with their high recognition for excellence in teaching and learning (see below) constitutes the participants as experts in the context of this study. The following sections describe the site context and provide clarity on participant selection approaches.

3.5 Context of Site

The site of the case study is a large polytechnic in Singapore engaged in a phased pre-COVID OLi intended to leverage technology for learning to encourage SDL and develop work-ready, digitally competent graduates. As discussed in the Chapter 1.2.2, the OLi was implemented in stages from 2017 with a pilot stage launched in 2016. A key aim of the initiative was to develop teaching staff's digital competencies. Lecturers were required to design, develop, or curate the OLi experiences rather than adopt an outsourced development approach. Provisions for training and support were put in place to enable this. To encourage experimentation and exploration as lecturers adopted and adapted to designing and teaching online, the initial focus was on quantity/number of courses to meet the objectives of OL experiences for all students (Ng, 2019).

The COVID pandemic hijacked this initiative and forced all teaching staff to adopt a 100% ERT OL approach. Although the study aims and the participant population did not change, study participants could now share perspectives about their phased move to OLi and the stress-filled short runway (maximum 4 weeks) to prepare for full ERT. Chapter 1, Table 1 summarizes the institution's journey to full ERT. Chapter 1, Figure 1 lists the key OLi guidelines.

The OLi design guidelines (Chapter 1, Figure 2) required learning experiences to include formative assessment tasks to help students check their understanding and receive feedback (automated or

personalized). This provided lecturers with means to monitor and gather feedback on student learning during the asynchronous segments. Assessment practices at the institution during the OLi implementation period included a continuous assessment component (midterm written tests, mini projects), applied learning component (supervised final projects, practicals) and an invigilated summative assessment component. To develop industry ready graduates, all projects inevitably involved the use of technology either extensively or for presentation and evidencing purposes. Development, discussions and scaffolding for these projects are usually embedded within the tutorial/practical sessions. During the pre-COVID OLi period, summative assessments were F2F invigilated exams, either handwritten or using e-assessments tools. Due to these assessment practices, lecturers at the institution do not relate summative assessments to asynchronous or blended modes. All other activities including projects are understood as formative, continuous assessment. Based on this background context, interview questions did not specifically discuss summative assessments, unless it was brought up by participants themselves. (The institution is in the process of reviewing its assessment policies as part of a curriculum transformation plan).

3.6 Sampling and Participant Selection

The population for this study was all lecturers at the institution who had at least six semesters of blended teaching experience as of October 2019. The lecturers were part of the first phase roll-out of the OLi in October 2017 and were assumed to have the most experience designing BL within the institution. This study was a single site collective case study as all participants were guided by the same institutional policies. A combination of sampling strategies was used for this study. To ensure richness of the data across domains for this qualitative study, a purposeful sampling approach which involved identifying and selecting participants who are especially knowledgeable about or experienced within each school at the polytechnic was first used (Creswell, 2013). This was followed by a convenience

sampling approach based on practicalities like availability and willingness to participate (Frey, 2018).

Participants were a selected group of twenty-three staff with at least six semesters of OLi design and delivery experiences. Teaching experience ranged between five and thirty-eight years. Twenty-one participants had received recognition for good teaching practices from the institution and students. As the OLi was a deliberately planned whole of institution implementation, the selected participants were from nine professional domains across the institution offering both pre-employment (PET) courses to post-secondary students and continuing education (CET) courses for adult learners. For anonymity purposes the domains are mapped to SkillsFuture Singapore domains (https://www.skillsfuture.gov.sg/) rather than the specific diploma titles.

Between commencement of the OLi and data collection, institutional changes discontinued some of the courses discussed and some participants changed roles, but their experiences/contributions as pioneering BL developers remained relevant to this study. Appendix A provides the details of the participants (identification number, years of teaching at the institution, domain based on the National Skills framework, year of OLi adoption, percentage of adoption (pre-COVID), OLi recruitment type - voluntary, school selected or member of OL committee). The details provided take into consideration the undertakings of confidentiality and anonymity given to the participants in compliance with national ethical guidelines.

3.7 The Researcher as Instrument

As this is an interpretive qualitative study, as the researcher I was the instrument for the interviews (Rubin & Rubin, 2005). My philosophical views and assumptions, my experiences in this area are all lenses I brought to the field as I interacted and uncovered participants' perspectives. I am a computer

scientist by training. I have been in the field of higher education for over 20 years in various positions including teaching, facilitating in Problem Based Learning environments, course coordination and eLearning development. I design and facilitate online and F2F PD courses within the institution. I also provide consultations and coaching sessions to facilitate lecturers' transition to BL. My role requires me to connect colleagues, practices, and ideas across the institution. This has helped me cultivate networks across the institution. Having this established rapport and trust was helpful in the research field. I strongly believe in social constructivist approaches to learning with a preference for interactive learning experiences. This will impact the sense-making and interpretation of the findings as well. As a trained facilitator, I am always mindful of my personal teaching preferences when communicating with colleagues. Memoing my reflections and ideas and sharing some of these with my participants as I did my fieldwork and analysis was one way of surfacing these thoughts (Saldana, 2011) and managing potential bias in the sense-making and interpretation of findings.

The research was conducted within my organization. I did not lead the implementation of the OLi, but I played a major role in designing and facilitating the two- day compulsory boot camp as well as online and face to face workshops. I also offered consultations to colleagues on a request basis. As there is always the possibility that some colleagues may be reluctant to criticize institutional policy and practices, I presented myself as colleague and implicated researcher engaged in collegial inquiry.
In conclusion, to establish trustworthiness and ensure quality of the data, I tried to check on my own sense-making and take a reflexive stance and how my own sense making was reflected in the research process (Schwartz-shea & Yanow, 2012; Charmaz, 2006). I have attempted to articulate my perspectives and values to the reader as I describe, analyse, interpret the data, and report findings.

3.8 Ethical considerations

Ethics approval was received from the HERA at the University of Western Australia (University of Western Australia, June 14, 2019). The approval detailed consent, access and confidentiality requirements. As part of the site organization's internal requirements, permission for this study was also sought from the institution's Internal Review Board and the head of department (Note: this communication is not cited to maintain anonymity of institution and participants).

This study was conducted within my own organization. Trowler (2011) refers to this as insider research. There is much value for such workplace-based studies where the researcher has a good contextual understanding, but I am mindful of possible biases including possible influences and power structure biases. The participants work in the same organization with a few hundred staff members but at different schools. Participants do not have any hierarchical reporting structure links to me, the researcher. My position is one that supports the PD of these colleagues but does not include reporting evaluations or judgements about their development back to the schools. As indicated, I communicated my role as a researcher involved in collegial inquiry to possibly inform the improvement of the OLi. Participants were invited through personal contact and email (Appendix C) with an introductory letter (Appendix D).

Interviews were conducted after receiving informed consent from voluntary participants using an Informed Consent Form (Appendix E) (which included objectives of study, participant's role and offer to withdraw). Participants were informed that their interests will not be compromised by sharing in-progress data or analyses with those who may hold reporting or performance management responsibilities. As the results will be disseminated, to address confidentiality and anonymity of the participants, I have referred to Participants with a numeral. To ensure participants did not feel misrepresented, each interviewee was provided a summary transcript including thematic headings

(discussed in Section 3.9) via email with an opportunity to seek corrections or clarifications.

3.9 Data Collection and Management

3.9.1 Semi- Structured Interviews

Interview data for this study were collected in individual sixty to ninety-minute semi-structured interviews between October 2019 and November 2020, across the pre-COVID divide into compulsory Home Based Learning or ERT OL experiences. Interviews were collected, initially face-to-face but through MS Teams virtual meetings after the introduction of the Circuit Breaker (CB)/lockdown in March 2020. Four of the six pre-COVID interview participants responded to further email queries on their COVID semester experiences.

Semi-structured interviews, with the flexible guiding questions (Appendix B) encouraged participants to describe their experiences, clarify and elaborate perspectives on their lived experiences of designing OL (Kvale, 1996). To improve the quality of interviews, draft interview questions were piloted with a lecturer who had experiences with qualitative research and four semesters of OLi experience (outside the research population). The responses provided feedback on the phrasing and clarity of questions. The pilot interview also helped to identify potentially leading questions, and this proved useful in shaping the final Interview Guide. The use of the Interview Guides ensured that I could deliberate and plan "on how use the limited time available in an interview situation" (Patton, 1990, p.283). The question-based Interview Guide also included possible probing and follow-up questions (Given, 2008). Adopting a semi-structured interview approach allowed me to inquire further into areas that arose during interview conversations. The Interview Guide ensured I maintained commonality throughout all the interviews. To manage potential biases when listening or transcribing, I adopted Given (2008)'s suggestion of asking

participants to elaborate on or clarify what they have said, summarizing what was said at different junctures and again at the end of the interview.

I was mindful of Punch's (2014) caveat on the accuracy of interview responses for several reasons including memories or social desirability. Verbal responses may not relate to what participants actually do. However, as most OL experiences are asynchronous and accessible anytime, anywhere, adopting Rapley's (2004) suggestion of using observational methods was not feasible. To address this issue and facilitate better evidence of practice, interviewees elaborated points using their live or archived online courses to elaborate during the interview.

3.9.2 Data Collection and Management Process

Permission was sought from participants to audio record the interviews. For quality purposes a digital voice recorder device was used. Audio files were downloaded to an external hard drive and deleted from the device post interview. For the post-COVID interviews, the Ms Teams meetings were video recorded with permission. Due to the nature of internet-based video conferencing tools, the interview was recorded securely in the organization's cloud servers as private files. Participants were informed the videos would be downloaded immediately after the interview and promptly deleted.

I transcribed all interviews as a combination of selective verbatim quotes (sans fillers) and summaries of certain passages (Given, 2008). Where deemed significant, expressed emotions and my interpretations of affective feelings were included at the end of quotes in brackets (laughs) (expressed anxiety). The transcriptions were organized by thematic headings with notes of my interpretation and provided to participants for verification and checking. This approach to sharing the thematic headings also provided some validation for the next stage of coding.

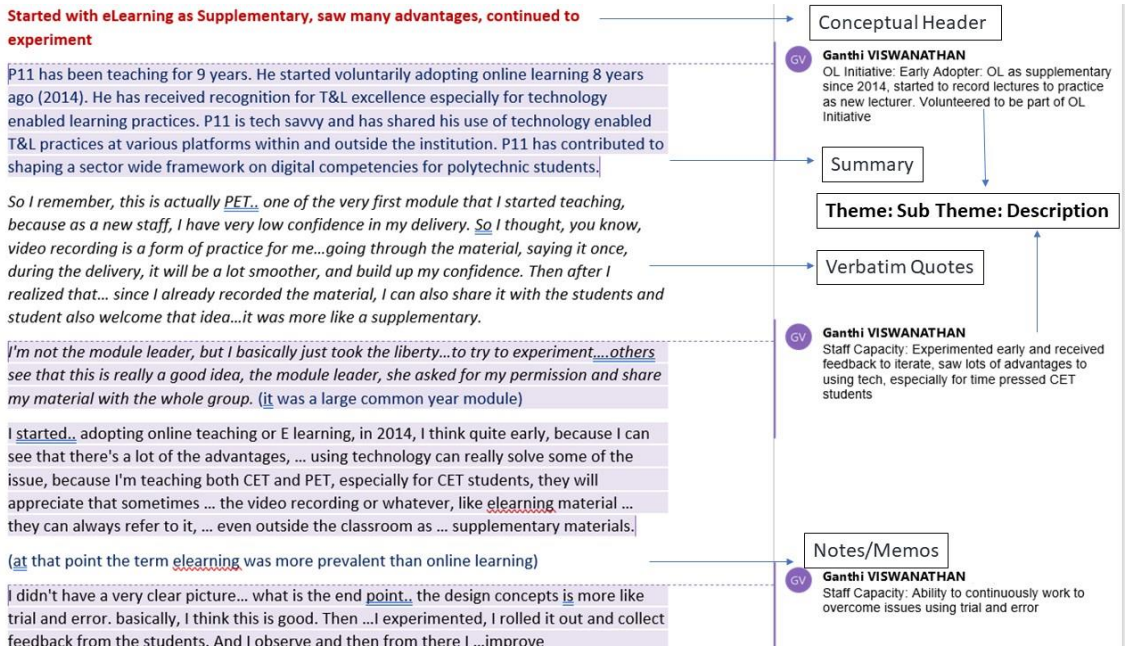
3.10 Data Analysis Process

Transcripts of the interview data were analysed in a grounded theory process using an inductive open coding approach (Cohen, Manion, & Morrison, 2018). I transcribed all interviews for analyses mostly adopting a word for word approach. Inductive thematic analyses (Braun and Clarke, 2006) were conducted in three (iterative) stages after member checking:

Stage 1— familiarisation of data and initial coding. I read through a few interview transcripts and annotated with initial noteworthy themes and sub-themes. Themes were largely at a semantic level, based on descriptions or surface meanings (Braun & Clarke, 2006, p.84). Rather than answers to interview questions, I re-organized the transcripts using a structural coding approach (Onwuegbuzie et al., 2016). This involved compiling related passages with conceptual phrases as headers. At this stage, patterns had already started emerging. Figure 5 is a screenshot for P11's transcript.

Figure 5

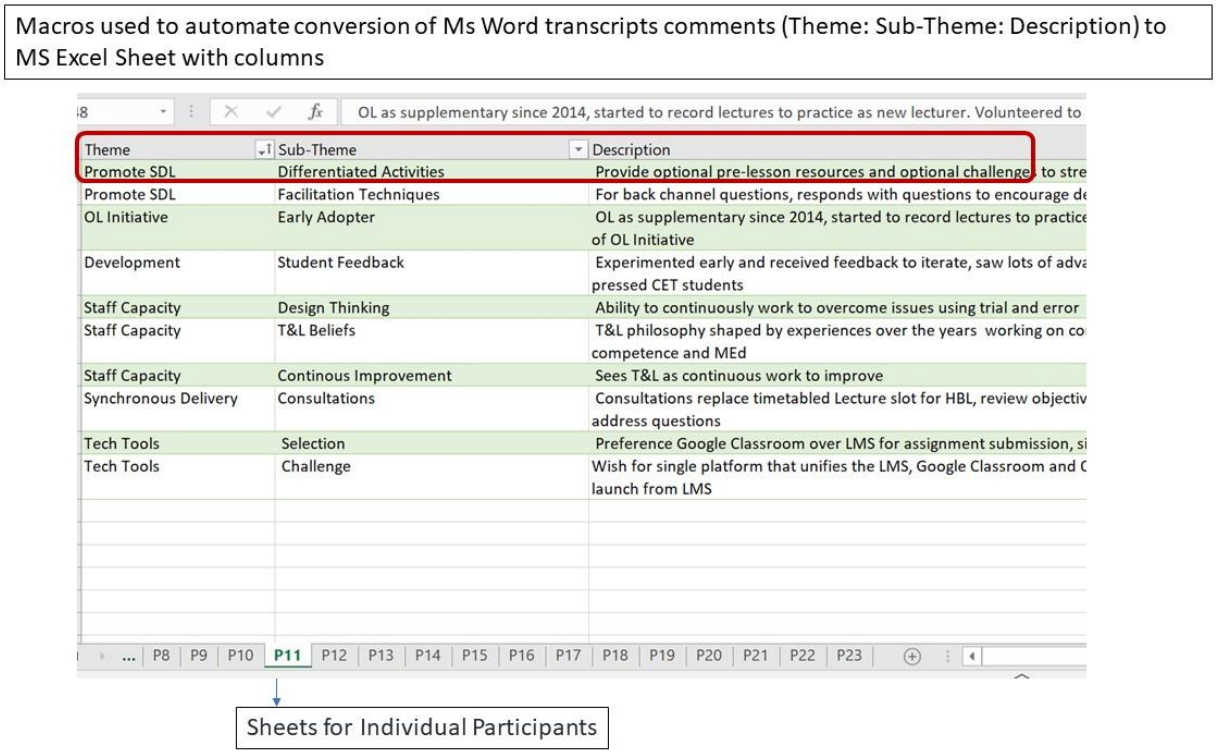
Screenshot of Stage 1 Analysis of Interview Transcripts



Stage 2 —latent or analytic level coding. After the first few transcripts, the themes naturally moved beyond emphatic level descriptions to include analysis of the meaning behind what was said. In an iterative process, some of the initial themes were combined to broader themes, or new themes/sub-themes were formed (Figure 6). It was inevitable that analysis was informed by my professional experiences and the literature review. All themes, sub-themes and descriptions for each participant/case were transferred to a spreadsheet using macros to automate the conversion and avoid errors. At this stage, links between the various themes and the components of the conceptual framework, were fully emerging.

Figure 6

Screenshot Early Stage 2 Analysis and Participant-Based Coding Sheets



Stage 3 — with a list of themes and sub-themes, I coded all the remaining transcripts to create an excel database of themes, sub-themes and descriptions with separate sheets for each participant. This process was fluid and required repeated reviewing of the themes, sub-themes and codes depending on the patterns that emerged from the data (transcripts) as more interviews were coded. This approach allowed for what Creswell (2013) terms as within-case analysis (themes and sub-themes for each participant) followed by a cross-case analysis or a thematic analysis across the cases. Figure 7 provides an illustration of the spreadsheet organization.

Figure 7

Extract Of Themes Depicting Evolution of Descriptive to Analytic Coding

Initial Themes	Sub Themes
Design	frame relevance motivational triggers flipped approach ease of navigation visually appealing facilitation techniques social media platforms understanding quiz activities simulation games
Technology	analytics automated feedback lack of personalization features
Development	CET needs PET visuals PET games elearning platform industry content teacher presence maintenance technical skills iterative design
CET	time poor digital competencies
PET	media preference social needs self regulation lecturer presence
Promote SDL	facilitation strategies time management tools communication strategies
Staff Capacity	technical skills OL learner proactive support seeking

Conceptual Framework Components	Themes	Sub Theme
Lecturer- Student Lecturer - BL Model Lecturer -Technology	Maximize engagement, humanize interactions	frame relevance motivational triggers ease of navigation engaging designs lecturer presence F2F communication strategies
Lecturer – Technology Student – Technology Lecturer – BL Model Technology (Features)	Community building	rapport facilitation techniques back channels social media tools
Lecturer – Student Lecturer – BL Model	Learner/Learning Visibility	TPC analytics authentic activities shy students flipped approaches
Lecturer – Technology Lecturer – BL Model Technology (Features)	Immediacy/Spontaneity	back channels flipped approaches synchronous sessions automated feedback adaptive features
Lecturer – Technology Lecturer - Industry Lecturer (Design Skills)	Curation	industry relevance workload professional quality
Lecturer (TPCK) Lecturer (Design Skills) Lecturer – Technology	Creation	teacher presence content contextualization workload
Student (Characteristics, Digital Competencies) Lecturer – Student Student – Technology	Student Profile	time availability digital competencies domain preference engagement needs socioemotional needs self regulation skills
Lecturer (TPCK) Lecturer (Role) Lecturer (Design Thinking Skills)	Lecturer	Iterative design TPCK design skills support seeking OL learner facilitator/conductor/consultant

Stage 4 - the last stage of data analysis happened whilst reporting the Findings and Discussions chapter, as the data and themes were compared to the themes identified in literature review and the conceptual framework to find similarities and differences for discussions (Figure 7).

3.11 Member Checking

Member checking is a commonly used strategy to enhance the validity of qualitative research findings (Given, 2008). Due to COVID related work exigencies it was not possible to provide transcripts immediately after the interviews for member checking. Member checking was done during the semester break periods. Transcripts were organized by thematic headings, related verbatim quotes, summary of discussions, and my interpretations. This resulted in most participants reviewing their summary transcripts very closely and providing additional details or more recent experiences since the interviews. Separately, some participants voluntarily provided updates on strategies they had adopted and outcomes at the end of the semester. I conducted post-COVID semester follow up interviews of thirty to sixty minutes with four participants who volunteered. These interviews were recorded, and notes sent to participants for verification. Member checking in this instance had shifted from a one-off event to an ongoing process (Given, 2008).

Many participants were appreciative of the opportunity to share their efforts and challenges to a willing listener: “Was an opportunity to reflect and consolidate my OL journey” (Participant 6, Email communications). From the post interview email communications, it was apparent that participants felt the word for word transcripts provided descriptive validity through accurate rendition of experiences and the thematic headings and notes “captured the meaning those experiences had for them (interpretive validity)” (Schwartz-shea & Yanow, 2012).

3.12 Trustworthiness Measures

The trustworthiness of this qualitative study cannot be judged by positivist standards of validity, reliability and replicability. As the sole researcher in this study with limited resources, it was not feasible to have an additional person to review the codes and themes to increase trustworthiness (Given et al., 2012). It is inevitable that my professional and personal experiences will have an impact on the coding process and selection of what is to be coded. Providing participants summary of transcripts with conceptual theme headings and memo notes created an additional opportunity to increase trustworthiness (Figure 5). Besides taking a reflexive stance throughout the process and member checking, the following measures were taken to increase the credibility/trustworthiness of this research:

- Thick Description: I have attempted to provide rich and descriptive details including short stories or Vignettes so the readers can see and hear what I experienced and engaged in the field. As highlighted previously, this may also enable the readers to assess the relevance of the research to their own context to allow for transferability (Lincoln & Guba, 2000).
- Audit Trail: I have maintained an audit trail that includes all email communications with participants as exported PDF files, recorded audio and video interviews, interview field notes with date, time and venue, iterations of the interview schedules, participant consent forms, iterations of the coding files, iterations of the reports on a personal hard drive (Given, 2008; Lincoln & Guba, 1985). This will allow me to reconstruct the research process and "provide a means to address issues related to the rigor of the research as well as the trustworthiness of the results" (Given, 2008, p.44).

3.13 Conclusion

This chapter described the methodology and procedures used in this study. The reasons for adopting a case study approach and the background context of the site institution were provided. The justifications for using semi-structured interviews as the data collection method for this interpretivist qualitative

approach were detailed. To enable transparency, my theoretical orientations, personal experiences and how it informed and shaped this qualitative study was clarified. The steps taken to address the quality of this study and method of analysis were explained, with supporting screen capture of working documents.

The next chapter presents the research findings and discussions using the themes and sub-themes generated using reflexive thematic analysis (Braun & Clarke, 2006). It is structured based on the dominant themes and the overarching BL models that emerged from the analysis.

CHAPTER 4

FINDINGS AND DISCUSSIONS

4.1 Introduction

This qualitative study aimed to generate local theory regarding the perspectives of lecturers on designing and delivering blended learning at the site institution. This chapter presents the findings and discussions organized by the broad categories that emerged from the grounded analysis stage. The findings and discussions are presented as six main themes with relevant sub-themes. Participants' intentions and strategies manifested as BL models, forming the main discussion thread and underpin the discussions for other themes.

Quotes are used extensively throughout this chapter. Quotes provide access to the participant's authentic voice, represent the dominant themes emerging from the data and help to illustrate an analytical point (Lingard, 2019). For similar reasons, short narratives or vignettes have been placed strategically throughout this chapter to display and discuss the data. These narratives communicate the participants' lived experiences and help me (the researcher) to bring my analysis and interpretations of the data to life.

A brief overview for each segment is listed below:

4.2 BL Models and Pedagogical Strategies - This segment distils and codifies the BL strategies and pedagogical reasoning of the experienced (and in many cases exemplary) participants. The learner, technology, institutional, industry and lecturer aspects are discussed in further detail in the subsequent segments. Analysis of BL models suggest that a one-size-fits all model will not address learners or course needs.

4.3 Addressing Diverse Learner Needs – A key theme that surfaced from the data was participants concerns about addressing and supporting the needs of diverse learners in BL environments, specifically at-risk students, and time poor adult learners.

4.4 Maximising Engagement, Humanizing Interactions – Participants were very mindful of the lack of physical presence and the resultant loss of human interaction during OL segments. The data revealed deliberate designs to support students' social emotional and cognitive needs and maintain a sense of community.

4.5 Mapping Technology to BL practices – Technology was embedded in all aspects of participants' BL practices. This segment discusses the criteria and factors (including industry) that shaped the selection of technology to support learning and learners. Challenges related to access to tools and licenses also emerged as a key theme. Enabling and sustaining innovative practices will require support for experimentation and flexible access to a range of tools.

4.6 Professional Development and Institutional Support – Varied PD strategies and the suspension of evaluation during the initial OLi phases emerged as themes for support and success factors. The analysis suggest that the prolific nature of technology and the dynamic 21st century education landscape require continuous and differentiated institutional support.

4.7 Lecturers' Roles and Reflections – Lecturers reflected on their evolution from fully F2F to OLi to fully OL ERT experience. What emerged from the analysis was participants' persistent problem solving, continuous learning and design thinking skills to adapt and evolve to thrive in the educational landscape.

4.2 BL Models and Pedagogical Strategies

Polytechnic courses integrate conceptual knowledge with hands on applied skills to develop industry ready graduates. At the site institution, lectures as an instructional method, focus on learning by acquisition and support the conceptual theoretical layer of Laurillard's CF (refer to Chapter 2.2.1 CF section discussion). Tutorials or practical and assessment tasks support the experiential layer through integration of theory with applied reflective practice. Additionally, reflection as a planned learning activity promotes metacognitive skills. These activities when combined, support the core learner adaptation cycle of CF.

The OLi's primary objective was to develop students' SDL and digital competencies. Despite this, many participants emphasized that developing SDL was not their initial intention for BL adoption (P10, P11, P12, P14, P17, P22 and P23). P11 and P22's comments highlight the starting point of OLi for many: "I didn't think like this immediately in 2014" (P11); "I didn't really think so much at the start. It's more like the management asked, since it's the direction that the school wants to pursue, I agreed" (P22). or the five pre-OLi early adopters (see Appendix B), flipping lectures was a solution to a pedagogical or student engagement issue (see Vignettes #1 and #2). Flexibility, addressing the pace of learners, increased engagement, and effective use of F2F time were the key reasons for adoption. Some participants started off reluctantly but soon discovered the benefits of a BL approach (see Vignette #3). For P17, who was assigned an OLi course in her first semester as a course leader, it was a matter of meeting requirements: "The focus was on creating OL content and making sure students could understand it and learn; the need to develop SDL, explore designs came much later" (P17).

Vignette #1 Early Adopter: Experimenting with BL to solve pedagogical issues

"When we are faced with issues as an educator, then we try to think of ways to really overcome and solve it" (P11).

As a new lecturer, P11, an engineer, lacked confidence in standing in front of a large lecture theatre. To practice his presentation skills, P11 experimented with rehearsing and recording lectures before each class. Having recorded the video lectures, he decided to share them with his students as supplementary revision materials. His CET adult learners found the videos useful as "they could always refer to it, even after class". The course manager saw the value of these recordings and requested to share them with the rest of the cohort. This eventually led to replacement of some F2F content delivery.

Having experienced the advantages of BL, P11 volunteered his Electronics course for OLi at 25%. He started the OLi design by "look(ing) at my whole content...what would really help my PET learners to build SDL skills and hopefully solve my issues with giving proper timely feedback". His students were rushing to complete their hands-on lab work within the stipulated hour; there was "…no time to provide individual feedback which I think is very very important".

Adopting an iterative design approach, based on observations and student feedback, P11 moved all practical sessions to asynchronous modes. Take-home kit sets allowed students to complete practicals at their own time. To support the process, detailed instructions, a range of resources and submission folders were set-up on the Google Classroom platform. Students built discipline and SDL skills by doing the practicals on their own, demonstrating their solutions in F2F sessions and received immediate individual feedback.

"It was a win-win solution" (P11).

Vignette #2 Early Adopter: Replacing "boring" "just teaching" F2F lectures with constructive activities

"There was no way I could deliver my class by just teaching. It doesn't work anymore...they will not listen to you" (P15).

A decade ago, as a newbie lecturer, P15, was confronted by a group of noisy second year students who enjoyed a good rapport amongst themselves and with their phones. He could not hold their attention for more than 10 minutes. It was the early days of MOOCs and as someone who enjoyed learning new things, P15 had signed on to several MOOCs. P15 found the courses beneficial and enjoyable. Inspired by the experience, P15 realized that he could record parts of his lectures for students to complete at their own time. Class time could be used to help students better understand concepts through collaborative activities.

In the early design iterations, students came to class unable to comprehend the key concepts from recorded lectures. There were no formative assessment activities for students to check their understanding. P15 now adopts a fully flipped approach with pre-class activity analytics to monitor learning and provide timely intervention.

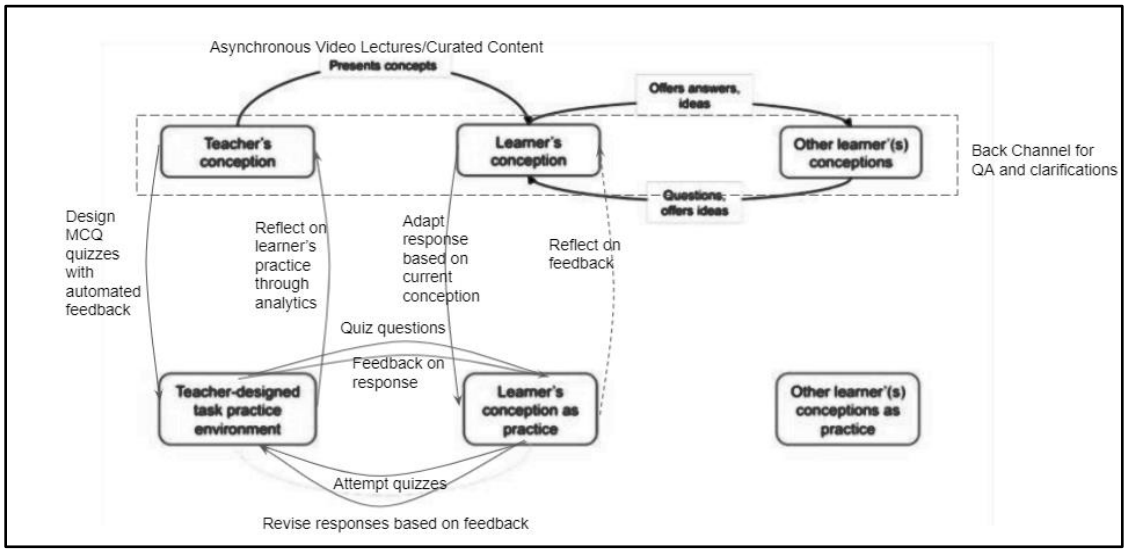
Vignette #3 Early Adopter: Developing confidence in OL lectures; attendance does not mean learning

P8 "discovered" the value of BL when he had to take a few weeks of unexpected leave. He could not find a part-time lecturer to take on the lecture segment. As a last resort, he recorded narrated lectures, while another colleague stepped in to facilitate the applied tutorial sessions. On his return, P8 was pleasantly surprised that his students' results were not impacted and there was no negative feedback on the experience. P8 reflected that the lack of a physical lecture segment forced concerned students to take ownership and review the recorded lectures carefully: "Attendance is not learning". Partial FL became a permanent feature in his course, providing more time to address the needs of academically weaker students.

Pre-COVID OLi practices. Blending F2F and OL modalities can take many forms and depend on multiple factors including the basic ingredients of pedagogy, technology and content (Graham et al., 2013). Courses with 25-30% OLi adopted a partial flipped approach, shifting selected content acquisition and the responsibility of time, place and pace management to students. Lectures, as P19 highlights, are the "low hanging fruit". OL content can be created or curated with multimodal, interactive elements. To address the lack of F2F cues and immediate feedback from students and support TMC, OL segments included practice activities with automated feedback for students to check understanding. Beyond conceptual knowledge quizzes, some participants included individual reflection or peer-peer discussion activities. LMS analytics and data from such formative assessment activities were used extensively to inform lecturers on students' participation and adapt subsequent learning activities (TPC). Provisions for back channels (email, instant messaging apps) were put in place to address students' questions during OL segments. Courses with 80%-100% OLi included collaborative and discussion based OL activities (PCC, PMC).

Figure 8

OL lecture Replacement Approach Mapped to CF (adapted from Laurillard, 2009)



Note: Figure 8 depicts common pre-COVID practices mapped to Laurillard's CF.

Appendix F provides the key OLi activities based on artefacts shared during interviews and recordings mapped to Laurillard's six learning activities with selected quotes. Regardless of OLi percentage, based on guidelines, the introductory session, student presentations, invigilated assessment checkpoints and final session were F2F.

COVID ERT practices. During the lockdown, the institution advocated virtual FL models: asynchronous modes for all lecture segments to increase flexibility and reduce the stress of real time technical issues; synchronous tutorials to ensure connectedness and immediate feedback; virtual simulations for practicals where possible. Only essential hands-on activities were postponed till F2F activities could resume. The COVID induced pivot created opportunities for participants to experiment with the place of

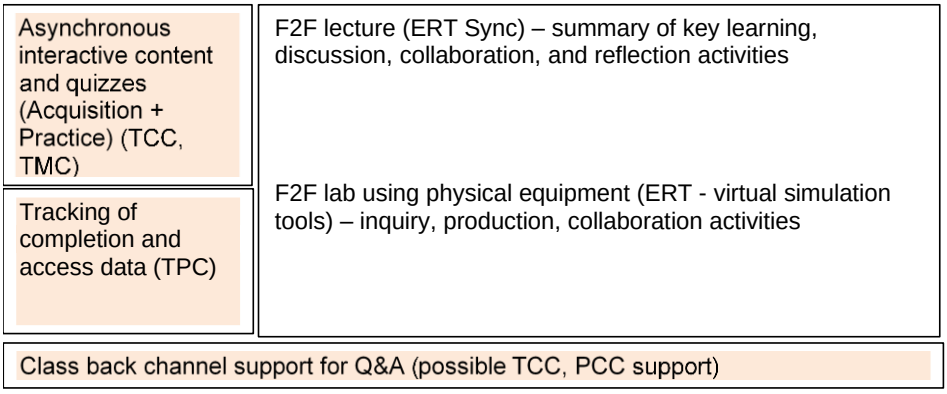
real-time vs asynchronous learning experiences. P11 highlighted “the need to move to a 100% (ERT) suddenly provided a clean slate to redesign the learning experiences”. What surfaced from the interviews were varied strategies with the intention of reducing “remoteness” during ERT. Educause (2010) defines back channel communication as a “secondary conversation that takes place at the same time as a conference session, lecture, or instructor-led learning activity” usually using a mobile app (para 1). However, at the institution, the term back channels has evolved to refer to the use of instant communication tools like Whats App, Telegram or official tools like MsTeams , email as communication channels during asynchronous periods or other out-of-class communications. Pre-COVID, Whats App and Telegram were prevalent but not critical. During the ERT period, these tools became essential platforms.

The fully OL and COVID ERT designs were not one size fits all. To create efficient, engaging, and effective learning experiences, participants in this study adopted variations of flipped models. In line with findings in the literature, design considerations included: course outcomes; student profiles including social-emotional needs, academic abilities, and motivation levels; lecturer’s pedagogical values and technical competencies (Jenkins et al., 2017; Munir et al., 2018; Bedrow et al., 2021). Post ERT experiences, all participants indicated a preference for BL models specifically for lecture replacements, as compared to fully OL. The following segment discusses the five models that emerged from the data. Models include descriptions of the pre and post-COVID designs and the lecturers’ rationale for adoption. Students, technology and institutional aspects of the findings will be discussed in further detail in subsequent segments of this chapter.

4.2.1 Model A Traditional Flipped

Figure 9

Model A: Asynchronous Lectures and F2F/Synchronous Applied Learning



Domains. Electronics, Electrical, Real Estate, Financial Services. Signature Pedagogies: Project Based Learning, Problem Based Learning. Participants: Default variation for most participants with 25%-30% OL pre-COVID

Model A Details. In this lecturer-led, content-focused approach, out-of-class OL segments included video lectures, quizzes, or simulation games. OL content was contextualized with real-world examples. OL resources included worked solutions, process visualization recordings. F2F tutorials provided opportunities for summaries, clarification, gamified quizzes and differentiated group activities to deepen learning. Courses with F2F practicals included the use of physical equipment to apply concepts. Technology tools were used to support PMC for students to share project work updates during F2F segments.

Rationale. Students are easily disengaged during didactic F2F lectures. OL allowed flexibility to learn at individual student's own pace, time, space and to revisit lessons. Follow-up F2F segments allowed for opportunities to deepen OL concepts, address misconceptions, and seek immediate feedback through collaborative activities and peer-peer communications. (Vignette #2)

Role of Lecturer. Design constructively aligned, short bite sized content videos with quizzes and activities. Monitor analytics and follow up with students who are lagging. Design and facilitate active learning strategies for F2F class based on analytics and learning evidence from OL segments.

ERT Adjustments. F2F sessions were substituted with synchronous classes. Virtual simulations in OL asynchronous mode replaced physical labs (for Electronics and Electrical domain courses). The strategies adopted to address lack of over the shoulder observations and make student learning visible included: submission of selected solutions for personalized feedback, time and virtual spaces for students to share project work progress with the whole class. P8 and P15 moved from collaborative F2F labs to individual virtual simulation practice activities. P8 moved to Model B for ERT. P15 suggested that collaborative OL activities were possible but more challenging to design. P15 included more authentic scenario activities to connect students with real-world problems. This was previously accomplished by F2F stories in class.

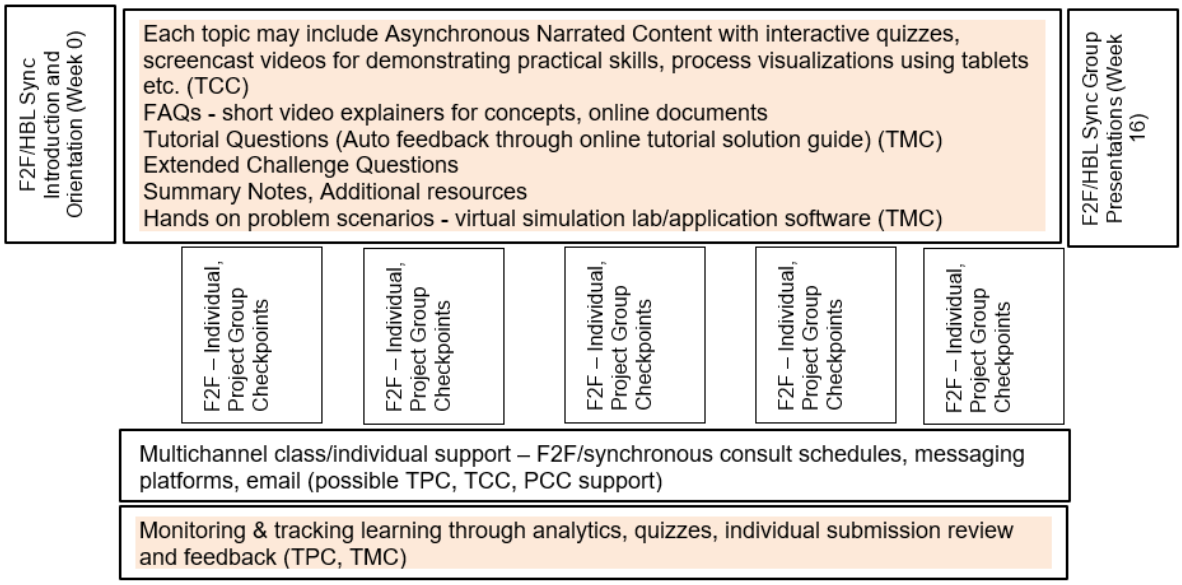
Variation 1: Partial FL. Post-COVID, participants indicated increasing the number of asynchronous lecture segments beyond the stipulated 25-30% OL. Threshold, challenging, or new concepts were taught via F2F/synchronous modes to allow for immediate clarification. This was to address the needs of students with less prior knowledge, lower confidence**,** or academic ability.

Variation 2: Inquiry based, Reflective Activities. MCQs and conceptual knowledge checks with "correct" responses did not align with intended outcomes of P3's design related course. To develop SDL, students undertook inquiry and exploration activities and shared the results online with the class community (TCC, PCC). This shared knowledge formed the basis of in-class activities.

4.2.2 Model B Mastery Flipped

Figure 10

Model B Combined Asynchronous Lectures, Tutorials/ Practicals



Domains. Engineering Services, Electronics, Healthcare and Critical core skills. Signature Pedagogies: Experiential and Project Based Learning. Participants: P2, P4, P6, P7, P8, P10, P11, P12, P13, P19 (varying degrees)

Model B Details. This model moved beyond the traditional timetabled lecture-tutorial/practical structure to lecturer-led, process-focused approach to develop course related competencies. F2F sessions were for orientation, consultations and milestone checks to demonstrate performance with immediate feedback and final presentations. Out of class activities included asynchronous lectures, tutorials/ practicals with well organized, clearly chunked segments. To scaffold student's independent learning, each topic started with layman explanations, everyday examples and objectives. All content and activities for the course were provided at the start to allow students to learn at their own pace with assessment checkpoints to evidence mastery. All aspects of the CF were conducted in OL mode with aspects of TPC supported during F2F checkpoints. Bergmann and Sams (2014), the educators who

popularized the flipped approach refer to this as the “flipped mastery” approach. P6 typified the design intention:

> standalone, as clear and concise and hopefully … address common questions that students usually ask before online learning. ...FAQ, …try to address in this online learning package. “I don’t believe in talking to air…that’s why no synchronous (lectures)”.

Rationale. Students can work at their own pace to learn the concepts and skills. Learning is demonstrated through development of tangible “projects” allowing lecturers to evaluate achievement of competencies. Lecturers can focus on providing support for weaker students (P4, P11). This approach standardizes T&L practices across large cohorts (P13).

Flipping Hands on Practicals. Hands on skills practice was a key component in this model. As part of the mastery approach, students practiced the skills asynchronously - using related software tools, physical kits, or virtual simulation tools (ERT). F2F/synchronous sessions were for lecturers to assess students’ demonstration of practical skills and ability to solve problems. During these sessions, lecturers offered over the shoulder, immediate feedback.

Role of Lecturer. “The teaching team can focus on being (learning) consultants” and assessors (P13). “(Individual) feedback is important – must tell them if they are learning or not learning” (P8). This approach required close monitoring of analytics and submissions to identify learning issues and at-risk students in the early stages. Lecturers did not have the option of quick side chats with students. Support in multiple ways/platforms was required to address the lack of F2F communication. Increased one-to-one counselling or consultation sessions for students who were falling behind became a necessity.

> (F2F cues on off-task behaviour) …students who are always late, distracted by mobile phones, not able to answer questions. But fully online a bit difficult (to identify students who are off task), have to purely base on assessment or e-quizzes, (as we) don’t meet them, so the submission is important. (P2)

Considerations. P7 highlighted the challenge with this model was determining whether to "step in" and support students or "trust the (asynchronous) design" and wait for students to complete the experience before intervening in the process.

Maximizing Engagement, Humanizing Interactions. The course started with a F2F/ synchronous orientation to highlight available support modes including synchronous consultation schedules and use of back channels to build a community of learners. Scaffolding to develop SDL skills included regular announcements and updates to keep students on track through teaching presence. There was concerted effort to increase "teacher's presence" including "appearance" on video/audio narration and scheduled consultations.

Challenges. Providing meaningful, individual feedback for asynchronous activities; monitoring learning and analytics across platforms was time intensive. The need for submissions and monitoring of a range of activities required multiple platforms including the LMS, Google Classroom (for ease of tracking and feedback), institutional video platform and virtual simulation platforms. P11 hoped for a unified tech platform to create a seamless experience for both lecturers and students.

ERT Adjustments. P4 and P7 had implemented Model B mastery FL for their 80-100% OLi courses prior to ERT. P8 and P11 redesigned the 25% OLi FL to the mastery approach. P8 found virtual simulation tools allowed for anytime, anywhere, individual practice to develop skill sets required in the workplace. Additionally, adopting virtual tools reduced physical resource requirements and ensured all students had equal access to the tools. However, P8 also pointed out possible challenges with fully virtual simulations, "students may lose out on some physical connection troubleshooting skill sets, but this is less than 10% of the skills". P11 highlighted shorter F2F practice sessions or personal at-home kits could address this gap.

Variation 1: "Drip" release. For topics involving complex concepts, P10 and P11 released content and resources in "drips" to manage conceptual load and avoid overwhelming students. P11 found this

approach was “useful for busy adult learners who may overlook segments” if all activities are provided at the start.

Variation 2: Fully OL modalities with ad-hoc check-in/consultations sessions. Students on internships applied the skills learnt from P12’s 100% OL course to the workplace environment. Students reported on their work based practice and reflections as assessments. The assigned internship lecturer was available for consultation or clarifications via synchronous or asynchronous modes.

Variation 3: Curated content and skills practice from eLearning platforms. P19 curated content and gamified practice activities with automated feedback from an industry leader/eLearning platforms/eBook publishers through the institution’s library resources. The approach was adopted to align training to industry needs. Lecturers focused on bringing content to life through design and facilitation of discussion and experiential learning activities, during F2F classes. (Vignette #4)

Vignette #4 Industry Content Collaborations: Lecturers as conductors not musicians

P19, an Information and Communications Technology (ICT) course manager, understood the importance of digital literacies and “learning how to learn” for today’s ICT students. When tasked to adopt 25% OLi, with multiple administrative hats to wear, P19 started off with the “low lying fruit”: “It's a lot easier to convert a didactic lecture approach” to OL. F2F classes focused on the applied skills within a traditional FL model. But it quickly became apparent that the work involved more than just converting lecture slides to narrated presentations. Creating engaging meaningful content required resources and skills. It was a time intensive process. Regular content maintenance was required as the ICT industry released quarterly software updates.

“I am not a content developer by trade...my strength is in developing curriculum and facilitating learning. My own content...compared to what I see outside (commercial platforms) ...at best (was) an amateurish attempt” (P19).

“Then I realised...instead of creating, why not curate?” IT professionals upgraded through hybrid (BL) learning approaches. “You do eLearning (OL) then you might go for a certification course (F2F) ...then you take the certification exams...that’s the industry norm. What better way to start training my students for industry?” (P19).

P19 convinced the key industry partner to provide free access to the eLearning platform to train the PET students. Now, P19 introduces and demonstrates the concepts - the whats and whys in F2F sessions. The purpose is to contextualize the application, with clarifications and targeted feedback. Students use the industry tools and eLearning software to practice the how, asynchronously at their own time, in a Project Based Learning approach. Consolidation and clarification happen in the back channels and during the next F2F session.

Students enjoy working with a gamified, adaptive eLearning platform with simulation tools and immediate feedback. The point rewards spur students to explore activities beyond the assigned segments. The platform is regularly

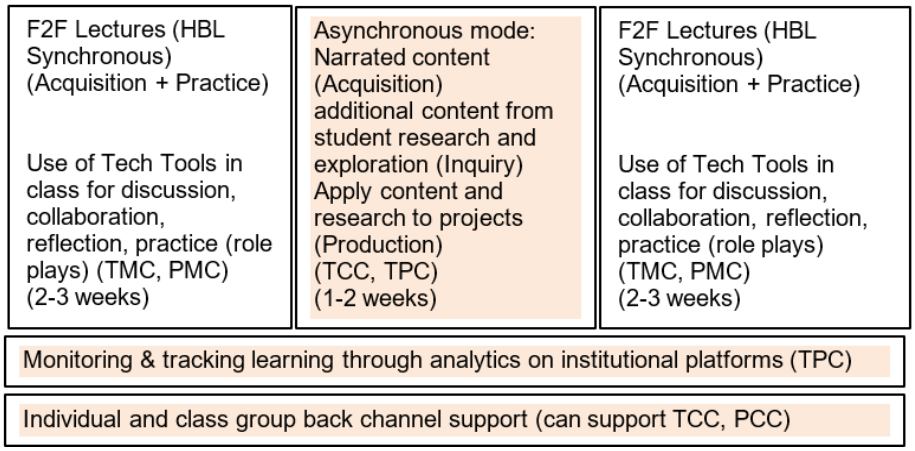
updated to reflect latest industry changes. The need to continuously update content is no longer a worry. P19 can now focus on designing contextualized discussion based activities for the FL model: "Win-win for us and the partner...they are training the next generation professionals...we are training our students to be more aware of the implications of the software".

"It's almost like we are no longer the musicians, we become the conductors...at the right time bring in the woods section, the strings…. hopefully make music and not noise" (he laughs).

4.2.3 Model C Interspersed Asynchronous OL Activities

Figure 11

Model C Interspersing F2F and Asynchronous Activities



Domain. Early Childhood, Healthcare. Signature Pedagogies: Experiential Learning, Project Based Learning. Participants: P17, P22

Model C Details. Designed as blocks of F2F interspersed with OL segments. The design provided opportunities for student-led content explorations tied to authentic tasks. F2F/Synchronous tutorials were seen as a necessity to scaffold development of communication skills and manipulation of simulated physical work Based Learning spaces.

Design. To promote SDL, F2F lectures and tutorials are interspersed with one or two weeks of individual asynchronous activities. P17 explains the OL segment design: " Lecture materials…(and) relevant

resources … read, understand, go and explore …do your own research… then tie up whatever you (have) learned, what I gave, plus what you gathered and complete the tasks".

Maximizing Engagement, Humanizing Interactions. Although OL activities can be designed for any activity, F2F practice is required to model workplace practice. From a course perspective, "exploring the (simulated) physical environment, reading emotions, etcetera are crucial to equip students with relevant industry skills" (P17). Fully online modes (text/audio) could result in possible miscommunications due to lack of facial and body language cues.

Role of Lecturer. The lecturer is the facilitator, the "bridge to connect content and real-world" (P17). Lecturers require learning design skills to develop activities that connect industry, learning to learn and digital skills.

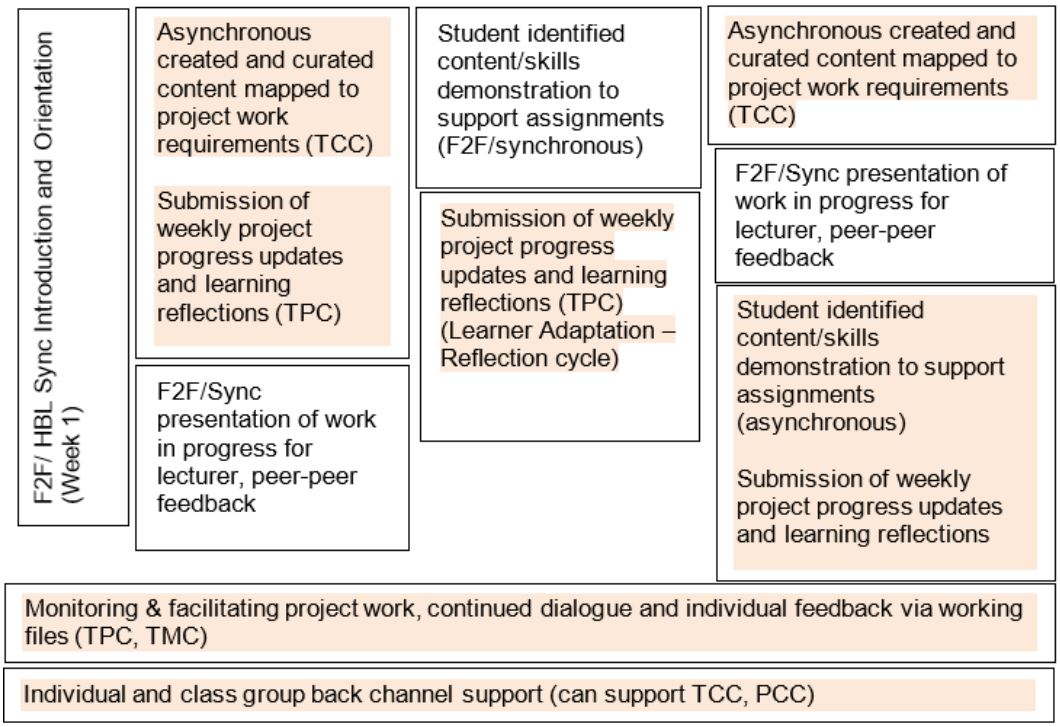
ERT Adjustment. P17 created immersive 360 degree videos (with technical support) to introduce physical spaces and related content. Unlike a fixed text-based content approach, immersive videos provided opportunities for students to navigate the spaces and come up with individual interpretations. This resulted in more student-led, independent content exploration with less reliance on the lecturer for direction: "I'm not there to say next, next" (P17).

Variation 1: Scenario Based Learning to link concepts. P22 observed students in a Healthcare course had difficulties connecting foundational concepts that were introduced during F2F lectures, over the course of a few weeks. P22 combined related topics and designed blocks of scenario-based asynchronous self-paced segments. The design allowed students to explore different topics in a contextualized holistic way, resulting in fewer conceptual misunderstandings.

4.2.4 Model D Flexible Flipped

Figure 12

Model D Flipping to Support Project Based Learning



Domain. Design and Media. Signature Pedagogies: Project Based Learning, Experiential Learning.

Participant: P20

Model D Details. This model had elements of lecturer-led and student-led designs with a focus on the learning process rather than the content. The design encouraged students to take ownership of their learning with peer modelling and feedback to support individual student's reflection and adaptation cycles. Content was mostly designed for asynchronous self-paced access. F2F tutorial sessions were for students to present work-in-progress for feedback from peers and lecturer. Weekly reflections on the learning process and progress allowed students and lecturer to identify gaps and customize future sessions. Certain segments were deliberately planned for students to identify the content/techniques

they wanted to learn to complete their projects. The lecturer curated or created content and facilitated accordingly.

Design. Flexibility in syllabus and timetable to address students' learning needs was key.

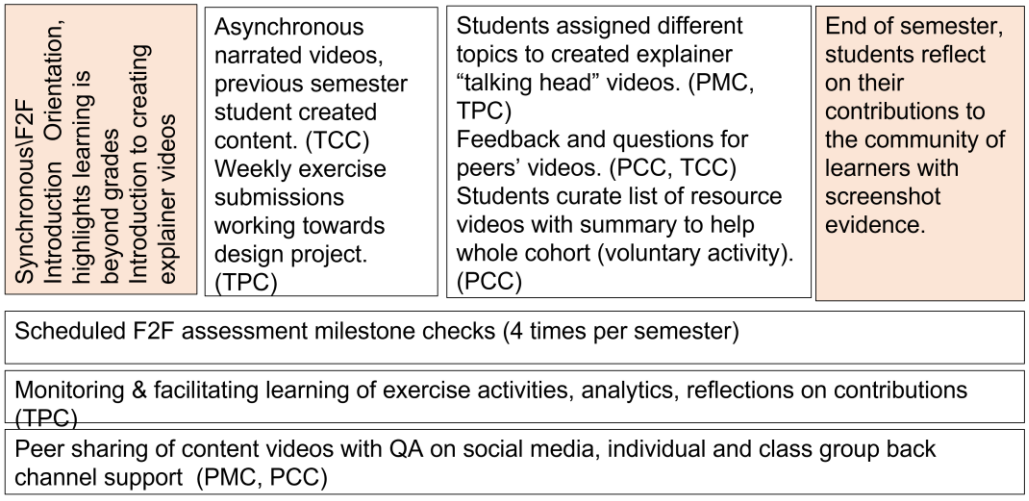
Role of Lecturer. It is crucial for the lecturer to frame the importance of independent thinking and the need for students to learn to dialogue. P18 emphasized that "there are no right, or wrong answers, students need to provide rationale for their choices". Time spent on frontal delivery was repurposed to provide individual feedback on work in progress with emphasis on "facilitating metacognition" (P20).

Considerations. "Timetable, syllabus…it's not cast in stone, depending on students' feedback and pace … a few places in the syllabus I can manage the time like buffers" (P20).

4.2.5 Model E Community of Learners

Figure 13

Model E Students as Co-creators



Domains. Built Environment, Design, Critical Core Skills. Signature Pedagogies: Project Based Learning.

Participants: P6, P18

Model E Details. This model combined lectures and tutorial/practicals in asynchronous mode. F2F/synchronous sessions were offered four times per semester for key milestone checks. Real time consultations were provided based on requests. This model is similar to Mastery FL but adopted a student-led, process-focused approach where content was co-created with students. This is the only model that was deliberately designed to support the PMC and PCC in OL mode.

Design. 80% of the course was offered asynchronously. Learning activities included student creation of instructional explainer videos. Selected student created videos from previous cohorts were also included. At the end of semester, students submitted reflections on their contributions to the community. Lecturers did not respond immediately to back channel questions; wait time was practiced to encourage peers to respond to queries and clarifications. Co-creating content promoted SDL skills and student confidence. “Learning from peers is always better (than from Lecturer)” (P18). (Vignette #5)

Rationale. The design focused on promoting a community of learners and students’ learning-to-learn skills. For ease of use, students posted their videos on a closed social media platform. Peers were required to respond to posts with feedback, share tips or ask questions. To promote SDL, the lecturers created instructional videos to introduce students to the first few steps of the process; students then learnt from exploring resources, doing research, and learning from peer posts to complete activities. “If we can bring the students on the first and the second step, which is the hurdle for them…the third step, fourth step …is very small height…then magic will happen” (P18).

Role of Lecturer. The key focus was to facilitate SDL through collaborative learning. To achieve this, setting and maintaining a conducive environment was essential. Lecturers facilitated peer-to-peer interactions, refrained from providing answers to selected questions, encouraged and applauded students’ efforts to contribute responses (supporting PCC). Monitoring participation and contributions was necessary to ensure lecturers could step in to correct misconceptions (TPC). Assessment related roles included reviewing contributions, reflections and providing feedback on projects.

Considerations. To take ownership and reduce plagiarism, students were required to "appear" in their narrated content videos. Instructions on providing feedback ensured all peers received feedback.

Vignette #5 Student as co-creators: Transforming learning to reduce workload

"Necessity is the mother of invention" (P18).

When P18's built environment course was selected for 80% OLi, the original plan was to replicate the F2F "show and tell" instructions followed by hands-on practice of software to fully asynchronous OL; 20% F2F time was for assessments and consultations. P18 started by replacing a few lectures with a selection of curated and created instructional videos to seek student feedback. Students preferred his screen recorded narrations as the eLearning content available via the library was not customized to the course exercises.

"When I started on the fifth video...it occurred to me, why should I be the one always making the videos? The software is not rocket science; students can build their confidence level by doing the videos" (P18). From his F2F class experiences, P18 had observed students learnt better from peers than the lecturer.

P18 conducted a screen recording familiarization session in the first F2F class. Fifty odd students in the cohort were tasked to develop short instructional videos for assigned topics. This student-generated content required timely feedback. To enable students to receive quick feedback and encourage social presence in an almost fully OL course, P18 had students share their videos on a closed social media platform for first level peer-to-peer feedback or comments. Much to P18's disappointment, students did not participate. Considering students' assessment driven behaviours, P18 assigned nominal marks for feedback to peers. However, tracking peer comments for each activity created an additional layer of work. P18 addressed this problem by transferring the ownership to students. Students were required to consolidate and evidence their contribution to the class community through an end-of-semester reflection activity. As a corollary, this strategy communicated the value of a community of learners and reflective practice. From a show-tell-test approach, P18 now designs and facilitates experiences to encourage learning as a community.

P18 had transformed his course design from a content driven, teacher-directed approach to a process-driven, student as co-creators approach within three semesters.

Variation 1: Discussion based online learning community. P6 taught a critical skills domain course (Vignette #6). Student created content for the course in the form of weekly analysis reports to be shared to the class community for feedback. The purpose was to create a "vibrant OL community with lively discussions". P6 provided individual feedback and weekly class summaries to facilitate critical thinking and highlight key learning points.

Vignette #6 Scaffolding SDL: Helping students manage time, resources, and learning

P6 led an 80% OLi course where students analysed media and society to develop critical thinking skills. F2F lessons were for orientation, project milestone checks and final presentations. Each week, students shared their analysis of the topic and resources on a collaborative platform for peer learning and feedback. At the start, P6 embraced the idea of choice and independent learning, providing a large variety of resources to choose from and a weekly deadline to submit individual analysis and peer feedback. Some students spent much more time on reading and viewing all the multiple resources, whilst others forgot to submit work. With follow-up iterations, resources were organized as essential or additional. Instructions indicated the approximate time required to complete the tasks. However, some students still needed additional "chasing".

Based on a student's suggestion, she has since introduced an activity in the first F2F class. Working around their other priorities, students were asked to book a primary and secondary time slot in their personal calendars to complete the OL tasks. This practice increased student accountability. P6 checked for submissions regularly but did not monitor if students were adhering to the time slots. P6 told her students she would not babysit them, but "it doesn't hurt to send out an occasional reminder on the Whats App back channel when weekly summaries are released, or the next deadline is due".

4.2.6 Expanding and Extending BL Environments

During the ERT period, technology enabled the quick conversion of Model A, F2F lectures to interactive OL experiences. Post-ERT, Model A adopters highlighted they would adopt partial FL with increased OL lectures for the anytime, anywhere benefits. However, practicals and applied tutorials would revert to F2F modes. Several reasons were provided: the need for over the shoulder monitoring and immediate feedback; address at-risk or "shy" students who may not actively seek support; complexities in facilitating group discussions online; the need for peer-peer social interactions to build rapport, trust and increase engagement; or learning outcomes that require hands-on, tactile experiences. These OL challenges were in line with existing research (Means et al.,2014; Saghafi et al., 2014; Laurillard, 2002).

The push factors associated with the OLi, and accelerated by the ERT, propelled many lecturers to expand their pedagogical strategies and harness additional resources (for example, student-created content) and partnerships (industry, eLearning platforms, eTextbooks). Model B, D and E break away from the conventional lecture-tutorial timetable structure. Model B focused on individual student's

mastery of applied skills. Models D and E were transforming blends adopted by design centric courses with a student-led, process-focused approach (Jenkins et al., 2017; Graham, 2004).

P18 adopted a content-focused Model B for a 25% engineering services course and Model E for the 80% design course. He explained the rationale for the different approaches - “engineering concepts taught have not changed in 150 years, the purpose is to apply the concepts to a real-world context” whereas “the design domain requires creativity and innovation”. Although all polytechnic courses have an applied skills focus, these findings align with existing research on disciplinary differences in OL designs (Fathema & Akanda, 2020; Smith et al., 2008).

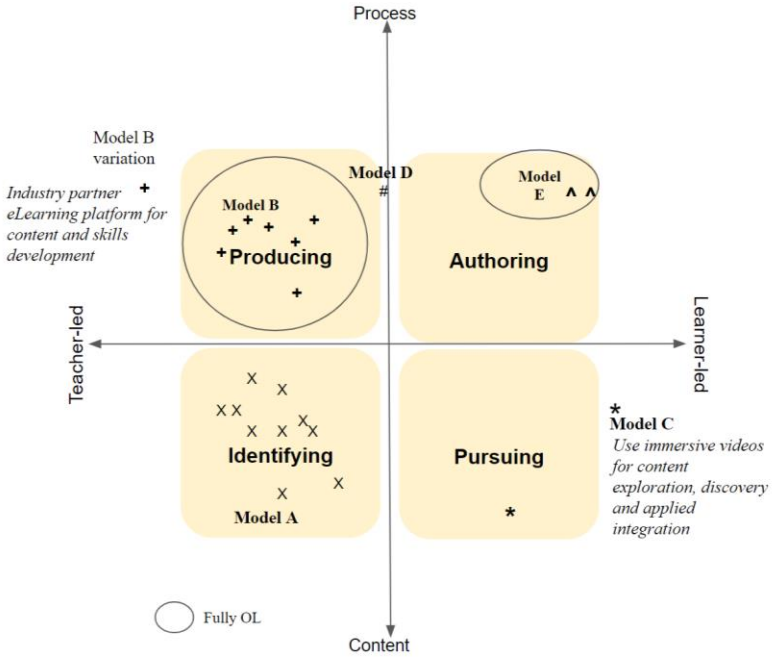
Situating the five models in Jenkin et al.’s (2017) FL matrix (Chapter 2.2.5) supports discussions from the pedagogical strategies and modality perspectives. Jenkins et al. indicate that FL designs may have elements from across the four quadrants of the matrix (teacher-student, process-content). Designs are matched to quadrants based on the most prominent features. The matrix models are discussed with reference to in-class (group learning space) and out of class (individual space) activities. Models B and E were mostly asynchronous, with in-class/synchronous (group space) components mainly for rapport building, orientation, student presentation/ demonstration for peer learning and feedback. At the institution, back channels have emerged as the persistent group learning space, integrating OL and F2F modalities. The data demonstrate that lecturers developed additional FL models influenced by a range of student needs and lecturer expertise; expanding the possibilities envisaged in the original Jenkins et al. matrix. Beyond a student-led or teacher-led continuum, industry partners and technology may also be part of the FL strategy. For example, P19 adopted Model B with an industry partner’s content and skills practice activities (Vignette #4). Model C included a virtual immersive environment for students to explore and discover content independently, promoting individual interpretations (Vignette #12).

The quadrants reflect the student and teacher roles and responsibilities in the FL designs. Increasingly, as dynamic components of complex adaptive systems, classrooms are no longer closed loop relationships between students and teachers. Polytechnics in Singapore offer compulsory structured internships for all full time students, for example, MOE (2015) and Teng (2021). Depending on the program of study, internship students may take OL or BL courses where content is then applied to the workplace situations. The industry supervisors work in partnership with lecturers to negotiate outcomes and take on the role of coach and mentors, collaboratively working with students on applied learning projects, for example Republic Polytechnic (2020). Other forms of classroom collaborations that are at early implementation stages elsewhere include the use of AI as virtual assistants for example the Jill Watson project (Goel & Polepeddi, 2016). At present these AI tutors can respond autonomously to frequently asked questions and even facilitate matching of student profiles to build communities among OL learners (Wang et al., 2020). These new classroom collaborations suggest the need to view flipped approaches beyond a binary teacher-led or student-led dimensions.

Based on the models that emerged from this study's findings, adaptations are proposed to the Flipped Learning Matrix model to extend conventional teacher or student-led environments (as presented in Viswanathan & O'Neill, 2021). In today's context of distributed expertise and blurred boundaries between F2F and OL, the traditional in- or out-of-class flipped components have evolved. Flipped models will need to expand to support seamless experiences across time, modalities and learning partners (Figure 14). Increasingly, blended and online learning facilitates partnerships between universities and industry, providing career preparation for students and involving "companies in the decision-making for what students need to know" (Glantz & Gamrat, 2020, p.283). New collaborative models could involve professional eLearning platforms, industry partners, multidisciplinary teaching teams or even Artificial Intelligence (Wiley, 2020).

Figure 14

Participant Models Mapped to the Adapted Flipped Learning Matrix (Jenkins et al., 2017)



Note: Participant models have been mapped to an adapted Jenkins et al.'s (2017) matrix to incorporate emerging features including industry partner platforms and future orientated technology.

There is a need for institutions to rethink the approach of learning by structured time and physical space bound learning experiences. For instance, the site institution's practice of Lecture-Tutorial-Practicals. With return to pre-COVID normalcy, many lecturers may fall back to traditional practices. Requirements to increase OL segments may lead to the easy option of one for one conversions of all lectures only to asynchronous modes. Such practices will limit the strategies adopted for OL modalities and may not maximize the benefits of technology for learning and external partner collaboration.

Participants' choices of BL models were dependent on the various actors and factors identified in the conceptual framework (Figure 7). The flipped pedagogy assumes that all learners can master the pre-

class content independently; however, evidence suggests flipped learning works best for motivated students with good metacognitive skills (Lucardie et al., 2017). The themes emerging from the interview data suggest that BL cannot be a one-size fits all approach, addressing student profiles and learning needs featured prominently in participants' BL intentions and strategies.

4.3 Addressing Diverse Learner Profiles

Learner demographics, learning preferences, motivation and self-regulatory behaviours are key factors that impact selection of BL models and outcomes (Van Lear & Elen, 2020; Lim & Morris, 2009). There are two distinct demographics at the site institution: the mostly Singaporean, post-secondary school, 17–20-year-old full time PET students; the increasing numbers of adults enrolled part-time in CET programs. CET learners have heterogeneous educational backgrounds and are from different ages and stages of life (Davie, 2018). Some CET programs attract Singapore residents originally from other Asian countries with less English language proficiency. All CET courses are required to offer at least 30% asynchronous OL components as part of the national SkillsFuture movement (discussed in Chapter 1). This is intended to promote lifelong learning and make learning more accessible to adult learners.

Participants used the term "students" to refer to PET cohorts and "adult learners" for CET cohorts, suggesting a difference in the way both cohorts' cognitive and affective needs were perceived. Participants' discussions on designing CET courses focused on: learners' time availability, access to resources, other life responsibilities, emotional barriers (including confidence to learn), and digital competencies. For PET course designs, participants stressed: the need to maintain interest and engagement, support "academically weaker" students, promote peer-peer interactions for learning and social emotional purposes, develop 21st century graduate competencies. These findings resonate with

existing research evidence, learner dimensions impacted the BL model adopted, facilitation approaches, choice of technology platforms and scaffolding strategies.

4.3.1 Different Value Propositions

Participants emphasized the value proposition of asynchronous OL components for both demographics, specifically for content deemed as suitable for students to learn independently. For example, P5 on the two factors that make OL a strong value proposition for adult learners:

> They made a conscious choice to enrol in a course, perhaps for career progression…its very unlikely parent pushing them, there is self-motivation (as compared to 17-18 year olds). ...for CET, the need for social interaction maybe pushed to a lower place by physical barriers like distance of workplace, work pressures, family pressures etc....these are issues that cannot be overcome, if we just stick to F2F learning. (P5)

The benefits of BL and preferences of adult learners reflects the findings of other studies including Birbal et al.'s (2018) Trinidad study and Zhu's (2017) Belgian study. P16 highlighted the benefits of asynchronous OL for diligent students: "academically weak but hardworking students if they don't understand they can replay the video again and again until they understand...if they don't, they can ask me…they know that I'm around…virtually" (P16). This observation is similar to findings from Mok's (2014) study of students at an IHL in Singapore.

Most participants highlighted the role of OL in developing SDL and digital literacies of PET students. Others took a more practical view of asynchronous OL: to promote learning content at personal pace; replace "boring" content transmission during F2F sessions with engaging activities to deepen learning and hold students' attention. After several semesters of OLi experience, many participants indicated a shift in thinking, "SDL and digital literacies all came later" (P17). Post COVID, SDL and digital literacies became a key intention aligned to the OLi objectives. Others like P5 recognised the *potential* for OL to

encourage SDL: “online learning is a good way to promote self-directed learning…although it's challenging to sell the idea of independent, self-directed, lifelong learning (to 17-18 year olds) we should still try” (P5). Similarly, Singapore’ Ministry of Education has recognized these strengths for students across primary to tertiary levels and introduces a slew of new practices and programs to develop SDL and digital literacies (MOE, 2020a, 2020b). These changes will have a significant impact on future students at the poly and require continuous redesign and curriculum reviews to ensure courses are mapped to students prior knowledge and abilities.

4.3.2 Designing Profile Appropriate Activities

For 25%-30% OLi designs, the key selection criteria for OL appropriate topics was the ability of students to “handle (content) on their own…with avenues to help them…make (sure) we are not throwing them into the deep sea” (P14). This directly impacted the selection of BL models. Model A adopters perceived OL segments to be appropriate for lecture replacement and practice activities, F2F modalities were for deepening and collaborative learning experiences. The key reasons for this were: anxieties about students’ abilities to learn and apply complex concepts independently; possible motivational and self-esteem issues that may impact students’ support seeking behaviours.

Participants highlighted the need to rethink aspects of design when teaching the same courses for PET and CET learners. P23 remarked, “We can’t treat them (CET) like PET students and expect to roll out the same thing and expect it to work”. For PET students, visually appealing content, animations, engaging, interactive features like gamification are seen as a necessity. Course domains influenced the aesthetic aspects of OL design. For example, P9 (Domain: Retail Marketing, Model A) and P20 (Domain: Design

and Media, Model, D) both emphasized the time and effort required to ensure production quality content for their media savvy students.

> Nature of what we teach in media is already entertaining…much higher expectation from students about how to engage them. For more traditional content like accountancy, easier to jazz it up a little to make it more engaging and interesting visually. (P20)

Participants described the CET learners' requirements in more practical, task-oriented terms: "no need animations…they want straight to the point…that they can immediately get the information and then know what to do" (P23); "they value content knowledge; not here for cartoon PowerPoints" (P21). P23 observed that adult learners preferred something that "they can do, and …get some feedback on … very test concerned", unlike PET students who are "comfortable with just quizzes to check understanding" of OL segments. P23 designed different activities for the PET vs CET cohorts for the same course. The findings in this study resonate with the evidence in the literature on the differences between adult learners needs (CET) as opposed to teenage and young adults (PET) due to different stages of life and experiences (Diep et al., 2019).

Participants teaching CET courses, adopted a Model A (partial FL) approach, with lecturer led OL strategies to support TCC, TMC and TPC. Group activities (PCC, PMC) were organized for F2F segments. Participants were mindful of the challenges part-time adult learners faced when trying to coordinate and collaborate on tasks outside timetabled hours (P11, P21). During ERT, P11 observed a marked increase in adult learners' time availability. P18 maximized on this availability by incorporating a group website development project to support PCC and PMC. This example suggests that OL activity types at the site were strongly influenced by learner dimensions compared to other factors.

Other accommodation and engagement strategies included the design and chunking of content. In line with empirical research findings on content video engagement and duration (Guo et al., 2014), OLi guidelines emphasized bite sized OL segments with opportunities to check understanding. However, participants found this conventional wisdom did not apply to CET designs. P10 and P21 emphasized that time poor adult learners did not want to access multiple short content videos; "They want one recording, they want to listen through" (P10). Another reason could be the ease of which video locations can be identified for videos with slide titles, which eased the playback. The OLi and many studies like Lo & Hew (2017) recommend videos of less than 6 minutes based on Guo et al's (2014) large scale study on MOOC videos. The findings from this study suggest that video duration preference is not a one-size fits all. It is dependent on multiple factors, including playback tool features and possibly age and stage in life.

4.3.3 Managing At-Risk Students and Readiness for OL

Asynchronous OL required students to manage their own time and pace. Participants shared concerns about the self-regulation skills of less academically motivated or younger students, especially in the absence of F2F interactions. P2 noted "online, my persuasion powers (to motivate students to complete activities) are less". Some participants observed that students needed the lecturer's physical presence to "push" or motivate them - "our students need that kind of guidance" (P9). P3, P4, P7 and P20 highlighted 16 year old PET students' need for "a lot of hand-holding and spoon feeding…after so many years of schooling" (P20). These experiences are consistent with empirical evidence that suggests the need for more supervised approaches for younger learners (Means et al., 2014). See also, Norberg et al. (2017) for discussion on procrastination in fully OL or BL courses. The younger learners were perceived to need considerably more scaffolding to maintain engagement:

> personally, I look at the audience, the capability of our Year 1 (post-secondary school) kids, still used to seeing a face...Year 2 can see less of you…starting off don't make it too difficult, can't do…they will go somewhere else…that's this generation. (P3 on the need for incremental strategies to encourage independent learners)

Based on a literature review, Boelens et al. (2017) identified facilitating students learning process and in particular low achievers who may not have the skills necessary for independent learning, as a key challenge**.** Participants in this study faced similar challenges. A range of strategies to scaffold and promote SDL were adopted: use of calendar tools, project management apps, self-reporting leader boards, carrot and stick approach with marks deducted for late submissions. Participants with large cohorts preferred to adopt Model A or C to ensure "(we) see them F2F and address gaps" (P14).

Close monitoring of LMS data helped identify "needier students" who required more individual follow-up (Vignette #7). Based on the data, "nudging", consultations, and facilitative questioning were all time intensive follow-up strategies. Nudging aims to change behaviour through small changes (Weijers et al., 2021) with opportunities for students to decide on the course of action. Examples of nudges shared by participants included friendly personal text messages showing concern for non-participation (P11), or even celebrating students who helped respond to peer questions to promote more such behaviours (P3, P6, P18). These approaches are similar to existing practices in the literature as summarized by Brown et al. (2020). P16 employed facilitation strategies to deal with students who did not attempt the OL segments: "certain students…dislike learning by themselves…no matter how good the materials, they didn't even try (based on data) …when they ask questions, I always ask…which part you don't understand" (P16).

For CET learners, participants adopted strategies to support cognitive load and avoid overwhelming time-poor and in many cases students with less English language proficiency. For example, to make it easier for adult learners to immediately access the resource links, participants used more persistent login tools like Google Classrooms compared to the LMS (as students may already be signed on to personal accounts). P11 on using a just-in-time drip approach to release information:

> they have to juggle many, many commitments, their work, their families, … their studies, so, we cannot just put whole chunk and throw it to them and expect that they will go through... every few days, I tried to introduce a bit of information (on the back channel). (P11)

With regards to comments about lack of time for adult learners and hence inability to manage multiple responsibilities and synchronise time for collaborative work, Singapore has been notoriously recognized for its long working hours ("Singapore ranks 32 out of 40 for work-life balance, second most overworked city ", 2018). Additionally, Choi and Park's (2018) large sample study on factors that affected online dropout amongst adult learners found that physical constrains of time and family/organization support had the most significant impact. Besides the lack of time, the CET learner profile includes a large number of lower academic ability learners working towards improving their qualifications with a diploma and non-English speaking foreign nationals. Similar to Salisman's (2020) literature review on English as a Second Language students learning online, low language proficiency results in these students struggling with large amounts of reading and writing, with the additional lack of physical gestures and body language increasing the difficulties students face. These characteristics invariably led to different BL designs and selection of technology tools for CET vs PET learners (discussed in Section 4.3.5)

Although the LMS was used by all participants, participants also adopted a wide range of additional tools including Google Apps for Education and Microsoft Online for different activities. In the absence of one "unified tool" (P11), the adoption of multiple platforms increased monitoring efforts across tools

(further discussions in segment 4.4). P2 adopted a manual spreadsheet to track submissions across platforms, P16 adopted completion badges on the LMS to help students keep track of their own OL work. Most other participants spent considerable amounts of time monitoring analytics and nudging students. Technology tools that support students' agency to track and manage their learning progress or support automated nudging (Lawrence et al., 2019) are still not widely available or adopted at the site. Such tools could be greatly beneficial to students and support time poor lecturers.

4.3.4 Challenges Personalizing OL

The introduction of multiple polytechnic entry pathways has resulted in students with increasingly mixed academic abilities within each class (discussed in Chapter 1). Many participants highlighted the difficulties in designing differentiated OL activities to meet and stretch all learners. The lack of technical skills, time, and resources made it difficult to implement OL activities offering choice and control to students. For example, P16 wished to provide differentiated learning activities for a very large, diverse foundational engineering cohort. P16 found currently available tools were too complicated. The OL design had to be pitched for the lower ability students. As recommended during the OL workshops, many participants included optional extended challenge activities to stretch students in addition to personalized feedback on projects, scheduled individual consultations and F2F activities (P8, P11, P15, P18). These challenge activities included more complex questions or scenarios, external resources or real life cases for additional reading or open ended questions to pique students' interest. P13 and P19 were able to adopt professional eLearning platforms (eLearning publisher and industry partner), designed for personalized adaptive pathways.

During ERT, P15 found facilitating differentiated synchronous group work required much pre-planning with additional technical and facilitation skills: "face to face, it's always easier (to personalise activities)

… you can …group them… assign different activities for them to work on. But online scenario, it is definitely a challenge". Automated tools for personalized learning are still in the nascent stage of development due to several technical challenges including addressing different learner profiles and prior knowledge (Nabizadeh et al., 2020). Although it may not be the state of the art, there are tools with features like branching that allow for personalized activities. Teo & Tan (2021) emphasize the need for institutions to proactively study and invest in easy-to-use tools and technologies that can support adaptive learning to meet the accelerated demands for digital learning. Access to the right technology tools to simplify the design of adaptive personalized activities could benefit learners and ease technology knowledge and skills required by lecturers.

4.3.5 Digital Competencies and Technology Preferences

PET students have a certain level of digital competence based on primary and secondary school experiences thanks to the two decades of ICT MasterPlans (MOE, 2015; Tay et al.,2021). P17 emphasized the need to tap on PET students' digital skills, "rather than still follow the conventional way of doing things". CET learners were less likely to be familiar with institutional technology platforms or eLearning resources like LinkedIn Learning (full time students receive orientation in year 1). P11 observed that CET learners, had fewer digital competencies: *"*they are struggling with very basic skills like...snipping tools to … copy the diagram so that you can put inside your assignment, all that you need to go through with them". Adults preferred to use their personal Google accounts rather than login to institutional accounts. This impacted the choice of platforms and availability of data for monitoring and tracking.

> I might be the only one asking them to login to their (institutional) accounts (and use platforms that allow tracking by student ID). I find that people don't have the time to familiarize, I don't want the whole agenda of online learning to be overwhelmed by just a login issue. (P5)

Participants emphasized orientation to OL and tool familiarization as a critical aspect of OLi courses. P11 pointed out the additional efforts required for CET cohorts, “every semester we have (a) new intake (of) students, there is a need to conduct this orientation every semester, unlike for PET”. Several participants shared strategies for Week 0, to orientate and familiarize CET students with technology platforms and each other. For example, P11 prepared induction guides and conducted a trial synchronous lesson before the start of the ERT semester to introduce institutional platforms and the LMS.

Full time students at the site are required to own laptops (see Chapter 1 for details). However, CET learners may not have personal laptops and rely on their mobile devices to access OL, “especially when commuting to and from work” (P5). Designing content that can be easily accessed via a mobile phone is essential, especially for CET courses. As previously discussed in 4.3.3, Language accessibility is also important for CET learners “when I …create content, I make sure that the video … there's subtitles because there's a lot of foreign students (who may not understand the accent)” (P11).

The digital competencies impacted OL communications as well. P11 suggested that CET learners, especially foreign students, may not be as confident as younger learners to connect online through back channels with a group of strangers. P5 had similar observations of CET learners’ unwillingness to seek clarifications on shared platforms:

> ...quite a few (CET students) screen capture (the problem), and then email back to me, perhaps it’s a function of their age, working adults being more comfortable with emails. It’s a wasted opportunity, other learners may have the same questions...sometimes I will actually... put a comment there (on platform) to say that so and so ask the question… have to figure out how to make them more willing to comment (when discussing further improvements). (P5)

Despite the lockdown challenges, P11 highlighted the positive impact of ERT on CET students, “having them to switch, between different platform, to work on the weekly assignments, to make use of different tools, …so that they can get their work done…I will say that levelled up their digital competencies and skills”. In future, with more exposure and use of technology tools, the OL learning curve may be less steep for adult learners.

Although the intended learning outcomes were similar, lecturers in this study designed and facilitated CET and PET versions of the course. As P5 highlighted, “We cannot use the same tools for all ages, it has to be age appropriate, maturity appropriate…that will give the best outcome”. Lecturers were empathetic towards adult learners and their multiple life responsibilities and adopted strategies to help adult learners manage life and learning. Based on their study of new students of an Australian vocation, education and training program, Yang et al. (2013) reported on the crucial need for a well-supported education technology preparation (ETP) program. Students in Yang et al.’s study had indicated a high level of anxiety adapting to online learning and balancing work and study, the ETP program increased confidence with students reporting better time flexibility with OL. Considering the increasing numbers of part-time adult learners, institutions will need to have orientation strategies for OL similar to full time students.

4.4 Maximising Engagement; Humanizing Interactions

As humans, we derive much joy from engaging with others, especially through immediate interactions and shared physical space and time. Social presence is required to enhance cognitive and teaching presence (Garrison & Vaughan, 2008; Geng et al., 2019). Asynchronous OL modes can strip learning experiences of some of these shared in-person interactions . Empirical evidence indicates increased risk

of isolation and alienation in fully OL courses (Allen & Seaman, 2013; Richardson et al., 2017). The need to deliberately design BL to support seamless interactions between the real and virtual elements of a course to create a collaborative learning community has been well established (Garrison & Vaughan, 2007; Geng et al., 2019). Regardless of BL models adopted, participants emphasized the efforts required to compensate the lack of facial cues and immediacy in OL and ERT experiences. The following findings suggest a strong case for BL, rather than full OL to provide holistic social emotional and learning support.

4.4.1 Building Presence, Rapport and Trust

Developing trust and rapport with students was seen as essential to enable a productive learning environment. Although P13 highlighted that small talk along the corridor is "not what we're here for", the lack of social interactions does impact teaching. During ERT, "students don't come earlier or hang around after class (for synchronous OL) ...feel (like) I don't know my students" (P17). P1 and P17 shared difficulties remembering student names and faces during the COVID semester due to the lack of physical and visual cues. Participants emphasized the need for F2F for social, experiential reasons: "face to face, you can show that you care for them...online ...more challenging" (P15); "I lost the human touch part... now (ERT) can only see 9 faces in a (Ms Teams) meeting" (P17). A number of participants highlighted the lack of humour as a rapport building technique in asynchronous modalities: "my lames jokes are less funny online" (P7); "you can't have so many jokes" (P1); "can't email a smile" (P19). P6 missed sharing the wonder:

> memorable, interesting, amazing classes...they're almost always face to face. Online learning gives you a quiet kind of wow. When I read a comment it's like, Wow, that's amazing, right? but I couldn't have shared that... It was just me alone in my cubicle. How do you share that amazement as you do in class?

“Kids now live their lives online...you can build rapport online, but it’s tricky”, P7 said of his 80% OLi Model B course. Participants shared varied strategies including the use of conversational tones, sharing related personal experiences, real-world scenarios and “appearing” in narrated content videos. Some lecturers enforced “video on” rules when speaking and presenting with exceptions (faulty cameras, or poor bandwidth).

Several studies have established the relationship between online teaching presence and students perceived learning and satisfaction (Caskurlu et al., 2020; Yang et al., 2016). Maimati et al. (2021) highlight a body of evidence that suggests the value of real time video conferencing in building social presence, teaching presence and sense of belonging. However, the sudden shift to fully online approaches and in some cases bandwidth and accessibility issues made it difficult for lecturers and students attuned to F2F classes to create the environment and “presence” in synchronous online sessions (Neuwirth et al., 2020). Participants like P9 and P20, teaching students from media related domains took steps to insist students have their cameras on when speaking during synchronous sessions. The students were informed this was to ensure better attention and social connection for the whole class. To address privacy issues, the students were encouraged to use blurred or virtual backgrounds. Other participants encouraged students to have cameras on but stopped short of making it a rule due to concerns about privacy and home situations. P20 expressed hopes that the institution would provide guidelines on synchronous class attendance with a camera on policy, he argues that students would need to learn online self-presentation skills for future work.

There were also participants in this study who used real-time video with caution: “My digital self is different...You can’t tell whether I’m joking or serious based on the tiny video on the corner” (P3). P17 also raised the need to manage digital personas differently from F2F classes due to lack of sufficient

visual and physical communication cues. A recent literature review highlights the existence of research on text-based online communications in the education domain (Soler-Costa, et al., 2021). However, Neuwirth et al. (2020) highlight a lack of studies on etiquette for synchronous video based sessions, including attire and body language. Singapore institutions of learning have dress codes and etiquette for physical campus attendance (see for example: NUS, 2019; Ngee Ann Polytechnic, 2020). The findings suggest the need for institutions to provide clear guidelines for lecturers and students on self-presentation in increasingly visual online platforms.

All participants used back channels like WhatsApp, Telegram and MsTeams apps to maintain "virtual teacher" (teaching) presence, to ensure students felt connected to the class community. Managing these different communication protocols add to the cognitive load of lecturers straddling both OL and F2F modalities. Participants were mindful of miscommunication due to the lack of visual cues in these mostly text conversations. For this reason, P3, P5, P7 and P17 shared "less jokes online", sarcasm and dry humour was avoided. Participants also raised issues with students sometimes unintentionally "blunt" comments on peers' responses in the messaging channels that may stifle further conversation (P5, P16). P5 noted that this may be due to students' perception that WhatsApp was for personal, informal communications. These instant communication channels support the need for immediacy in the absence of physical classrooms but do blur the lines between personal and work/study spaces. The implications will be discussed in Section 4.4.2.

4.4.2 Addressing Immediacy and Spontaneity

Although teaching presence does not need to be in real-time, immediate feedback can enhance cognitive presence to deepen learning (Mishra & Panda, 2020). Besides verbal feedback, participants

cited facial and nonverbal cues, physical proximity and over the shoulder observations of work in progress as indicators to sense students' learning in F2F classes:

> …even if they are not comfortable asking questions (in front of the class), there is always an opportunity for me to mingle around, talk to them face to face, and then maybe solve their issues, right on the spot. (P15 on the benefits of physical classroom spaces)

To address lack of F2F opportunities for clarification, lecturers encouraged students to post questions on shared platforms or back channels. Students were provided basic rules on posting and response times that differed from participant to participant. However, most participants shared that despite setting "office hours" student queries were responded to almost immediately during the COVID lockdown period, even on weekends, "as long as it's not like 1am" (P22). P10 highlighted the reason for this: "I feel bad this bunch do not have me on hand, face to face". The surge in use of back channels during this period could also be attributed to the anxieties caused by the pandemic and lecturers need for information on COVID exposures or any other ERT challenges.

Instructions, explanations, and activities can be spontaneously adjusted in F2F classes when dealing with new or challenging concepts. P7 raised limitations of his pre-prepared "lesson-in-a-box" asynchronous Model B approach that did not allow for real-time updates. P10 expressed similar views: "explanation will always be the same no matter how many times you replay it (video content)". P9 and P17 adopted "book-ended" OL lectures during ERT. Scheduled lecture slots included synchronous introductions and closure chunks with time for individual asynchronous learning in between. Both participants reported flexibility and immediacy as benefits. These observations are in alignment with other studies (Yen et al., 2018) and highlight the value proposition of BL vs fully OL or fully F2F approach to balance the need for crucial immediate feedback with opportunities for students to learn at their own pace. However, as P1 reflected, synchronous sessions are not one-for-one replacements for F2F: the resources, facilitation

skills and communications norms for both modalities are different. These changes of competencies for educators in OL and BL environments have been well documented (Chapter 2.2.4) and will be discussed in detail in Section 4.7.

4.4.3 Increasing Learner and Learning Visibility

Participants shared anxieties about students' asynchronous learning. ERT synchronous lessons where "invisible" students had mic and cameras off, added to this concern. P9 and P20 emphasized framing the increased student responsibility and accountability required in a fully OL mode due to the lack of facial cues and immediacy, telling students, "If you don't speak out I will never know" (P9). Other participants shared similar perspectives: "With OL, I am more anxious about collecting feedback...better do my work early and get feedback...and ensure there are opportunities for clarification" (P5).

Participants missed the non-verbal behaviours observable in F2F: "there are additional cues to alert lecturer on students who are not learning... always late, distracted by mobile phones, not able to answer questions" (P8). However, P8 and P10 stressed that physical attendance does not equal learning: "facial cues can be very misleading…some very good actors…give you very honest nods…when the results are out you wonder what happened" (P10). All participants created additional activities to make learning from OL segments visible through evidence:

> Don't meet them so don't know if they are learning or not ... the (need for) weekly tracking to see whether they submit tutorial and quizzes to assess their learning ... to see if they understand my material (P8).

The LMS analytics and data generated from learning activities on additional platforms like Google and Padlet enabled lecturers to adapt and modify the subsequent lessons to address gaps and misconceptions (to support the TPC of CF). Almost all participants emphasized the ability to track and

monitor learners helped ease their anxiety about student learning during asynchronous periods: “Need some way to track...otherwise it's very invisible and scary” (P7, Vignette #7). Participants reported using these data to identify potential at-risk students, monitor for possible OL design issues and provide meaningful feedback to students either online or during the next F2F session. A typical example: “I’ve got my eye on a few students, I just texted the group (on the back channel) saying I have two people didn’t do the quiz yesterday” (P10 on the use of data during the OL period to check-in on students’ progress).

Vignette #7 Reflections on Monitoring and Tracking

P7 was one of the earliest participants at the institution to adopt 80-100% OLi for a large cohort, first year IT skills course. Concerned about students’ ability to manage their pace, time and learning independently, P7 ensured there were many activities for students to apply their skills and evidence learning. “Need some way to track...otherwise it's very invisible and scary”. The team ensured there was a variety of learning activities which resulted in the adoption of multiple technology platforms. To motivate students to complete tasks, marks were assigned for completion. After several iterations the course had numerous activities with “ridiculously small percentage of marks like 2%” (P7).

“Students complained there were too many things to do on too many different platforms; lecturers complained there was a lot of tracking and marking to be done”. Despite strategies like auto marked quizzes with immediate feedback to reduce workload, the applied IT skills activities meant students could “copy paste” or corroborate. It was difficult to authenticate student learning. It became evident that there was no point in checking for learning with “a quiz after every single task”.

P7 redesigned the course with differentiated mini projects that combined tasks. “Creating and marking differentiated activities is more complex... additional step but it can be done”. P7 shared the strengths of the current design: “we have the data, if they are doing very well, we leave them to it...but then there are students who should be at this stage but are nowhere there...we disturb them on Slack (communication app) ...I can spend a lot more time on the needier students.”

Reflections have become a critical part of the course: “The real meaningfulness of OL...reflections ...when they (students) pull together the different bits and segments and complex things we’ve put up.”

P7’s continuous improvement process through trial and error has similarities to many other participants. The adoption of BL approaches and the need to address lack of F2F interactions and cues have resulted in more student-centred activity based OL designs. These findings are similar to Martin et al. (2019)’s

study of award-winning online faculty designs where learner interaction was intentionally increased in addition to feedback, presence and periodic communication. van Leeuwen (2019) emphasizes the ability to monitor and adapt to students' learning process has become a key competence for teachers in the BL and flipped environments. The challenges involved in monitoring learning across multiple technology platforms will be discussed in Section 4.7.

4.4.4 Creating a Supportive OL Class Community

Aligned to Garrison's COI framework, learning from peers through interactions was valued as a strategy to develop independent learners, **"**it takes a community of learners to build self-directed learners" (P11). The role of peers was especially valuable during asynchronous periods. P18 who teachers a software based course, shared his observations of peer explanations being more helpful than the lecturers' clarifications at many points. P18 suggests such interactions increase students' ownership of learning and encourage seeking responses independently rather than waiting for the lecturer to provide the answers. Based on these beliefs about T&L, P18 adopts a Model E that focuses on developing a community of learners. Additionally, P10 and P18 remarked, peers were more likely to be available in the late hours that students seem to prefer to work for clarifications or support.

Most participants used F2F activities and the back channel to promote these interactions. Sharing a physical learning space enables students to learn from observing peers, listening in to conversations with other students and sharing work in progress for class level discussions. P19 remarked on the value of shared physical spaces for learning: "sitting in a cluster having a face to face conversation ...build bonds that matters. Nothing beats looking over your friends' or classmates' shoulders and saying "oh what's that ah?"

During the COVID pivot and the initial period of uncertainty, most lecturers encouraged students to post learning related questions on the group back channel to avoid having to respond multiple times. Many participants took a facilitative approach to manage the group discussions. Wait time was practiced for less critical questions to encourage peer to peer responses. Despite encouragement, less confident or "shy" students preferred to message the lecturers privately. P20 lamented the additional effort and time required to answer the same question repeatedly in OL mode, whereas in F2F classes, all students could "tune in". P8, P11 and P16 sought student permission to post individual questions to the main group, stressing the value to peers. Additionally, P20 and P23 observed that students were reluctant to discuss work in progress in front of their peers during the ERT synchronous sessions. This behaviour was attributed to a lack of rapport and trust amongst the class: "This batch of Year 1 has never met F2F yet" (P23).

With fewer opportunities to mingle with peers, CET learners from diverse backgrounds were less likely to interact or respond to peer questions in back channels. The communication channels were largely lecturer-directed to disseminate information and help adult learners stay on track with learning. P11 noted differential levels of peer engagement:

> I did this…quite successfully in my PET group, the better students, they really start helping one another and answering the question... For the CET… actually it's harder to get them to do that...background is really, really diverse...I'm trying to encourage them to contribute to the group (P11).

Participants stressed that post-COVID, F2F will remain a necessity but the "precious" F2F needs to be deliberately planned: "there is a reason for coming F2F, focus on the social aspects...need to make it more socially experiential not just experiential" (P19). OLi 80% Model E adopters, P6 and P18 use various OL strategies to build a class community: the design of structured peer-peer interactions with a

requirement to evidence learning from peers; activities and social media platforms to promote social presence. (Vignette #4) (refer to Segment 4.5 for technology related discussion). P5, on adopting Model A with F2F sessions observed that “New normal or not, humans, especially at particular ages, have a primal need for social interaction and F2F lessons fulfil that innate social desire”.

The loss of human connection expressed by participants has been widely reported in the literature, such as Means et al. ’s (2014) large scale metanalysis. What is unique to this study, is the participants' prevalent use of instant messaging channels to support student learning and create a sense of class community throughout the course. Emails were generally used for official purposes, the security features that require additional logins to access emails may have further reduced the use of these tools. Many of the participants in this study used Whats App personal accounts for this purpose. Some like P11 use the Telegram app that does not display users phone numbers. Others preferred to use the MS Teams app tied to the institution account (tool selection decisions will be discussed in Section 4.5). These mobile app-based tools allow students and lecturers to have instant access to messages on mobile phones without the need for additional logins. Instant communication channels further blur the boundaries between formal and informal learning spaces and require “much more effort and time” to manage and respond to individual queries (P16).

In a literature review of the use of WeChat, a mobile social media platform, Xu & Churchill (2019) identified seven categories of use in education: Resources Sharing, Authentic Learning, Collaboration, Community Building, Motivating Environment, Evaluation and Feedback, and Administration for Learning. The only category that did not emerge in this study was the use of social media for authentic language learning. The back channel was extensively used for announcements specifically reminders (administration purposes), rapport building (community building), exchange of ideas, clarifications

(collaboration), providing encouragement and support (motivating environment). The literature review did not identify any issues with the need to manage official communications between lecturer and student and personal boundaries on these mobile apps. The authors briefly point out that privacy issues related to the use of social media apps in education could run counter to its usefulness in resource assessing and delivering. The site institution's full time students are generally between 17-21 years of age, young adults who may still be vulnerable. There are other channels, MsTeams which requires institutional login provides a robust mobile app which is increasing in popularity. Institutions will need to have guidelines in place to support lecturers and students to manage personal boundaries, well-being and use of instant messaging tools.

4.5 Mapping Technology to BL Practices

Participants viewed technology as essential and central to learning and future work: "digitization is inevitable"; "just as it is in our daily lives"; "digital literacies are necessary to prepare students for industry"; "how learning is accessed today". Beyond developing students, the OLi was envisioned as an opportunity to develop lecturers' OL design and facilitation skills (details in Chapter 1).

Pedagogy before technology is an oft repeated mantra at the site institution's PD sessions. However, some participants were of the view that it was not simply "design more than technology, sometimes tech makes it happen easier, and more engaging" (P20). As P7 (Vignette #8) discovered, the choice of technology with its affordances and constraints impacts how learners interact, engage and experience learning activities (Koehler & Mishra, 2009). Graham et al. (2014) also underscore the impact of technology tools on pedagogical effectiveness. Based on the simplification of Gibbons & Rogers (2009) theory of instructional design layers, Graham et al. (2014) propose two layers that impact BL design. "The physical layer is the presentation or delivery of instruction, while the pedagogical layer is the

strategy that enables learning to take place" (p 21). The teacher's ability to integrate these two layers through effective learning design requires application of TPACK .

Vignette #8 The tool shapes student responses

P7 found students' reflection submissions lacked structure and varied in length and depth. Additionally, reviewing submissions required accessing and reviewing one document at a time. To scaffold the process and ease the workload, P7 created an online reflection form with text boxes for students to enter their reflections. The change of format resulted in most students providing brief answers as responses. Students had assumed forms required shorter responses as compared to a document submission. Reflections had become a form filling exercise.

The technology-related themes that surfaced from the interviews could be categorized into four interdependent aspects: criteria for technology selection; design and development decisions; the role of iterative design and student feedback; the impact of technology provisions and licensing issues.

4.5.1 Criteria for Selection

The institution's technology provisions included a range of tools and resources from the standard LMS to eLearning platforms via the library. Independently, lecturers adopted a wide range of license free online web tools including gamified quizzes. The availability of Google Apps for Education accounts eased the login and authentication process for most of these tools. Participants emphasized that there was no perfect tool or platform that could meet all their needs (Vignette #9 and #10). Participants considered several criteria when selecting appropriate technology. The following key selection criteria themes emerged from the findings and will be discussed in the subsequent segments: Aesthetics and Visual Appeal, Automated Feedback Features, Availability of Analytics, Gamification Features, Virtual Community Spaces and Privacy, Familiarity, ease of use and technical support, Tools aligned to industry practices.

Vignette #9 No perfect solution – It's a continuous experimentation process

P6 teaches an 80-100% OLi elective course to promote analytical and critical thinking through media. Adopting OL has enabled students to watch the media "at their own time and convenience" and respond to the discussion prompts in a "thoughtful critical way".

"I want students to take more ownership of their learning". P6's vision for the course platform is "a place where people could access the media and create a vibrant online learning community with lively class discussions". Over the years, P6 has continuously experimented with strategies to incentivise participation; the goal is to move from "just responding to the questions" to "leading the discussion".

Technology plays a crucial part in achieving these objectives. P6 emphasizes that vibrant discussions are hard to achieve if "it's very hard to post, engage and check frequently for updates". The platform should "mimic students' interactions on social media". The LMS platform was not designed for such interactions and felt "stuck in time". For students' postings and peer-peer feedback, P6 has tried Google Groups, Facebook, Google Classroom, Padlet, Google Slides, Google+ amongst other platforms. The use of these tools eased authentication as institutional accounts were linked to Google accounts.

P6's frustrations were evident: "We've always tried to shift things, sometimes not so successfully. What we want doesn't exist out there...it's like finding the best possible platform out there". P6 is continuously on the lookout for an easy-to-use, visually pleasing, mobile friendly platform, saying, "I'm not a hundred percent satisfied with (latest tool) that's why I am exploring Tool X." The platform must also support the purposes of tracking, monitoring and evaluating, as "we can't be having discussions over What's App right?"

P6 emphasises that as there is no one platform or technology solution that can address all the design needs, the quest for "the best platform that matches" continues: "If things didn't work out...there is always a fall back (previous iteration)".

Aesthetics and Visual Appeal. Several participants highlighted the need for interesting and visually appealing OL designs to meet the students' expectations for engagement (See Chapter 4.2). P21 commented on PET students' preference for visually appealing content and animations: "we need a lot of time to create…to suit our new generation of learners"; "we are not professional content developers". P9 found the LMS "finicky and clunky". For this reason, some participants preferred to use the Google Classroom or Google Sites (institution's version). The LMS was mainly for assessment submissions.

> I took the effort to do the experience in Google Sites, Google Classroom for them (students) to have a good experience of the platform ... especially the (domain) students, they're very aesthetic...if the lesson platform was ugly it will turn them off. Also the site is mobile optimized. (P9)

> User experience is important, the human factors… students feedback they prefer to have teacher presence in videos… otherwise it's just another PowerPoint with voiceover…that triggers me to spend a lot more time to develop the whole green screen teacher presence kind of videos. (P15)

Lecturers who made aesthetics a key selection factor were generally very technically savvy, and had design experiences (teaching in design, media, marketing courses or had product design experience). These participants also reported spending weekends and nights creating content. Not being a professional developer, P19, opted to use professional platforms. Others like P1 opted for the familiar PowerPoint tool but wished an expert would help develop a visually appealing narrated story to communicate the relevance of her content. P12 and P22 both adopt team development approaches and ensure one team member has visual design skills.

Debates about whether visual appeal has an impact on student motivation and learning have existed in the literature for decades (Tomita, 2018). However, considering that students can and do make judgements on the quality of a course based on visual impact, Bader and Rowenthal (2018) argue that beyond taking an instructional perspective to design, institutions will need to focus on aesthetics and visual design to improve overall learning experiences. Lecturers will need support to improve the visual design of online experiences. These provisions could include PD support (Section 4.6.1) or access to easy to use tools for creation (Section 4.5.4)

Automated Feedback Features. Most lecturers adopted tools that allowed for immediate feedback to support the TMC: quiz tools with automated feedback, LMS adaptive release features for summaries, completion badges, rating features were also used. These features in addition to individual feedback, saved lecturers time and enabled motivated students to reflect and modulate their conceptual and/or procedural understanding. However, the activities with automated feedback were limited to Multiple Choice Questions (MCQs) with automated answers or generic summaries on submission of written work. One challenge raised by participants was the lack of easy-to-use tools to design and support diverse learners, for example, personalized adaptive quizzes and activities (as discussed in Segment 4.3).

P2, P7, P10, P14, P22 highlighted concerns about the authenticity of quiz attempts and asynchronous activity responses: students could be guessing, corroborating, or copying. To address this issue, the randomized quiz feature in the LMS was used extensively by many participants. Additional assessment strategies such as personalization of projects, student presentations and reflections were adopted to address the issue of plagiarism in asynchronous activities.

Feedback is a crucial factor to support learning (Hattie & Timperley, 2007; however, providing real-time feedback at an individual level is not feasible. As highlighted by many participants, students can complete asynchronous work at all hours of the day. Although still in nascent stages, there are many advanced feedback tools including intelligent authoring systems that offer adaptive, individualized feedback in text, video and audio modalities (Deeva et al., 2021). Institutions will need to proactively explore and evaluate advanced technology tools for possible adoption to improve student learning and increase lecturers' productivity.

Availability of Analytics. P5 described the availability of data as "reassuring…great way to keep track of whether students finished the videos and how many questions they get correct, very important feedback". (See Segment 4.3 for related discussions on monitoring learners). Participants emphasized the use of data and analytics generated from OL activities (for example: access time stamps, responses) for monitoring purposes to address the lack of physical over the shoulder opportunities

Many participants highlighted analytics features that simplify the visualization of data like LMS quizzes and Google Forms quiz responses to monitor learning, inform on potentially difficult questions maximize time and increase efficiency. Others like P16, who teaches a cohort of less academically inclined students, tracks the video analytics to identify which videos students are repeatedly watching to understand the learning difficulties. However, some lecturers like P3 commented on the need to be able to distinguish between the noise and useful nuggets in the LMS data. P11 who uses multiple platforms for various purposes pointed out the time required to pull data from these various platforms for each week's activities.

Beyond helping lecturers understand student behaviours and learning patterns, Harindranathan and Folkestad (2019) highlight the role data and learning analytics could play in supporting students through "meaningful feedback targeted to improve self-reflection among students who show less metacognitive awareness of their learning behaviours" (p.46). The productive use of learning analytics for self-reflection could support students' development of SDL, the key objective of OLi and the institution wide post-COVID BL implementation. Lecturers need access to varied customized and customizable dashboards based on the insights to be reflected on.

Gamification Features. Participants reported better student engagement with gamified learning activities. However, standard institutional tools did not provide these features and customized development would require substantial resources. P7, P13, P16, P18 adopted free, limited access Game-Based Learning platforms like Kahoots. (During the period of this writing Kahoots had reduced its free version features, requiring many lecturers to look for alternatives). P19 adopted a gamified industry partner eLearning platform (Vignette #4). Creative problem solving skills helped some participants overcome limitations. For example, to introduce friendly competition, P2 resorted to creating a manual "spreadsheet leader board". To address the maintenance efforts, the activity evolved to a student-managed collaborative board. P7 designed a simplified Game-Based Learning activity for a small cohort course. However, without deep technical skills the design could not be upscaled for large cohorts. As creative learning designers, lecturers will need the flexible opportunities to adopt, experiment and play with a range of technology tools. Technology provisions to support these experimentation efforts are discussed in 4.5.4.

Virtual Community Spaces and Privacy. Across all BL models, lecturers attempted to create "teacher" (teaching) presence and peer presence using technology tools and a class back channel (refer to Segment 4.4). Additionally, P6 and P18 stressed the need for technology platforms that supported the community-based BL Model E in an "easy, user friendly manner with minimal barriers to posting" (P6). Both participants reported iterative experimentations with multiple platforms to support peer-peer sharing and interactions in a seamless manner (Vignette #5, #9). The LMS features did not meet these "social media like" needs. P6 and P18 discussed possible risks with students before adopting closed social media platforms. As discussed in section 4.3, post-COVID, instant messaging tools were used extensively by participants. Besides WhatsApp, a few participants adopted Telegram or the institution's Ms Teams app to avoid disclosure of mobile numbers. Participants reported being more lenient during

the COVID period and responding to messaging late into the night or weekend. Some participants generally responded promptly unless “I’m sleeping“; others practiced wait time to allow peers to respond. The institution had encouraged lecturers to set “office hours” or available times with students when using back channels. In addition to Xu and Churchill's (2019) literature review discussed in 4.4.4., use of social media and instant messaging has been reported in more recent studies on the utility and usability of instant messaging tools for social engagement (Tang & Hew, 2019). Xu et al. (2020) discuss the effect of teacher role on student engagement, but neither study considers privacy, boundaries or guidelines for use.

Familiarity, ease of use and technical support. Some participants preferred to adopt institutionally available tools for the support and services offered: “I try to keep within LMS, institution is using it, at least there is a course base and support” (P3). P1 adopted familiar tools to address time and resource constraints.

Vignette #10 Familiarity, ease of use and cost as criteria for technology selection

P1 voluntarily adopted asynchronous OL to replace F2F lectures for a foundation course in the ICT domain. P1 attempted to adopt eBook content but found it ineffective based on students' feedback. Subsequent attempts to develop content with a PowerPoint add-on tool came with a steep learning curve. The need to periodically update content and activities “took up a lot of man hours”. Although the course involved a large teaching team, members were teaching multiple courses and did not have dedicated time for content development. Outsourcing the development of courseware came with a cost, required justification and complicated maintenance. The team considered multiple options but finally decided to keep “to very simple solutions”.

“Since I had to do it by myself, the easiest was to choose the tool that (I was) already familiar with, which is PowerPoint” (P1).

P1 argued that software will always continue to evolve, there will always be “a better software”. Additionally, there is no pleasing everyone. Students and team members will have personal preferences whichever platform is adopted. P1 chose to use familiar tools in conjunction with the LMS monitoring and tracking features -” More cost effective, students are receptive”.

Tools aligned to industry practices. To ensure curriculum practices are aligned to industry, participants highlight the need to align the use of IT tools with current industry practices (Vignette #4). For example, P3 discussed selecting tools for collaborative activities based on industry practices "whatever I do, I tried to link it with industry, it's the same thing with Tool X".

4.5.2 Design and Development Factors

Three themes emerged in relation to the design and development options adopted by participants: Curations Vs Creation and Students as Co-Creators, Team Vs Individual Development and IT Development Support.

Curations Vs Creation and Students as Co-Creators. Most participants started their BL journeys by creating contextualized interactive content, as appropriate resources were not readily available. Where possible, curating content was seen as an option to reduce workload and avoid re-inventing the wheel. Eventually, most participants opted to create content based on student feedback: "they couldn't understand some of the accent and terms used" (P16); "they complained content was not directly related to the practice exercises" (P18); "the students feedback they would prefer the lecturer's voice" (P15); "I think they find the lecturer's voice comforting (P5)". Creating content allows for better contextualization to local events (P3). Although creating content was time intensive, P18 emphasized the benefits of repeated use.

Software related courses required more frequent revisions of content due to regular feature updates. P19, an ICT domain lecturer, chose to curate resources from an industry partner, "we are not set up for professional e-content development" (Vignette #4). There could be possible skills development, ethical issues with selecting one industry platform over the other. P19 highlighted the necessity to identify the

leading industry platform for hands on training; it was the role of lecturers to contextualize and highlight the pros and cons of each platform. P14 curated readily available content from a library subscribed platform for her foundational IT skills course (Vignette #11).

Vignette #11 Training students for the future of learning with professional eLearning platforms

P13 volunteered to adopt 80-100% OLi for a foundational IT skills course. It was a good opportunity to prepare students for "learning in the future, after they leave school". Based on P13's personal experience as a Masters student, a mastery FL design (Model B) was adopted. This allowed students to learn the skills at their own pace. Additionally, asynchronous OL ensured consistent content delivery across the large (over 400 students) and diverse cohort of students.

P13 did not "see any point in creating the content…there's so much content out there, people do so much, way better things than us, they do it as a full-time job. I cannot be doing teaching and video editing and recording and making sure that all the nuances are in place."

P13 evaluated e-textbooks and online MOOCs for this foundational skills course. After consulting the Teaching & Learning Centre on possible copyright and IP issues, P13 curated content and practice exercises from the LinkedIn Learning platform. F2F sessions were converted to assessment and consultation slots to assess learning, address students' queries, provide support and feedback for learning.

Initially, students did not like the narrated video accents but "(the) transcript's on the site. … I thought that's great for my non-native speakers of English… really helped them quite a bit."

Student preferences sometimes needed to be overcome: "the (course) students tend to be people orientated, they wanted face to face. They like it when the lecturer is sitting in the classroom, and they can ask questions anytime". P13 repeatedly framed and emphasized the importance of a blended approach and the need to adapt to external learning platforms at the future workplace.

Curated content comes with challenges, as continued availability cannot be guaranteed. A keen OL learner himself, P4 enthusiastically incorporated a free MOOC as part of his course (students were required to sign on to the MOOC). Unfortunately, after one run of the course, the MOOC was discontinued. Having experienced the benefits of a BL approach, P4 had to quickly create course specific instructional videos with relevant understanding check activities. It was not perfect, but "was useable", P4 iteratively improved the design and content over the next two semesters with student feedback. Most participants who created content did so with a similar mindset; starting with a basic design and the most essential features in place, followed by iterative refinements over the next few semesters.

Many participants adopted a combination of created content to address contextualization needs and curated resources to provide relevance, currency, and real-world examples. To manage workloads and promote ownership, P18 co-opted students to create instructional videos for a design software (Vignette #5). Participants like P4, P17 and P20 enlisted students to research and share curated content. Considering exponential digitization across industries, expanding traditional lecturer-created content to include external partners and industry has been discussed in Section 4.2.6.

Team Vs Individual Development. Based on institutional recommendations, the pilot batch of OLi courses adopted a team approach to develop OL segments. School-selected teams enabled better support for pioneer OLi course leaders. Having been part of three development teams, P12 attested to their value and benefits. P12's team had a creative colleague who could draw and animate, a technically savvy lecturer and the subject matter expert. Other teaching team members played the role of reviewers and testers. P22 from a different school, described a similar experience leading a team where one team member "could draw" and came up with original work to address copyright; two other colleagues curated content and reviewed iterations.

> Sometimes ideas need bouncing to grow, we each thought differently…helped us…come out from that normal expectation of what a course should look like….very nice experience for me ...helped that we were from previous teams…we knew the pains…we knew how to minimize the pains…down to the simple things like which room to book for recording. (P12)

However, as P12 discovered, this approach would require careful planning for deployment. P12 described an early course she had developed as part of an instructional design team. None of the development team members were teaching the fully OL course. Due to the time factor, the teaching team was not involved in the development or student review and feedback session. Although briefing sessions were conducted, the teaching team lacked understanding of the design intentions, and this

resulted in several issues for the first run of the OL course including misunderstanding an asynchronous activity's purpose. Reflecting on the experience, P12 underscored the need to keep the teaching team in the loop: "training of the facilitation team is essential, they need to understand (rationale)...need to buy-in, …know how to help the students". Several studies have established the value of collaborative team-based approaches, as "good practice in learning design and course creation" (Olney & Piashkun, 2021, p.12).

IT Development Support. At the research site, development support is strategically offered by a small team of technologists for high impact projects and prototypes with potential for institution-wide implementation. Helpdesk, periodic PD, online self-help courses and troubleshooting support for institutional tools is available to all. At the site institution, there is an increased use of immersive technologies that allow for students to explore and practice learning in safe yet authentic virtual environments especially during ERT. However, these efforts were all professionally supported. During the COVID ERT pivot, P17 and P18 took up the technology team's offer to support the development of immersive videos for physical space familiarizations activities (Vignette #12).

Vignette #12 Immersive environments enables student-led content exploration

P17's Year 2 course prepared students for work attachments in the following semesters. Field visits and the use of a simulated physical room play a crucial part in ensuring the authenticity of course learning activities. The lockdown and sudden campus closure created a major challenge for P17. P17 was concerned about students' ability to achieve the intended outcomes and prepare for workplace attachments:

"We use a particular room, in a simulated manner, so that helps students to understand... How am I going to bring (the) environment to them? I can show pictures but it doesn't give much idea".

"(at the) COVID pre-semester briefing and sharing sessions held by the Teaching and Learning centre …the tech staff… suggested… using 360 video".

The introduction of the immersive spaces allowed students to explore and discover the content for themselves. P17's physical absence encouraged students to take ownership and control of their learning " …because I'm not

there to tell them next next…" Based on the quality of assignments, "I can confidently say they engaged with the environment and achieved the learning outcomes".

With the support of the (technologies) team, "I stepped out and learnt…I'm bit more adventurous in the tools (post ERT)".

P17 acknowledged the positive impact of the technical support, to achieve learning outcomes and inspiration to explore other tools. "Outsourcing" the development of courseware to the internal technology team or an external vendor comes with its own set of issues. Any updates, major or minor require seeking support outside the teaching team. Maintenance and shelf life is reliant on continued availability of external technical support and funds (for vendors). Evidence suggests a compromise approach that allowed lecturers to receive periodic expert instructional design and technology support has been successful (discussed in Section 4.6).

4.5.3 Iterative Designs and Student Voice

All participants adopted student feedback focused, iterative design approach to OL segments. The compulsory PD emphasised phased development with small scale trials and pulse check surveys or in-class observations (see further discussions in Segment 4.6). Participants recognised the value of testing their designs as P 20 observed, "really important to prototype; you can't expect someone 16 and someone my age to think alike" (P20). P20 sought help from previous batches of students to test prototypes. Participants like P17 were keenly aware of the need for continuous development cycles: "number one…most important is fundamentally you need to understand your students first. I think that it's constantly changing (digital competencies and needs) with every group of students …need to redesign" (P17). P4 emphasized the role of student feedback for improvements: "I won't say it's a challenge, but rather a continuous work on improving it…after every iteration, student feedback improved, they are happier to learn this way".

These findings of successful adoption through iterative designs informed by student feedback align with Schmidt et al. (2020)'s reflections on how faculty learn to teach online. However, participants did not have the luxury of time for phased iterative developments during the COVID pivot. P14 remarked on the differences between her previous 25% OLi experiences compared to the ERT pivot: "Sometimes, given the situation we must learn to adapt…I remember in the past, we have a whole team (to) embark on … four topics. Now (ERT) all of us have to run alone to convert the materials".

With the current climate of exponential growth, curriculum changes maybe more frequent and require more digitization to align with industry needs. Besides being adaptable and resilient, individual lecturers will need varying degrees of support and systemic level strategies to cope with these changes (Zhao & Watterson, 2021).

4.5.4 Technology Provisions and Licensing Issues

Institutional tools address the needs of most lecturers; however, some lecturers wanted additional options to better support design intentions. P20 emphasized issues that arose with a one size fits all approach to technology adoption at large institutions like the site. P23 made the decision to use institution tools as requesting for additional tools would require "strong justification for purchase" and evidence of substantial use (a necessity to ensure prudent spending of public funds).

Institutions generally adopt highly formalized procedures for technology implementation, a requirement to address increasing security threats, resource and budget management. As an example, during the COVID pivot, lecturers were strongly encouraged to use the LMS and institutional tools rather than tools like H5P, Kahoots for example. These guidelines were precipitated by the additional ERT measures, including the need to track students' attendance and participation at institutional and national levels.

Using institutional tools enabled lecturers and the institution to efficiently harness the analytics generated and consolidate IT support efforts during the unprecedented period.

As BL and technology based learning continue to grow, adhering to strict or efficiency focused policies can make it difficult for lecturers to adapt quickly to changing needs (Vignette #13). On the flip side, the web applications environment is dynamic with a constant flow of new and improved versions. Wang et al. (2015, p.388) highlight the "necessity for the constant replacement of older technology with newer technology". This impacts the relationship of the technology component with all other aspects in the complex BL environment - the need for lecturers and learners to adapt, the need to update content and curriculum due to the changes and the need for planning, supporting and financing updates by the institution. Participants also take inputs from industry on the immediate and future developments. Understandably, these constant changes will create challenges for institutional planning.

Vignette #13 Institutional challenges in planning technology requirements

Early OLi adopters were offered a PowerPoint add-on tool to support interactive content development. P21 shared that "most colleagues declined, there were no takers. They asked me, and I said yes". Considering the lack of interest, limited licenses were procured. During the COVID semester, the few available licenses were suddenly in demand, but "(when) my colleagues asked me for the license, and I had to say no as I needed it" (P21). P21's experience highlights the challenges with attempts to project demand and plan for IT provisions at an institutional level.

Lecturers are offered a choice of laptops or tablets for device replacement on a periodic cycle (minimally 3 years). In the last 2 years, a batch of touch screen tablets from a prominent maker had several issues, resulting in most lecturers opting for conventional laptops. This made it difficult for some lecturers to record and narrate hand-written solutions, draw visual processes or mark scanned submissions during the ERT period. Participants reported using personal devices instead. As P10 shared "gesticulating in the air is not going to achieve anything; people should have the right tools, you can't expect perfect without the right tools".

Post-COVID semester, touch screen laptops were procured for all lecturers. Additionally, the institution allocated each staff a small sum of money to purchase device/equipment to aid working from home. Hardware and software are rapidly changing, shelf life of IT products are increasingly shorter. Newer versions and features are available more frequently. This has impact on institution's staff "re-tool"ing policies and budgets. To promote digitization and prepare students for future work and learning, institutions will need to consider strategies that enable staff to have access to the latest IT resources for experimentation and exploration.

Freemiums. Freemiums refer to a combination of free plus premium and refers to products that offer the basic features at no cost (Kumar, 2014). They are a popular choice for lecturers who are keen to experiment with technology without the purchase justifications required. As with curated resources, there are several risks: “Using freeware tools is good for trials, (but) the trials will expire and then your content can just disappear” (P3). P20 lamented about a freemium tool that converted to a paid model, necessitating re-creation of the content. P17 raised the issue of data collection and privacy concerns when using freemium tools, “the school account, I’m comfortable…that I can track and just use it”.

Moving forward. Considering the increased requirements for OL, the site institution has started to shape technology policies and budgets that allow for experimentation and exploration. Flexibility is a necessity to encourage proactive digitalization efforts. P3 and P20 welcomed efforts by the institution to increase purchase of web tools: “I’m glad that we are now moving on to a bit more tools like purchased software” (P3). P20 applauded the recent steps to include lecturers in the evaluation and purchase of a new technology platform, as “decision makers are not educators, consultation with staff on choice of tools and affordances in necessary for buy-in”. However, there is a need to balance the advantages of flexible, open engagement with web based tools and sites with the requirements to protect staff, students and institutional security and privacy, as noted by Lorenz and Alba (2020).

The pandemic has accelerated technology adoption by several years across industries, including education (McKinsey, 2020; World Economic Forum, 2020). More than a decade ago, Kereluik et al. (2011) argue that teachers need to be able to “experiment and play” with technology to understand the affordances to enable “subverting” technology for pedagogical purposes. The ability to subvert technology to enhance teaching and learning has become even more critical. Not all lecturers maybe

able to keep pace with this quantum leap. Institutions will need to consider differentiated technology tools and development support. Technically-able lecturers will require more flexibility in tool provision. Other lecturers could benefit from developmental support and access to a range of easy-to-use authoring or plug and play tools. Curated content, students as co-creators, access to up-to-date content and features from industry and eLearning platforms could enable lecturers to focus on facilitating and deepening learning (Vignette #4). A team development approach to mobilize complementary skills can lead to creative OL solutions. Continued PD and support for lecturers is a must.

4.6 Professional Development and Institutional Support

4.6.1 Compulsory Workshops, Best Practices Sharing Sessions

The phased OLi implementation included a multipronged strategy to ensure critical training, support and communication needs were addressed. This included a compulsory two day boot camp style workshop (refer to Chapter 1 for details). P15 who had adopted BL for supplementary learning prior to OLi, commented: “before the workshop, planning was very minor, not in a structured manner” (P15). Participants described the impact of the workshop: “it was really clear. … get the structure… list the activity… the time and building that timetable (lesson plan) …once I had that… everything just fell into place” (P12); “2014, the compulsory workshop…was the one that changed my teaching method…I’ve mentioned that in my teaching portfolio” (P18).

The terms participants used to articulate OL intentions and strategies during the interviews were closely aligned to the OLi guidelines and concepts introduced at the compulsory training. For example, participants commonly used terms like *learning maps* (to describe the OL learning activities), *constructive alignment*, *ADDIE*, *lecturer presence* and *exit ticket* to refer to student pulse check

strategies. These examples of adapting and contextualizing the PD to participants' own practices indicated the impact of the sessions. The guidelines, communication strategy, BL templates and PD enabled staff at the institution to share a common language for both communicating within domains and across domains when sharing BL developmental experiences.

In a literature review of educational technology and the impact on teachers' stress levels over the last 15 years, Fernández-Batanero et al. (2021) highlighted the role of training to support the professionalization of teachers, with sufficient capacity to combat the challenges of increasingly complex technical tools and instructional processes. Staff development and training has always played a critical role at the institution, especially over the last decade with the increase in technology enabled learning efforts. Previous attempts at training adopted a show and tell, followed by hands on approach or sharing by lecturers who had successfully adopted technology. More importantly to attract more participation, pre-OLi, workshop durations were kept within one to three hours.

Participants had no prior experiences designing formal OL experiences; many had never been online learners themselves. The workshops and sharing sessions were planned to provide the structure and support required to start on the design process. To ensure staff were equipped to review the design of the F2F lessons and to inform the transformation of their lessons to OL experiences, a hands-on design-focused prototyping approach was adopted. The design was influenced by Laurillard & Masterman's (2010) work and the ABC Learning Design workshop (https://abc-ld.org/) with structured design templates and examples of different practices across the institution. The purpose was to allow lecturers to work on their own course content and design a prototype, receive individual and peer feedback, discuss challenges and concerns over the two day session. Similar to the results of Kennedy (2014)'s study, findings suggest that this structured hands-on, prototype development approach to PD promoted

transfer to practice. However, as P21 highlighted, the training impact could be attributed to the timeliness and relevance to the participants of this study.

> I enjoyed the course…went back (to school) and said to everybody, you have to go for the compulsory workshop...(I) guess not compelling to them because they didn't have to meet the requirements (not assigned an OLi course) (P12).

The decision by the institutional leaders to implement a two day compulsory workshop which was rolled out over the course of 3 years to more than 96% of the staff (Ng, 2019), signalled the commitment by the institution and ensured all staff had the opportunity to rethink learning design of one lesson using a structured approach in a facilitated environment. The extent of the initiative required a wide range of resource commitments from staff developers, technologists and senior lecturers at each school who were co-opted as co-leaders. As argued by Gilmore (2020) and Gregory and Salmon (2013), the findings suggest the critical need for compulsory PD and personalized learning opportunities.

Evans et al. (2020) advocate for ongoing PD to ensure continued exploration and sustained improvements to BL designs. To address the need for ongoing PD, in addition to the compulsory two-day workshop and a range of short sessions, OLi Forums were organized on a regular basis by the different schools during the 2017-2019 period as part of the OLi implementation roadmap. Attendance was voluntary but due to communications highlighting the OLi rollout, the sessions were generally well attended. Several participants in this study discussed their designs, student feedback, key challenges and learning points at these school-level forums to instil confidence and share evidence-based strategies with colleagues. These avenues also provided participants the benefit of feedback and suggestions from colleagues (P1). P17 highlighted the impact of these sessions on her practice:"when I saw what the other schools were doing…things differently, although the content is different, but I can use the technique". Schmidt et al. (2020) highlight learning from peers who taught in similar subjects facilitated

successful transition to online learning. Additionally, this study's findings suggest the value of learning from fellow educators who teach similar student profiles.

Beyond the OLi related workshops and forums, P8, P10, P15, P18, P20 highlighted the role of participating in various institutional level T&L committees, master's in education programs and formal COPs as playing a big part in their shift in thinking about teaching and learning and OL. P4, P21 and P23 highlighted personal experiences as OL learners themselves that triggered the voluntary move to BL approaches. The findings highlight the need for lecturers to be learners themselves. An aggregative review of PD for OL and BL, Philipsen et al. (2019) summarized the need for a supportive environment with regular and just-in-time support and feedback, with well thought out process and appropriate duration considering time-poor teachers. These findings suggest that many of the institution's decisions for pilot OLi courses were aligned to evidence based practices. However, due to a lack of resources, coaching by Staff Professional Developers was compulsory only for the early adopters; subsequent coaching was offered on an on-demand basis.

4.6.2 Staff Developers, Peers and Mentors Support

Early phase OLi courses had the additional benefit of a Teaching and Learning Centre staff developer (refer to Chapter 1, Table 1). P22 described how the coach "gave me advice regarding the development plan and how to implement". P12 on working with a team of colleagues selected for different strengths including graphic design and subject matter expertise: "There were three of us mainly…And then there were people who are helping to review and give feedback… I think that's essential…(single member development)… doesn't help creativity at all, because we're not good at everything". P12 and P22 who went on to develop other courses, acknowledged the additional coaching and team support during the

initial phases, “the learning curve can be very steep”. P13 preferred a solo approach to OLi design to avoid the “too many cooks” issue. Besides the team, P8, P11 and P16 credited other OLi committee colleagues for the many ideas and suggestions that contributed to the pilot designs. P20 remarked that the OLi was more successful than previous institutional technology enhancement projects as it was collaboratively led by a committee represented by lecturers from all schools with clearly communicated goals and processes. The findings concur with previous studies by Mishra and Koehler (2006) and Voogt et al. (2015) that collaborative curriculum design and experimentation with technology in supportive environments serve as PD that can contribute to the development of lectures’ TPCK and lead to better quality outcomes.

P17 was the sole participant tasked to develop an OLi course on her own in her first semester on the job. During this period, P17 was assigned a T&L mentor as part of a milestone new lecturers’ induction program. The school had assigned P17 a T&L mentor who was an OLi course leader. P17 acknowledged the mentor’s role in helping to shape the design of her OL segments and providing much needed examples-in-action. Several participants highlighted the role of the institution’s tech support team: “(they) helped me a lot because every now and then I asked …how to do certain things” (P16). Based on the findings, courses with large teaching teams or carefully picked course design teams may have the option of recruiting members with existing complementary skills. However, courses offered by individual lecturers could benefit from a collaborative approach or coaching from an experienced colleague besides formal PD and access to tech support. The current provision for optional coaching and consultations may not be sufficient to meet all design objectives for all courses; sustained professional instructional design, peer and mentor support maybe required.

Vaill and Testori's (2012) reported on a three tiered approach to PD model to address increasing OL uptake, beyond an introductory facilitated multi-week course, periodic check-ins by instructional designers offered faculty customized sustained guidance on the appropriate use of the LMS and pedagogical support with constructive feedback, resulting in high quality OL courses with highly satisfied faculty. Similarly, nurse educators across 14 US institutions who delivered up to 51% of their courses online in Richter and Idleman's (2017) study reported increased efficacy with on-going support for OL design and implementation through a range of PD formats including mentoring, peer support, and instructional design support.

Having completed a few design iterations, several participants shared their wish list for the future: visually appealing Scenario Based Learning content (P1), equipment and support for live streaming sessions and professional videos (P3), designing Game-based Learning (P7), instructional design skills to create better interfaces (P9) and personalized adaptive learning segments (P16). The two day workshop that was sufficient to get lecturers started on the design is clearly insufficient for advanced practitioners. Although a range of complimentary, voluntary OL related workshops is offered on a regular basis by the institution, more bespoke, personalized PD sessions maybe necessary. Gilmore's (2020) study emphasized the need for multiple pathways to provide ongoing PD and support for increasingly mixed ability groups. Recommendations from Vaill and Trestori (2012), Richter and Idleman (2017) and Gilmore (2020) could be used to shape on-going personalized multiple pathway PD programs at the institution.

4.6.3 Suspending Evaluation, Supporting Experimentation.

Lecturers in Vaughan's (2007) study identified receiving less favourable student evaluations and anxiety about losing control over the course as major risks for implementing BL. More recently, Ruth (2018)

highlights lower student evaluations and response rates for OL as one of the key oppositions to OL. In Martin et al.'s (2019) study of award winning OL faculty, willingness to learn and experiment were key drivers for successful adoption. In the current study, to allow time for exploration and experimentation, lecturers were assured that initial runs of OLi courses would not be evaluated based on standard academic evaluation and quality instruments. This approach may have supported participants' incremental iterative design efforts: "(first iteration) can use but not perfectly made…got students to voice out their opinions. The design was more stable after three semesters" (P4); "there were many wrong turns" (P11); "trial and error process" (P8, P15, P19); "my first semester and now (5 semesters later) …180 degrees difference" (P17); "we did it in three phases" (P18). P12 highlighted the absence of scrutiny, "… that amount of freedom is necessary, because even amongst the team we don't agree on things, right?". However, P9, who identified as a perfectionist, remained anxious, "I know the school won't do that (evaluate)…this was not required but…I remember feeling very paranoid about the end of course survey…" (P9 collected student feedback after each OL segment to continuously refine the design).

Several participants also brought up the initial resistance from students to OL weeks (P2, P3, P9, P14, P15, P16). Two key reasons were shared for the teething issues with OLi: students' resistance to change of F2F sessions to OL and the need to "study by themselves" without the lecturer to present the topics to them. In P15's case, he reflected that the key reason for this reaction was that initial OLi designs that lacked engagement. Based on institutional data, student acceptance increased with time and as more courses joined the initiative (Ng, 2019). Another key issue highlighted by P7 was the early stage misconceptions by some colleagues who assumed that OL meant that students were to have no contact with them until the following F2F class. Participants emphasized satisfaction with OL design and

outcomes after a few iterations, suggesting the merits of the institution's decision to support a conducive development phase.

The "support for success" themes that emerged suggest encouragement to experiment and explore practices with timely prototyping focused workshops, readily available tech support, coaching and mentoring support and opportunities to discuss BL practices with peers contributed to a cultural shift amongst the OLi early adopters. No other studies could be found on institutional practices that suspended planned academic quality measures like course experience surveys with special replacement surveys. However, the resulting willingness to experiment aligns with expert views on the need for a culture of innovation and willingness to take risks to sustain digital T&L practices (Huang & Hung, 2020). The challenge will be to provide on-going sustained support to encourage and promote institution-wide innovative designs and digitization efforts.

4.7 Lecturers' Roles and Reflections

Participants in this study ranged from pre-OLi early BL venturers to inclined or assigned OLi adopters (Appendix B). It is important to note, none of the participants in this study indicated strong resistance to adopting OLi; BL approaches were perceived as a necessity. This profile may also have been a result of the institution's strategically recruited initial OLi participants to ensure early success as a communication strategy to increase adoption and alleviate anxiety.

4.7.1 OLi to Post-COVID Journey

All participants had minimally 3 years (6 semesters) of blended learning and one semester of ERT experiences. Participants' BL intentions were largely determined by their motivations to adopt BL. Early adopters and the inclined volunteers perceived asynchronous content delivery as a possible solution to

pedagogical or engagement issues (Vignette #1, #2, #3). Participants P9, P15, P20 derived personal satisfaction from maximizing the use of technology for learning: “I want to go into the edtech space, I want to teach comfortably with tech…it’s important we see ourselves as constantly evolving teachers…I want to learn instructional design next” (P9). For P20, it was about deriving job satisfaction from developing independent learners. For some like P17, it was a part of PD as a lecturer in the 21st century classroom: “We cannot be teaching with old ways”. For P8, a para counsellor, OLi provided “more time for the needy students”. The assigned adopters started with a cautious “ensure no learning loss” strategy to OL segments. P23 on being assigned to develop one of the first OLi courses with her team:

> No concerns that it wouldn't work but … more … concerned about whether the effectiveness of the teaching materials… because it's our first time designing… so we don't know, you know, what works best. (Initial) aim…nothing too ambitious…the same learning objectives can be achieved (as F2F).

Participants developed confidence in BL and buy-in increased after reviewing student performance and feedback. For example, P17, an assigned adopter, observed an increase in students self-directed behaviours after implementing an immersive video activity during ERT: “I’m glad I was pushed to take OL course…otherwise, I think I wouldn’t have explored this far…” (P17). P9 reflected on the rewards of investing time and effort to learn new mobile friendly technology tools: “the fact that I was able to achieve what needs to be achieved today… just assured me that (it was worth the effort) ...the rewards of at least understanding a platform”. Despite the different contexts, these findings are in line with Wingo et al.’s (2017) synthesis of empirical research on lecturers’ perceptions of OL.

The models adopted by the participants in this study evolved to reflect their assessment of students’ learning and social needs intertwined with their increasing confidence with BL. Pre-COVID, almost half the participants adopted Model A partial flipped pedagogies (25-30% OL). The OL segments focused on

transmission of knowledge with activities to check surface level understanding through MCQs (as discussed in Segment 4.2). The lack of F2F cues forced participants to adopt a structured OL design approach to ensure students' learning was evidenced. Moving content to OL shifted the focus of F2F sessions to student centred activities. Additionally, some participants reported adopting more technology tools in F2F classes as an extension of the OL experience. P18's adoption of different models for engineering concepts (CET, Model A) vs creative design skills (PET, Model E) and P11's adoption of PET Model B vs CET Model A, suggests participants adopted flexible practices depending on learner needs and course outcomes.

The pivot to ERT required participants to teach in a completely different modality with less familiar tools. Many participants shared that the OLi experiences had eased the adjustment to ERT. Model A adopters converted F2F sessions to synchronous ERT lessons to ensure opportunities for real-time peer interactions. As P14 noted, unlike the OLi there was no easing in phase. Some participants inevitably compared F2F and synchronous ERT delivery. Facilitating synchronous collaborative activities was the key challenge: "no one used the discussion forum"; "it's challenging to facilitate group work synchronously"; "online there can be silent partners". The lack of TPK for synchronous modes made it difficult for these participants to focus on the pedagogical purpose. Most lecturers will inevitably start by transferring F2F routines to online contexts. Transition from F2F to BL or fully OL will require time, reflection and impact how teachers perceive themselves including the routines, beliefs, knowledge, skills and attitudes (Jonker et al., 2018; Baran et al., 2011).

For many participants, the ERT experience provided opportunities to reflect on the blend of OL and F2F modalities for their post-COVID course designs. Technicalities aside, participants argued that F2F was essential to meet the social need for 17-19 year old PET students. Many like P2, asserted that

synchronous sessions were a “poor substitute” for rapport building and social interactions. Only P6 revealed a preference for synchronous sessions as compared to F2F. However, P6 was an exception; the virtual classroom created less visual prominence on the lecturer at the front, allowing the focus to shift to student speakers and creating a sense of comfort for the introverted P6.

During the COVID pivot, two participants (P8 and P11) redesigned their Model A flipped courses (30%) to Model B individual mastery approaches (80%) with a sharper focus on competency-based assessments (refer to Section 4.2.2). The intention was to “spend more time on needier students” and provide “personalized individual feedback”. Although the institution has promoted more competency-based course approaches, the COVID redesign has initiated ground up changes which may signal more such practices at the institution.

Several participants underscored abundantly available OL content as a clear signal that didactic teaching was no longer acceptable. The perceived effectiveness of asynchronous OL lectures was evident with participants sharing plans to increase flipped segments post ERT. Perceptions of students’ ability to grasp concepts or skills independently was the key factor to determine which topics were selected for OL segments (refer to Segment 4.3, 4.4 for discussions). The ERT experience has brought the awareness to the next level, as P19 highlights:

> effort and time spent in F2F classrooms will become more valuable…if you (lecturer) are asking me (student) to come down and listen to you and I have to travel…why can’t we do this OL? There must be some meaningful purpose for F2F.

For others it was not about the modality; the focus was on preparing students for the real world: “Whatever I do is aligned to the industry” (P4); “Having come from the industry...I approach things like a workman, think of what they need to do in the real world and then I try to convert that into a task” (P7);

"prepare them for industry….not just content based skills, but more towards other skills as a learner, self-directed learning, resilience..." (P17). Others, like P14 stressed the students' ability to learn online has become an absolute necessity post-COVID:

> It's always been our graduate outcomes (digital literacies and SDL) but skills to learn online was not the top priority then, when OLi was being implemented... but now it becomes a concern, that this is a skill set that is necessary… when they're at a workplace

For the participants in this study, BL has come to reflect the everyday life. It is a matter of designing experiences that support students in effective, efficient, and engaging ways within their capacities and available resources and "in a way that it won't kill you in marking and going through one by one. If you can balance this both (students and lecturer's needs), I think that's the best design you get" (P17). These findings are in line with Chen et al.'s (2021) survey of CET educators from the public and private sectors in Singapore. The majority of educators in Chen et al.'s study viewed online learning as the future of higher education. The majority of CET educators in Chen's study, found the COVID experiences to be an "opportunity for pedagogical experimentation and innovation, and professional growth" (p.36). The key challenges highlighted by educators in Chen et al.'s study were in the areas of online learning design competencies, pedagogical and technical support and student engagement issues. These challenges are similar to the themes that have surfaced in this qualitative study.

Lidolf and Pasco (2020) evidence TPACK development when adopting BL through increased ICT proficiency, perceived change of role and transformations in pedagogies. Based on these indicators, the findings suggest that many participants in this study have over time developed their TPACK knowledge and skills at varying degrees. It is to be noted that the participants were experienced lecturers and many had received recognition for good teaching practices. For these experienced lecturers, the ability to

adopt and adapt from F2F to OL or even immersive environments required a willingness to change, PD, support, opportunities to reflect and time.

4.7.2 Time - an Enabler and Barrier

Numerous studies have reported the issue of time as a factor in teachers' technology (and BL) adoption (Fathema & Akanda 2020; Jeffery et al., 2014; Zhao & Frank, 2003; Ertmer, 1999). In line with these studies, participants identified time as a challenge: to provide immediate meaningful feedback; respond to student queries; monitor learning activities and analytics; design and develop professional looking content; maintain/update content and platforms; and learn new technology features to improve designs (refer to Segments 4.2 and 4.3 for detailed discussions).

P9, P15 and P20 spent many hours including weekends to develop visually appealing designs. P19 estimated spending over sixty hours to design and develop his first one hour equivalent OL experience. As with findings of other studies, including Oyarzun et al. (2020) development time reduced with experience, reflection and redesign as noted by P20 and P23. Some participants reaped the rewards of the initial upfront development time with repeated subsequent uses and time to focus on "needier students" and "admin work" during the teaching weeks. As P17 reflected "we can actually reduce the workload if you plan well... and reach out to every single student".

The institution is currently undergoing a curriculum transformation; courses offered by many of the participants will be combined, revamped, or discontinued. As digitalization efforts increase across industries, course curricula will require more frequent updates. Shorter development periods to address dynamic situations (for example, pandemics) and curriculum changes may become the norm, creating additional demands on lecturers. Dziuban and colleagues (2018) suggest advanced tools and processes

like AI, learning analytics, adaptive learning, calibrated peer review, and automated essay scoring can allow teachers to invest more time and effort in providing care, support and facilitation to deepen learning. Such advanced tools can augment the role of the teacher and address lack of resources. Maximizing productivity by investing in easy-to-use tools that support lecturers in their everyday roles (tools for monitoring, tracking, personalization of learning) is critical.

4.7.3 From Performer to Designer, Observer, Consultant

As evidenced in the literature (Kebritchi et al., 2017; Goodyear et al.,2009; Bawane & Spector, 2009), participants in this study revealed a shift in their roles in the BL environments. P11 explained the changes in role for F2F versus OL modalities:

> For F2F, you feel like you are doing teaching, you are delivering the content, but for OL setting, I feel I'm more the designer, I design the whole experience…and then my role here is to …observe…because it's asynchronous…observe what happened…then fine tune some of the parameters along the way, and then intervene as and when needed. So not so much teaching…more to facilitate and to design that experience.

A key OL task was to design and develop the "lesson-in-a-box" (P7). Many participants expressed the lack of "professional content development" skills to design engaging and visually appealing OL content (see Segment 4.5). For participants who adopted curated content, the focus shifted to contextualizing content and playing the role of consultant and assessor. P19 described his role as a music conductor, orchestrating different experiences with curated content (Vignette #4).

At the site institution, the role of "Observer" of learning has come to the forefront. In comparison to lists of OL lecturer roles a decade ago, monitoring learning activities and analytics emerged as the key task described by all participants (Sections 4.2, 4.3 and 4.4). In contrast, Goodyear et al., (2009) listed

monitoring learning as one of the many tasks of Content Facilitator and Designer roles. P3 articulated the change in role: “A large part (of the OL work) is gathering information, different kinds of information…need to stay focused on what I’m looking for because there can be noise” (P3 on the use of various sources of data).

Increasing partnerships with industry partners, current projects experimenting with chatbots and AI tutors, will all bring further changes to lecturers’ roles (Wiley, 2020). The widespread use of multiple technology platforms and data brings with it many implications for IP, copyright, privacy, and ethics; these aspects impact selection of tools and communication strategies (as discussed in segments 4.4). Ma et al. (2021) highlighted those educators who rushed to place materials online or adopt online materials during the ERT period without a clear understanding of copyright implication may have to deal with consequences in the future. PD and discussions around copyright and educational use is a necessity. The site institution has compulsory briefings for all new staff on copyright and educational materials; this information is also available on the LMS site. However, whilst harnessing the benefits of dynamically evolving and emerging technologies, institutions will need to consider the implications and facilitate periodic discussions on these issues.

4.7.4 Observations from Supporting Peers as Collaborative Leaders

Several participants were OLi committee representatives for their respective schools or were co-opted as school based champions to support their colleagues (Chapter 1). P8 shared his observations on the early reluctance of some colleagues– “if they record everything, you already got my value, the content in the slides…I’m dispensable”. Adopting BL was seen as “lot of effort, time and loss of self-value”. Similarly, P19 highlighted this worry of dispensability amongst his colleagues. To convince other lecturers that curated content would not displace them, P19 termed it as: “21st century

textbooks...more videos and interactions…but essentially a repository of information...I told (asked) them did the textbook replace you in the 20th century?". These concerns on the ground were reported back to management. A key OLi communication message was the assurance that OLi courses would not result in headcount cuts. These findings on job security are aligned to Ruth's (2018) summary of faculty opposition to OL. In Ruth's study the issues that were raised were more specific to the proliferation of MOOCs and the potential threats of replacing individual courses.

P8 highlighted OLi adoption is "more about buy-in after they (resistant colleagues) see the benefits". P8 shared these observations about reluctant colleagues who merely move content online without due considerations: "some …usually just voice over PowerPoint, (they) lose the focus…don't put themselves in the shoes of the students and conclude OLi does not work" (P8). P9 from another school, shared a mixture of sadness and frustration when observing colleagues who may not be "so sophisticated in their use of tech" but do not seek support: "(They) keep saying no way to do OL…but they haven't even tried?" (P9).

The school forums and PD workshops highlighted successful OLi designs with data and evidence to influence adoption. School committee representatives and ICT champions like P8 made efforts to highlight colleagues' continuous efforts and OLi design journeys to encourage less confident lecturers to take the first step. Beyond institutional level PD, ICT champions like P3 and P9 conducted course level training sessions to provide more ground level, targeted support for colleagues at the schools. P9 offered "a short, simplified, non-threatening, introduction and troubleshooting session" for colleagues during the ERT preparation period. The purpose was to support lecturers who were reluctant to use other technology tools beyond PowerPoint, by "minimize(ing) barriers". P3 shared similar strategies of

getting less OL inclined colleagues in a large teaching team to attend short training sessions and start with small incremental changes to develop confidence.

From the participants' sharing, the value of having senior, experienced lecturers as implementation committee representatives was evident. There was a sense of collective responsibility to help peers come on board BL and make the implementation successful. These observations suggest that a collaborative leadership approach, with peers as leaders framing the value, exposure to best practices, peer support and small successes can help break-down resistance to change in modest steps.

The gradual BL growth pattern was replaced by an almost overnight move to fully OL. P7 and P9 commented that colleagues realized that without the shift to full OL (and subsequently BL) learning continuity would have been impossible. P8 observed a forced mindset change in reluctant, senior lecturers, post ERT, "they are more acceptable for OL". Lim & Graham (2021, p.vi) remarked on the COVID induced sudden uptake to OL the "forced reality has been much more powerful than advocacy or research outcomes presented before". However, the quick development approaches during the COVID crisis may not be suitable for longer term achievement of learning outcomes (Hodges, et al., 2020). Individual educators' ability to sustain and further refine on emergency BL practices cannot be taken for granted. Erlam et al.(2021) highlight that institutions as learning organizations need to have clarity of purpose to move forward and review requirements to enable teachers to succeed.

Reculturing institutional practices, support and resource provisions are required to sustain change in the role of educators in the context of a complex, evolving education and work environment. From the findings of this study, collaborative leadership approaches that bring together central department leaders and senior lecturers within schools to make collective change maybe a useful first step to

reculturing efforts. Two recent publications on institutional BL adoption in Asia (Lim Wang, 2016; Lim & Graham, 2021) did not evidence any collaborative leadership approaches as described in this study. There is possibly a gap in the literature that warrants further research to inform leadership and management strategies for institution wide reculturing for BL adoption.

4.7.5 Technology Proliferation, Continuous Improvements and TPCK

The findings from this study identified no discernible patterns for participants' TPCK based on years of teaching experiences, age, gender, or domain. In this study, lecturers' interactions with the other components as identified in the conceptual framework, impacted lecturers' technological, pedagogical content knowledge and skills development. Participants' BL designs were primarily shaped by student-centric factors including: students' prior knowledge; perceived conceptual difficulty of content or tasks and students' ability to complete intended outcomes independently; social and emotional needs; attention span; perceived engagement features like animations and visually appealing interfaces and adult students' time availability. Tseng et al. (2019) refers to these factors as student-contextual factors that influence teacher's TPACK enactment. For some participants, industry-contextual factors prompted technological pedagogical changes to align the curriculum content with industry. For others, institutional factors and OLi, ERT requirements shaped BL and TPACK enactment.

In line with many empirical studies, participants reported varying struggles related to first order (external) barriers of time, resource availability and OL development skills (Ertmer, 1999; Tsai & Chai, 2012). Participants designed for BL through iterative cycles seeking student feedback, taking "wrong turns", observing, and reflecting, discussing with peers or coach and adopting creative work arounds. As conscientious lecturers, participants continuously set themselves new challenges to improve the design and proceeded to confront possibly new barriers. These iterative practices were aligned to Laurillard's

(2012) description of the learning design process. Participants managed many technological and pedagogical issues creatively or collaboratively. For example, after being introduced to possibilities of using immersive videos for content development, (during ERT briefings), P10 redesigned student projects to include panoramic immersive videos as a possible presentation option. Having no experience in creating such videos, P10 invited a colleague from the Learning Technologies team to provide a quick tutorial for students. Similar to other empirical research findings, with increased BL adoption, most lecturers' indicated increased confidence with technology (Al-Freih, 2021; Kearns, 2016; Scott, 2014).

Sharing insights from a whole of institution move to BL, Korr et al. (2012) observed that despite developer training, some lecturers, inevitably, had weaker development skills. Unfortunately, for a few participants, the skills required to achieve their design intentions were too large to bridge within a short duration. For example, despite sharing increased confidence facilitating synchronous sessions during ERT, P1 wished someone could help her "create narrated presentations with Scenario Based Learning" to communicate relevance through authentic situations. She highlighted a lack of instructional design, creative and technical skills to create engaging storylines and visually appealing presentations. It is inevitable that technology proliferation will continue to pose challenges. P14, with over 5 years of OL experience, discussed her trials with the institution's recently updated interactive video platform (to clarify, short introductory PD sessions were offered, P14 may not have found a suitable time slot to attend):

> I referred to the resources, it seemed easy to follow but when I tried to do it, I had constrains. I referred to guides to troubleshoot but was not able to. Due to time constrains (start of ERT semester), I used other (more familiar) platform. (P14)

Even P9, with a keen personal interest in technology and instructional design, lamented, "there are always newer, better versions (of applications), the learning curves keeps increasing and you need to be

able to learn by yourself". Bruggeman et al. (2020) highlight the key hindering attribute to BL implementation is teachers' anxiety towards the BL and technology implications. First order barriers will continue to persist, lecturers will need creative thinking, PD, collaborative team members or technical support to address these first order barriers.

Based on the interview data and personal observations as an academic developer, participants were more willing to overcome second order (internal) barriers of pedagogical and technological beliefs (Ertmer, 1999) in response to issues with students' achievement of learning outcomes, engagement needs and/or workload issues. For example, in P18's case, during the compulsory PD, the facilitation team (including the researcher) discussed the possibilities of curating instructional videos or co-opting students for content creation. At the time, the suggestions did not align with P18's show-and-tell approach to teaching software. However, after the first run of the course and dealing with the additional workload coupled with the need to increase student engagement, P18 went on to explore student-created content. Similarly, BL and OL provided a solution to learning continuity issues during COVID, resulting in increased acceptance by initially less inclined colleagues (as observed by P3, P8 and P19).

4.7.6 Design Thinking Skills

From the many stories shared, it was apparent that participants were highly reflective learners themselves. P17's concluding statement aligns with the attitude of many participants in this study "I like to learn…in a way it helped me (to think) …. what other ways can I do?". P10's reflections suggest her ability to evolve and adapt to the changing educational landscape:

> The way we teach, has evolved over the years. It's certainly different from when I first joined (20 years ago) or even before 2013 (first attempt at BL). Every time I write my teaching portfolio, I realize how things have changed. (P10)

Despite the differences in cultural, institutional contexts and student profiles, the attributes that surfaced in this study of experienced lecturers had many similarities to Bruggeman et al. (2020) study of Flemish faculty. The attributes that contribute to BL implementation include student-centred pedagogical belief, realizing the need for change, ability to critically self-reflect, ability to map technologies to learning processes and the willingness to experiment and move on from failure.

The many Vignettes and quotes in this chapter demonstrate how participants overcame various pedagogical, technical and resource issues with design thinking strategies. Design thinking definitions vary by domain. However, problem solving skills, observation skills, reflection and analytical thinking skills, experimentation, the need for iterative design cycles to implement human-centred solutions are fundamental skills and processes across domains (Micheli et al.,2018). As P18 reflected, "necessity is the mother of invention". P7 described his approach to teaching: "I'm teaching the person something, I approach things as a workman, by hook or by crook, I need to make sure they are learning that thing which I put in my learning objectives…just get it done". ERT and the pivot to fully OL created opportunities to further develop participants' TPCK from developing strategies to facilitate collaborative synchronous sessions; experiments with tools and techniques to address a noisy home during lockdown; using Telegram to edit and share math feedback. This need to rethink and learn new skills during the ERT period was evident even in the cases of participants like P1, P5 and P14 who had initially adopted a partial Model A approach with a focus on the replacing F2F lectures.

Based on this small-scale study, beyond TPCK, design thinking skills surfaced as essential for BL adoption and adaption. These findings resonate with Tsai and Chai's (2012, p.1058) argument that lecturers' design thinking skills and capacity "to re-organize and adapt learning resources and activities" especially in a "constrained" learning environment, like the COVID induced ERT, is crucial for successful technology integration. Adapting Tim Brown's (the designer who coined the term) definition of design thinking to this site's educational context, the findings suggest that lecturers used iterative, student-centric approaches to implement BL by drawing from personal experiences, peers, contextual knowledge and skills and institutional support to integrate the needs of students, the possibilities of technology and the requirements to achieve course learning outcomes (Brown & Katz, 2009).

4.8 Conclusion

This chapter discussed the findings based on the broad themes that emerged from the ground-up analysis in relation to the underpinning empirical literature and the proposed conceptual framework (Figure 4). The findings indicate that participants' BL adoption and adaption evolved over time with continuous iterative design and development cycles. The OLi requirements to replace F2F experiences forced the adoption of more structured activity centred learning designs. The reshaping of pedagogical practices was triggered by the need to evidence learning, increase engagement and interactions whilst maximizing the flexibility and time for reflections in asynchronous modes. BL strategies emphasised support for at-risk students, meeting the social emotional needs of 17-20 year-olds and addressing the needs of time-poor adult learners.

The OLi requirements for complete learning packages with formative assessments ensured BL adoption moved beyond providing flexibility and access; participants adopted "enabling" to "enhancing" blends to integrate the strengths of F2F and OL modalities at varying degrees (Graham, 2005; Lim & Wang, 2016).

A few participants transitioned to more transformative uses of technology to facilitate activities that were previously not possible in F2F. These transformative blends were triggered by the need to address pedagogical issues, student engagement or workload issues within 80-100% OLi courses. The BL models that emerged from the findings highlight the need to extend the work of Jenkins et al.'s (2017) FL matrix model. Beyond the dimensions of space, time modalities, process-product, student-led or lecturer-led, the BL models that emerged seamlessly incorporated industry-led, student-created content and immersive learning experiences.

The pivot to ERT created opportunities for some participants to think out of the timetabled lecture, tutorial, practical slots and reflect on what works best for student learning. COVID and fully OL accelerated the need to move towards more flexible and efficient instructional methods. Lack of access to physical resources during ERT periods also hastened this transformational process. Lecturers' scope of work and workload were significantly impacted by the need to: monitor and track learning; provide back channel support during ERT periods past official working hours; organize and maintain activities and materials on the LMS; create "professional looking" content; meet increasingly shorter curriculum change cycles due to industry advances; and to learn and re-learn technology tools and features to support all aspects of T&L. Where appropriate content was available, curation strategies allowed participants to expend more energies on facilitation of learning and improving learning designs.

Growing confidence in OL and comparisons to professionally created eLearning prompted some participants to explore external development tools and platforms to increase quality of engagement and address increasing workloads. For some, explorations were hampered by cost and technology licenses. For others, the deep technological skills required to create personalized adaptive experiences posed barriers. One participant in this study demonstrated the value of partnerships with industry to gain

access to the latest learning technologies (gamification, adaptive experiences) whilst promoting skills closely aligned to industry needs. Technology and its affordances could be better utilized to support lecturers in managing workload related to monitoring, tracing, nudging, and designing adaptive experiences.

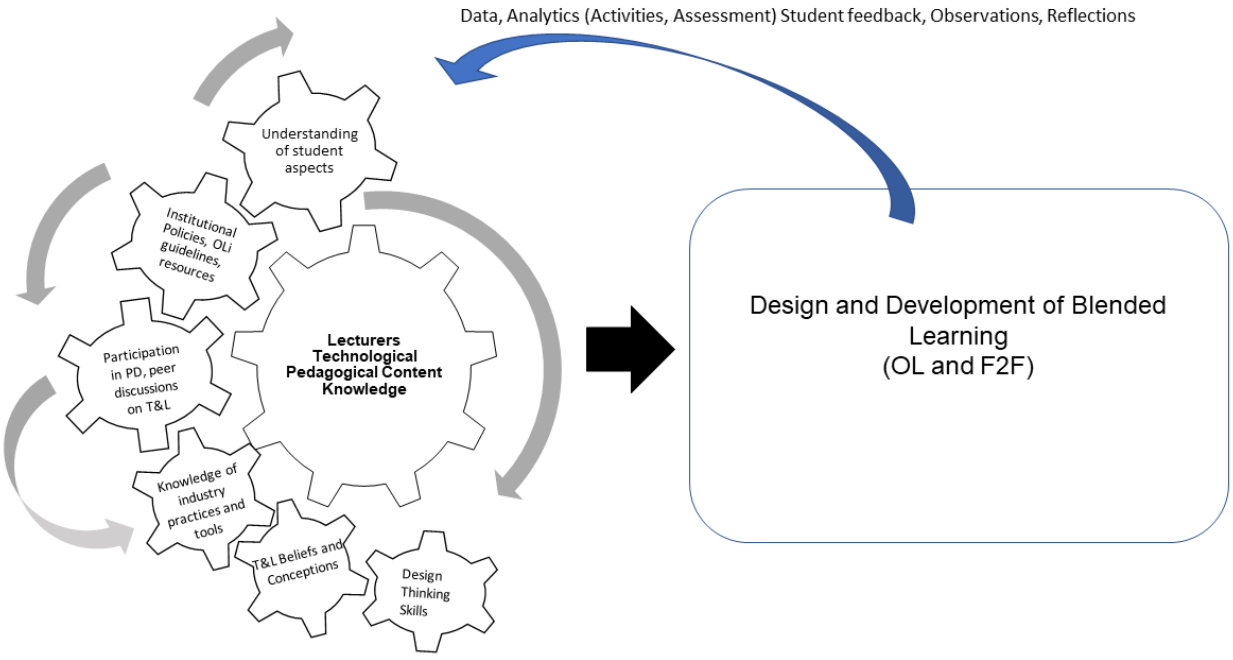
Participants' understanding of students' needs, design thinking and problem solving skills, TPCK, industry and contextual knowledge and personal attributes including personal enjoyment of learning online were all factors that shaped BL designs. Institutional reculturing efforts that emerged as enablers to adoption included: phased implementation led by school representatives; communication campaigns to highlight rationale, guidelines and assurance that adopting BL would not replace lecturers; adopting team development approaches for pilot courses; and non-evaluative initial OLi phases.

The findings suggest the compulsory hands-on, prototyping approach to PD provided much needed support to get lecturers started with BL. Participants who sought to further improve designs recognized a need to deepen skills and have access to a wider range of tools. Mentors to provide feedback and discuss learning designs were valued. Discussions with OLi school representatives, ICT champions, peers and team development approaches provided motivation and ideas for further improvements. As experienced pilot adopters, many participants shared their designs at school organized forums. Besides seeding evidence based reflective practices in a collegial environment, forums encouraged crowdsourcing of ideas, leading to improved BL practices.

Figure 15 summarizes the findings of knowledge, skills, attitudes, and PD factors that contribute to participants perspectives about designing and developing BL.

Figure 15

Participants and the Iterative Design and Development of BL: Skills, Knowledge, Attitudes and Factors



Note: Figure 15 illustrates participants' skills, knowledge, attitudes, and factors that contribute to the iterative design and development of blended learning at the site. The themes that emerged from the data as factors are represented as cogs. The cogs drive the wheel of TPCK development, with data and reflections on action collectively contributing to the iterative design and development of BL.

Many of the themes in this thesis concur with existing literature, providing triangulation and support for the data (see for example Boelens et al.,2017; Bruggeman et al.,2020). However, as noted by Lim & Graham (2021) there is no one-size-fits-all approach to complex problems of education. This is even more so with BL which encompasses digital and physical learning environments. Based on the findings, several institution specific recommendations were made in this chapter. Table 5 summarizes these key

recommendations. Several of these recommendations would apply to institutions with similar contexts.

Table 5

Summary of institution specific recommendations made in this chapter

Recommendation	Rationale
Review the place of fixed lecture-tutorial-practical to support seamless BL experiences across time, modalities and learning partners	The models that emerged from this study highlight a one-size-fits all BL model may not address the needs of all students or course outcomes. During ERT, the lack of physical timetable constrains allowed some participants to think beyond the space and time bound concept of lecture-tutorial-practicals. With return to pre-COVID normalcy, many lecturers may fall back to traditional practices. Requirements to increase OL segments may lead to early OLi practices of converting all lectures only to asynchronous modes. Such practices will limit the strategies adopted for OL modalities and may not maximize the benefits of technology or collaboration with external partners. (Section 4.2.6)
Investment in technology to support students' SDL development and Personalized Learning paths	Evaluate and acquire suitable technology tools that support - students' agency to track and manage their own learning with automated nudging features (Section 4.3.3) - pedagogical use of learning analytics by lecturers to support the development of meta-cognitive skills (Section 4.3.4)
Centralized BL preparation for adult learners	Part-time adult learners may not have familiarity with institutional technology tools and do not enrol on a three-yearly basis as full time students. Common technology orientation sessions similar to first year full time students for new part-time learners will reduce the time and burden on lecturers to conduct orientation sessions throughout the year. (Section 4.3.5)
Guidelines for use of personal accounts, instant messaging tools, online self-presentation for lecturers and students	Considering the extensive use of personal account based instant messaging tools (WhatsApp etc) for formal learning communications, there is a need to have guidelines in place to support lecturers and students to manage personal boundaries, well-being

Recommendation	Rationale
	and use of instant messaging tools. (Section 4.4.4) Although there are guidelines on expressing views online and digital literacy courses for students, the increasing use of real time videos and emerging technology require guidelines similar to physical campus dress codes and conduct to establish new norms for digital spaces. (Sections 4.4.4 and 4.5.1)
Periodic communications on copyright and use of immerging technologies	Whilst harnessing the benefits of technologies, there will be increased complexities around copyright and fair use. As demonstrated in this study, there will be lecturers who proactively seek and experiment with new technologies. Besides the initial teacher training session on copyright, the institution will need to consider copyright implications of future orientated technologies and facilitate periodic conversations around these issues. (Section 4.7.3)
Collaborative course development options	Lecturers have different aptitude and skillsets. BL course development processes specifically for single lecturer courses could benefit from a collaborative development approach with peers and/or tech staff support, coaching from an experienced colleague or professional instructional design and visual design support. There is a need for flexibility on the types of development support available to lecturers. (Sections 4.5.2 and 4.6.2)
Professional development programs with multiple pathways	The experienced lecturers in this study highlighted several areas for further development including instructional and visual design. Besides the compulsory two-day PD, optional training sessions and professional support, on-going compulsory and personalized PD for BL with multiple pathways will need to be developed to address the varying abilities and needs of lecturers. (The institution has exiting fixed milestone T&L PD programs based on years of service). (Section 4.6.2)

Recommendation	Rationale
Technology tools and processes to maximize productivity	Investing in easy-to-use tools that support lecturers in their everyday roles (customizable dashboards for monitoring learning, creating personalized learning paths) can allow lecturers to invest time and effort in providing social emotional support and facilitating personalized approaches to deepen learning. (Section 4.5.4 and 4.7.5)

Note: During the time of this writing, the institution has started a curriculum transformation review and has started to explore aspects of these recommendations related to access to professional instructional designers. Additionally, the Ministry of Education has announced new measures to strengthen digital literacies including "efforts to strengthen the cyber wellness curriculum to enhance teaching of digital well-being and ethics" of IHL students (MOE, 2020b, "Higher Education Levels" section).

The value of this study is in the analysis and interpretation of the findings contextualized to the site's OLi implementation and the COVID pivot to OL. The results provide a powerful narrative of lecturers' current reality of BL adoption. There was a keen awareness amongst participants that post-COVID, education and curriculum cannot be status quo. Developing students' digital literacies and lifelong learning skills which were good-to-haves have now become critical must-have skills. Post-COVID digitalisation efforts have accelerated across all industries. A global management survey suggests that COVID-19 has pushed organizations around the world "over the technology tipping point and transforming businesses forever" (McKinsey, 2020). These changes have a direct and profound impact on polytechnic programmes and courses and thus the design and facilitation of BL. Reculturing institutions to adapt to these changes is critical.

Responses to the central research question and guiding questions in relation to the conceptual framework and implications of these findings will be discussed in the concluding chapter.

CHAPTER 5

CONCLUSION AND IMPLICATIONS

5.1 Introduction

This study was embedded in perspectival theory shaped by four aspects: intentions, strategies, outcome, and significance. This concluding chapter will summarize the research based on the four perspectival strands and provide an analytical response to the central question. Informed by the interpretation of the findings, this chapter will present the most comprehensive theory regarding lecturers with related propositions and implications for practice and/or policy. This chapter concludes by explaining how this thesis adds to the current body of knowledge, the limitations, and suggestions for future research.

5.2 Intentions, Strategies, Outcomes and Significance

In relation to the guiding questions of this study, participants' intentions, strategies, and outcomes evolved over time with continuous reflection on action, increasing confidence and experience. Participants' intentions for BL expanded with students' ability to cope with the OL segments without negative impact to learning experience or performance. Pre OLi, early adopters' intentions for BL were related to student factors - providing students flexibility to learn at their own pace and allowing for more engaging F2F sessions that deepened learning, reasons well established in the literature. The assigned OLi adopters started implementing BL with intentions to ensure no learning loss whilst meeting the OLi requirements. For a few participants, achieving these objectives without increasing an already packed workload was an additional aim. Most participants intentions for the fully OL ERT designs blending asynchronous and synchronous sessions was to minimize disruption to students' learning. The lack of face to face interactions and loss of shared physical classroom space and resources specifically

for at-risk students were key concerns. Post-COVID participants' intentions had evolved to deepen students' SDL skills and digital literacies whilst optimizing F2F experiences to enable critical hands-on experiences through social, peer-peer interactions. Post pandemic, a key outcome has been the shift in the significance of F2F experiences in BL. Most participants emphasized that F2F will become more "precious".

Participants' BL strategies emphasized engagement and interactions to increase student participation and make learning visible during asynchronous periods. Strategies to ensure no learning loss and address the needs of at-risk students, were of utmost priority. The strategies and technology tools participants selected took learners' ages and stages of life and industry requirements into account. The strategies and tools selected were inevitably dependent on their TPACK knowledge and technical skills. These strategies were also shaped by interactions with peers and staff developers. Whilst technology was used to automate routine tasks (i.e. automated quizzes, time-released feedback), most participants used hi-touch strategies to manage individual dialogues with students, promote peer-peer interactions and address time management and behavioural issues. Learning activities that generated digital footprints (through artefacts and data) were used extensively to monitor and evidence student participation and provide timely support. Data and learning evidence, provided feedback to design subsequent F2F and OL activities, address gaps and deepen learning. Back channel communication strategies and the availability of data reduced participants' anxiety about students' learning during asynchronous periods and played a critical role during ERT.

The outcome of participants' intentions and strategies emerged as BL models. The design decisions that were made resulted in variations of asynchronous, synchronous or F2F strategies that attempted to maximize the strengths of each modality. Pre-COVID, participants assigned to 25-30% OLi courses mostly

adopted a Model A partial FL approach. OL segments were designed for content delivery and understanding checks as they provided flexibility and increased engagement. This lecture replacement approach, was aligned to the intention of ensuring lower risks of learning loss, could be designed with familiar tools and allowed for increased engagements during F2F. Peer-peer interactions and modelling (PMC, PCC) were mostly encouraged in F2F tutorial activities. The requirements to meet higher OL percentages (80-100%) created a need to address pedagogical issues, meet student learning needs (e.g. more time for at-risk students) and workload issues. Higher OL percentages forced participants to use technology and OL for a wider range of activities, beyond content and quizzes. Participants who adopted BL models other than the traditional FL approach (Model A), implemented student-directed, collaborative, peer-peer OL activities that have been evidenced to promote deep learning (see for example Trigwell et al.,1999; Kember et al., 2008; Jenkins et al., 2017). The pivot to ERT caused by the COVID-19 pandemic created opportunities for some lecturers to explore BL models beyond the boundaries of physical vs virtual spaces and timetabled classes. This resulted in seamless models mapped to technology tools that facilitate and support student learning through formative assessment activities and back channels.

Participants identified several institutional efforts as enablers to BL adoption and adaption: collaborative leadership of OLi implementation; communication campaigns - to highlight rationale, guidelines and assuage fears; non-evaluative initial phases; and a range of PD. The prototyping focused compulsory PD, access to mentors and school-based implementation committee representatives, collaborative team development approaches for pilot courses and regular sharing forums, had a strong influence on participants' BL designs. These efforts were in line with existing literature on strategies to address barriers (Medina, 2018; Poon, 2013; Sankey & Hunt, 2013; Garrison & Vaughan, 2008). This present study draws attention to additional factors: the promotion of iterative designs through PD, data

informed design decisions and the implementation of an experimentation period where formal quality monitoring processes were suspended.

Although this was not initially the case, post-COVID, most participants equated successful BL implementation outcomes with the development of students' SDL and work-ready skills. However, the understanding of what SDL was, differed amongst participants. This was largely due to the difficulties participants faced in assessing SDL. As Brandt (2020) highlights, SDL is a process. Students' ability to independently achieve the OL segment outcomes and the final performance grade (the product) was the proxy for successful SDL development. In many instances, participants described self-regulation (SRL) skills, when discussing students' SDL skills. Loyens et al. (2008) describes SRL skills as students' ability to manage time, pace of learning and the completion of prescribed formative assessment tasks. Some participants did not surface activities and projects that promoted student agency, ownership, or choice that promoted students' SDL (Tucker, 2020; Hargreaves, 2020). To clarify, choices, agency and extensive use of technology tools were part and parcel of each programme's identified signature pedagogies (e.g. Project Based Learning, Experiential Learning) and related assessment tasks, irrespective of OL or F2F modality. These findings suggest that some participants in this study have a time-table structural view of BL, OL or F2F components, with assessment activities as a separate component, as opposed to an integrated pedagogical view.

While SRL is a dimension of SDL, the terms are not synonymous. Researchers note that this misconception is prevalent even in the educational literature (Cosnefroy & Carré, 2014). Based on national directives (MOE, 2020a), post-COVID, the development of SDL and digital literacy skills will continue to be key drivers for BL adoption at the site. Moving forward, it is essential to clarify the definition of SDL within the institution's BL context. Further, lecturers will need to be provided

guidelines on how they can promote, monitor, and evidence development of students' SDL. (Note: Singapore's Ministry of Education provides a broad definition of self-directed learners as students "who take responsibility for their own learning and question, reflect and persevere in the lifelong pursuit of learning" (MOE, 2021b). Primary and secondary school teachers are guided by several strategy focused resources including Tan et al.'s (2011) monograph on SDL as a spectrum. The OLi implementation that has successfully brought lecturers on-board with BL adoption in terms of quantity (percentage of OL segments) and baseline requirements for OL activity (Ng, 2019) will now need to focus on harnessing BL's transformative potential. That is, transformational practices that allow for technologies to facilitate student centred practices that move beyond merely replicating traditional classroom designs (Graham, 2019). The findings suggest a one size fits all approach will not work. The various models that have emerged from this study offer a practical starting point. Institutional reculturing efforts will need to include a review of the concept of time-tables and the physical space bound concept of lecture-tutorial-practicals. The institutional guidelines will need to be expanded to focus on holistic practices integrating F2F and OL activities to enable the best BL outcomes.

The significance lecturers attached to the outcomes were varied. Almost all participants attained professional satisfaction by ensuring students (particularly, at-risk students) achieved the learning outcomes independently (at their own time, pace and without the lecturer's physical presence to "push" them). For some participants, successful BL adoption met the PD requirements for 21st century educators. Others achieved professional and personal satisfaction at having developed well designed BL with improved student feedback. Many participants derived personal satisfaction from continuous learning, increased comfort and confidence with technology, improved BL designs and the recognition as coach to fellow peers as an expert practitioner.

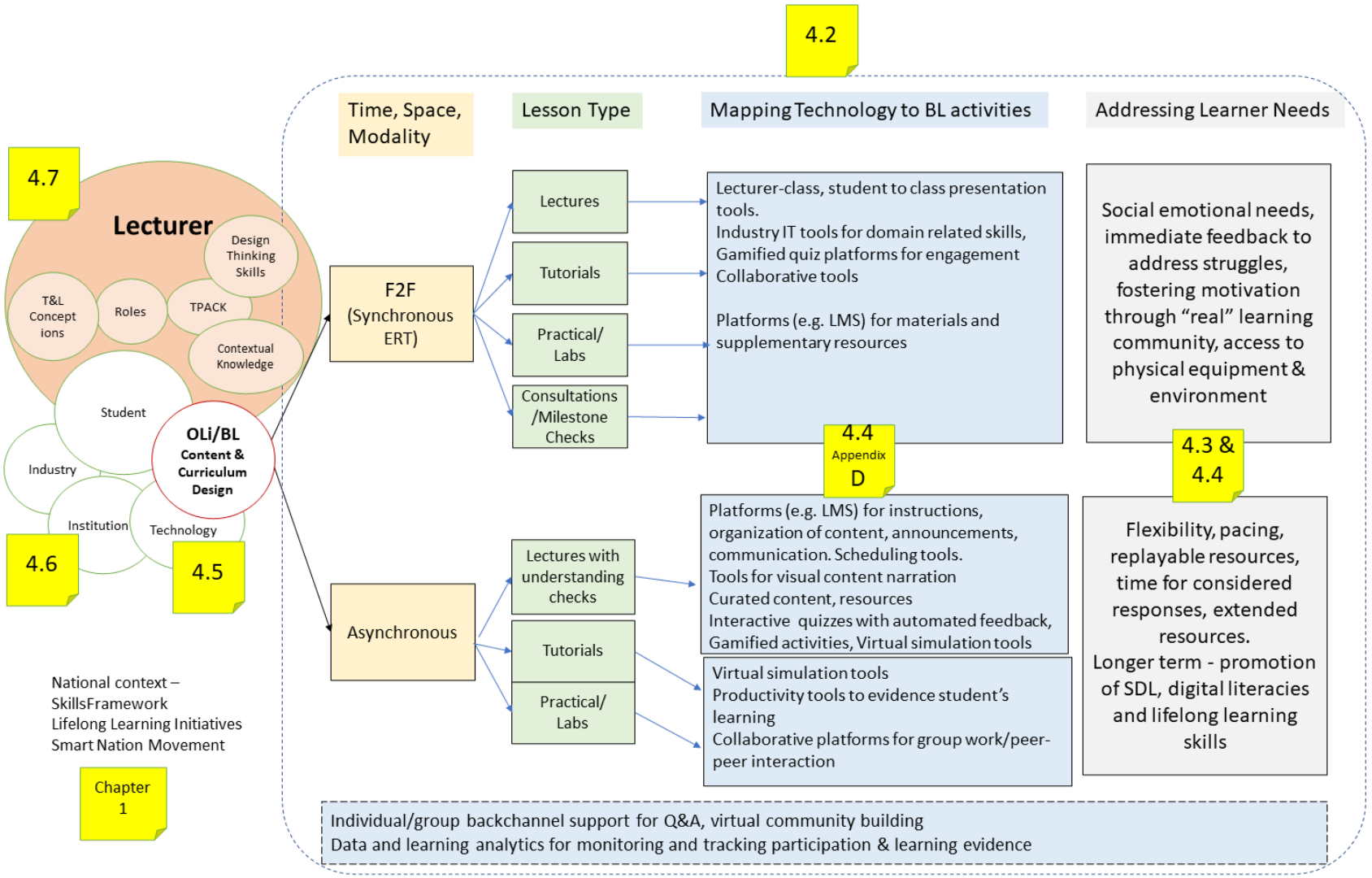
Lecturers used design thinking skills and iterative design and development cycles to adopt and adapt to BL, supported by TPCK, industry and contextual knowledge, understanding of students' needs and personal attributes including enjoyment of learning and problem solving. The COVID ERT experience impacted the significance participants attached to BL. Participants clearly perceived BL to be the new normal. This thinking is in line with the national view: BL has become an educational imperative not a mere emergency response but a tool to develop students' "skills and dispositions to thrive in an interconnected, diverse and rapidly-changing world" (MOE, 2020a).

As discussed in the preceding paragraphs, the four perspectival strands were shaped by, and evolved with, continuing interactions between the different components within the conceptual framework (see Chapter 2.3, Figure 4). Figure 16 maps the six thematic sections of Chapter 4 to the Conceptual Framework. As visualized in Figure 16, the outcomes of participants' intentions and strategies manifested as BL models (Section 4.2). To illustrate, participants' intentions for BL ranged from addressing the learning needs of students (Section 4.3) without any loss of learning, meeting the objectives stated in the Curriculum in an effective and efficient manner, meeting the Institution's OLi requirements to improving personal and professional skills as 21st century lecturers (Section 4.7). The strategies adopted to achieve these intentions aimed to: maximize engagement and humanize interactions to compensate for the loss of F2F interactions (Section 4.4); meet the learning needs of diverse learner profiles (Section 4.3); use technology (Section 4.5); and enable these strategies and achieve the outcomes (Section 4.2). Professional development (Section 4.6) and institutional factors including OLi percentage requirements and the need for formative assessment activities impacted the adoption of these strategies and achievement of outcomes. Based on participants' demonstration of artefacts, Appendix F provides a summary of pre-COVID OLi and ERT lesson designs based on Laurillard's

six learning activity types in comparison to traditional F2F Lecture-Tutorial-Practical sessions. The purpose of the activities, the type of technology tools used with participants elaborations are provided.

Figure 16

The Six Thematic Sections Mapped to the Conceptual Framework



5.3 Regarding the Perspectives of Lecturers on Designing BL

The purpose of this study was to generate the most comprehensive local theory to provide a rich, contextualized understanding regarding the perspectives of lecturers as they adopt and adapt to BL at the institution.

What is the most comprehensive theory that can be generated regarding the perspectives of lecturers on designing blended learning at a polytechnic in Singapore?

Experienced lecturers' perspectives evolved with the application of design thinking skills to adopt and adapt to BL through iterative design cycles, supported by data and evidence within an institutional context that encouraged experimentation with PD and support.

The following underpinning propositions emerged from the analysis of findings to support and contextualize this local theory:

- Institution-wide BL initiatives led collaboratively by the Teaching & Learning centre with selected lecturers to represent individual schools, created ground-up ownership.
- Communication of rationale for BL, clear guidelines, phased implementation schedules and assurance of pedagogy and technology support, promoted BL adoption.
- Assurance that formal quality process would be suspended during the initial pilot phase semesters, increased willingness to experiment and iterate BL designs towards better quality outcomes.
- Prototyping focused compulsory PD and a phased implementation period promoted design thinking approaches and increased confidence with BL.
- Requirements for OL segments to include formative assessment activities generated data that made learning visible, provided feedback on student learning during asynchronous periods and

led to better acceptance of OL.

- Access to mentors or expert peers provided support for iterative BL design.
- Lecturers required understanding of student profiles and social emotional needs, TPCK, industry and contextual knowledge and skills to adopt and adapt to BL.
- Developing BL required a range of skills including design thinking, visual design, storyboarding and organizational skills.
- Team development approaches where members contributed varied skill sets to collaborative efforts promoted/enhanced learning opportunities.
- Collection and analysis of student experiential feedback by the OLi committee with follow-up communication to lecturers enabled better understanding of student needs and shaped the institution's OLi implementation and guidelines.
- Reflective evidence-based sharing and demonstrations at forums by pilot adopters seeded good practices and created opportunities to receive peer feedback and suggestions.

These propositions will be discussed in further detail in the following segment, in relation to recommendations and implications for practice and policy necessary to accelerate BL adoption at the site. Fullan (1998) advocates the need to replicate the conditions of successful change to enact institution-wide reforms. Some aspects of these implications are strongly supported by existing literature suggesting potential for adaptation to IHLs with similar contexts.

5.4 Implications for Practice and Policy

Sustainable BL practices that continue to evolve, disrupt ineffective practices, and transform learning requires both lecturers' buy-in (ground-up initiative), and institutional practice and policy commitments (Murphy, 2019). BL experts have highlighted the need for institutional strategic planning in many aspects including vision and philosophy, comprehensive PD, technical and human resources, finances,

physical and virtual resources, support for learners, research and evaluation (Garrison & Kanuka, 2004; Lim & Wang, 2016; Bower & Chambers, 2017). The analysis and interpretation of the findings from this perspectival study highlight several implications for future practice and/or policy at the site institution and could inform other IHL with similar contexts.

5.4.1 Recommendation 1: Promote Experimentation through Phased Implementation and Suspending Evaluation

The models that emerged from this study emphasize that a one-size fits all approach to BL design will not meet the complex and evolving objectives of polytechnic education. Adopting a phased iterative process to gradually increase BL implementation at the site provided lecturers with time to receive training, adopt, experiment, and adapt BL designs. The time and iterative approach, augmented by communication campaigns helped lecturers manage possible anxieties about technology, changes in role and poor student feedback. It also provided the OLi committee time to calibrate its guidelines and offer support based on feedback from student experience surveys, student performance data and lecturers' anecdotal feedback.

This iterative design process would not have been successful without the decision to suspend formal student evaluations during the phased OLi implementation period. Not all lecturers may be willing to take risks and experiment. The institution's decision to suspend formal evaluations during the pilot phase, created a safe and conducive environment to promote experimentation and risk-taking by the participants of this study. To enable success, the pilot phase was closely monitored by OLi committee representatives within each school, supported by staff developers and learning technologists. As technology evolves and BL adoption at the institution intensifies, the ability to experiment, innovate and adapt is an essential trait for all lecturers. Enabling conditions that foster experimentation and

innovation whilst ensuring students would be able to achieve course and program outcomes requires continuous support from IHL leadership with allocation of time and resources.

5.4.2 Recommendation 2: Form Sustainable Partnerships with External Organizations

In an increasingly complex and distributed world, embracing partnerships with industry partners, platforms, ePublishers, MOOCs and the wider community are a necessity to ensure access to up-to-date industry knowledge and resources (Agarwal, 2021; Young, 2021). Participants' experiences suggest that access to partner content and industry standard platforms enables lecturers to shift time and energies to the design and facilitation of authentic, meaningful learning experiences and creating supportive learning environments. However, as experienced by participants in this study, adoption of free resources or MOOCs initiated by individual lecturers without formal institutional arrangements in place may result in sudden loss of access and create additional challenges.

Industry partners can play a role in complementing public education efforts as "learning providers for students, training providers for adults", or collaborate to create technology solutions (Singapore's former Minister of Education, Lawrence Wong as cited in Global-is-Asian, 2020). As rightly pointed out by Lim & Graham (2021), the concern is with BL becoming "commercialized or dependent" on a specific product. Institutions will need guidelines and policies to promote and support these partnerships with commercial entities without compromising the fundamentals of public education spaces.

5.4.3 Recommendation 3: Provide Flexible Access to a Range of Technology Tools

Lecturers in this small scale study found that effective use of a wide range of technology tools allowed for more productive use of time to focus on developing competencies and skills through facilitating activities and providing personalized feedback. It was evident that the LMS could not address all learning and teaching needs. Specifically, tools that allowed the design of personalized learning paths and

supported students in the development of SDL through proactive monitoring and automated reminders. For some participants in this study, BL design intentions could not be met due to a lack of easy-to-use tools. Other participants took risks by using freemium web tools, without any assurance of continued "free" access. Adopting multiple platforms brings with it certain issues. Participants found tracking and monitoring data across multiple platforms required time and effort amidst the many other responsibilities. Institutions will need to proactively invest in tools that can reduce workload, allowing lecturers to focus on efforts to facilitate authentic learning experiences.

As technologies evolve at an accelerated pace, awareness and exploration of new tools and features provide opportunities for innovative use and could support productivity. The ICT champions in this study shared similar views. Institutional flexibility in licensing requirements and promoting sandbox opportunities can proactively support ICT champions exploration and testing of new tools. As lecturers explore and extend online resources and newer technologies to enhance learning and maximize productivity, periodic communications on copyright and safe use of e merging technologies will be needed. Balancing frustrations and risks, as experienced/reported by participants in this study points to, the necessity for institutions to continuously review policies and practices to promote a safe yet productive online learning environment.

5.4.4 Recommendation 4: Facilitate a Range of Collaborative Development Approaches

Most pilot OLi courses in this study were developed by teams, consisting of teaching team members or lecturers who had been selected for their strengths in technology or design aspects (members were from the same school but taught different programmes). Besides subject matter expertise, team members with diverse skillsets in visual design, technical and organizational skills bring much needed expertise to the storyboarding, design and testing process. Teams can consist of lecturers with existing

expertise or adopt rotational membership approaches to equip more lecturers with development skills. To maximize learning opportunities and buy-in, all teaching team members (including those not in the development team) will need to be engaged in the review process from the get-go.

Considering the increased demand for digital skills, interdisciplinary skills and 21st century competencies, Medina (2018) emphasizes the need to foster a culture of collaboration within the institution, specifically across domains to add value to the curriculum, lecturers and students. Incorporating such interdisciplinary collaborative team development approaches can help lecturers level-up BL design and development skills. Implementing collaborative approaches will require reviewing distribution of work and workloads of lecturers at the institution. Participants adopted innovative BL models that co-opted students as collaborators, students can be co-creators of content to manage lecturer workload and deepen student learning. Hargreaves (2020) suggests these transformative practices promote agency, ownership and develop greater SDL skills.

In line with Cobek et al.'s (2015) concept of lecturers as participatory designers, the findings suggest that partnerships with learning technologies staff and T&L coaches for the design and development of BL experiences can also create learning opportunities for lecturers. The site institution adopts a professional partnership approach between learning technologists and lecturers as test beds for innovation and institution-wide propagation. As the demand for BL and innovative use of technology accelerates, sustaining and growing such partnerships will become a necessity. Participatory design approaches, cross disciplinary teams and student as co-collaborators provide alternative options to support single lecturer course development. Institutions will need to creatively resolve the resourcing issues to foster these collaborations.

5.4.5 Recommendation 5: Provision for PD with Multiple Pathways and Formats

It is inevitable that lecturers will be at different stages of readiness for BL adoption. PD that can support the varied needs and developmental stages of lecturers is essential. The site institution made a concerted commitment to PD for all lecturers by mandating the need to attend a two day bootcamp style session. Design thinking with its focus on redefining problems to create solutions (Tsai & Chai, 2012) has emerged as a necessary skill when adopting and adapting to BL. These skills should be deliberately cultivated as part of future pedagogical design focused PD sessions.

Beyond compulsory sessions, all other sessions including pedagogical strategies or technology focused short programs, forums, consultation sessions with academic developers or school representatives were voluntary. Many participants in this present study were interested in TeL, voluntarily attended such sessions. As with any institution, and as reported by participants, not all lecturers may participate and benefit from these sessions. Technology is continuously evolving; new tools and features could provide better learning support and outcomes. Continuous PD and technical training is a necessity.

Adoption of multiple pathways to PD can address the needs of increasingly mixed ability groups. Compulsory PD with a BL focus at various stages (for example, every fourth semester or 2 years) to review BL and curriculum designs and rethink strategies in a facilitated environment may enable lecturers to stay abreast with the latest tools, features and examples of best practices. Collaborative or participatory development approaches can add to the range of PD options. Additionally, quality processes that monitor and flag lecturers who need additional support will ensure targeted mentoring can be provided.

5.4.6 Recommendation 6: Redefine Lecturers' Work, Workload and Workspaces

Digitization and technological advances will disrupt IHLs and continue to have a major impact on the curriculum requirements to prepare students for the future of work, life, and lifelong learning (Zhao & Watterson, 2021). Technology increases possibilities but also increases the demands on lecturers' roles and the competencies required. Baseline digital competencies for lecturers, as with other roles in the economy, are constantly evolving and expanding. As dual-professionals, lecturers at the site have a herculean task ahead: keep abreast with industry domain knowledge to ensure curriculum meets the needs of the dynamic and evolving workplace; and design digital learning experiences that meet these curriculum outcomes. As demonstrated by the participants in this small-scale study, collaborations, partnerships, access to easy-to-use technology tools and institutional support are imperatives to enable lecturers to meet these dynamic demands.

Advances in technology like AI and learning analytics can support and augment educator's roles. However, technology and automation of routine tasks have also increased fears that jobs will be replaced. Participants shared concerns of colleagues with similar anxieties at the start of the OLi. As discussed, current and previous Singapore Education Ministers have emphasized the role of "human" teachers within a personalized, technology enabled, values-driven educational model (Yip, 2018; Davies, 2021). There is a need for such ongoing dialogue with educational leaders on the vision and role of lecturers as adoption of digital learning intensifies. Based on analysis of this study's findings, enabling sustainable BL practices requires alleviating lecturers' fears through on-going communication, and highlighting the value of BL in solving pedagogical issues and addressing students' needs.

Extending the classroom to the digital environment, creates anytime, anywhere learning possibilities. But this seamless learning across time and modalities comes with inherent problems including extended

working hours for lecturers. Many studies have highlighted providing incentives including development time to encourage adoption of BL (Bichsel, 2013) and other incentives including recognition (Graham et al.,2013; Han & Wang, 2021). The institution provided incentives in terms of recognition for excellence in design and teaching. Additional time provisions of varying durations were provided for early adopters, but several highlighted the insufficiency. Mainstreaming BL will require dealing with the prickly issue of development time. Institutions will need to take into consideration availability of curatable resources, size of teaching team, size of student cohort, type of BL design and availability of support staff for development.

BL also increases lecturers and students' online presence. Findings suggest that COVID and the uncertainties caused by the pandemic, further exacerbated the boundaries between the personal and work lives of lecturers and students. Participants emphasized the need to manage digital personas and online communication due to the lack of physical cues. Institutions will need to revisit guidelines and resources that support lecturers (and students) on the management of digital self, online communication, personal time and space boundaries for effective learning.

5.4.7 Recommendation 7: Empower through Collaborative Leadership

Learning from previous technology for learning implementations, the site institution chose to adopt a co-leadership strategy with the Teaching & Learning centre and selected senior lecturers from the schools. This collaborative approach allowed the OLi committee to manage and shape the overall implementation process, ensure consistent communication of OLi objectives, progress, organize PD and resources, monitor overall implementation and timelines, collect and analyse student feedback. Informed by the PD and OLi guidelines, lecturers made course-level decisions about design, technology tools and strategies. The findings of this study suggest that involving selected lecturers as co-leaders in

the institution-wide implementation and decision making process increased ownership. The efforts made to value and recognize their expertise, encouraged lecturers on the committee to further their BL explorations and provide support to peers. (As indicated in Chapter 1, many of the participants had been recognized for good T&L practices or had demonstrated keen interest in technology).

Additionally, the interview data suggests the need to extend this shared leadership to the evaluation and acquisition of hardware and software for T&L purposes. Participants emphasized the recent moves at the site to include lecturers as evaluators of technology platforms as the right approach for future technology decisions. Adopting an efficiency-first approach to address administrative and resource management issues may not address the pedagogical purposes of BL and technology tools.

Moving forward with BL as the norm will require reculturing institutions at various levels: reviewing academic quality and evaluation practices, realigning roles, work and workload of lecturers and support staff, addressing logistical issues like timetabling across online, F2F spaces, travel time and resource allocation. The models that emerged from this small scale study clearly indicate a one size fits all approach to BL will not work. A collaboratively-led phased approach to determine the right way forward for institution-wide BL will be needed to ensure sustainable adoption.

5.5 Limitations and Suggestions for Further Research

This was a single site collective case study of the perspectives of lecturers at one IHL in Singapore. The relatively small number of participants was offset by the range of experience across domains, initial OLi adoption motivations (early, voluntary and selected adopters) and years of engagement and experience. The depth of data encompassed pre and post-COVID interviews and verification, as well as examples of curricular materials and innovations. For a more comprehensive understanding of lecturer perspectives,

the research design of this study could be further enhanced by including other sources of data (Patton, 1999), for example participant reflection journals or teaching portfolios.

Many themes emerged from this study; only the dominant themes were discussed in depth. Further investigation of specific issues affecting lecturers' satisfaction and workload could address an under-represented area in the BL research (Graham, 2019). The findings in this small scale study suggest that the skills to be developed (applied hard-skills versus creativity and innovation) may influence the BL model adopted. Inquiries to explore the impact of course domains and/or signature pedagogies on lecturers' perspectives and BL designs may help inform PD and support practices at the site. Only formative assessment practices were discussed in this thesis, summative assessment practices are a key piece in the complex BL environment and require more detailed inquiry.

The site institution is an applied skills focused polytechnic. Polytechnic lecturers are required to be dual professionals who are "experts of their disciplines" and possess "deep knowledge of learners and the teaching strategies" (Leong et al., 2016). The scholarship of teaching and learning is strongly encouraged and supported, but not compulsory. Domain specific research is mainly driven by individual lecturers' interests. Conducting similar studies at universities where faculty are expected to engage in domain related research and teaching may provide very different results.

Graham (2019) and Graham et al. (2013) stressed the need to pursue research on critical institutional aspects of BL. Lim and Graham (2021) suggest studying how institutional "policies, initiatives, and strategies" may drive and support the "sustainability and scalability of blended learning practices". The OLi implementation approach had a significant influence on participants' perspectives and design of BL. Studying the leadership strategies and design of this initiative could provide useful insights to future

initiatives within the institution and other IHLs with similar context involved in post-COVID reculturing efforts.

5.6 Contribution to Knowledge and Theory

5.6.1 Proposed Expansion to the Flipped Learning Matrix

Based on the BL models that emerged from this study, adaptations to Jenkin et al.'s (2017) Flipped Learning Matrix model are proposed (Figure 15) to expand and extend conventional teacher-student environments (Viswanathan & O'Neill, 2021). In today's context of distributed expertise and blurred boundaries between F2F and OL, the traditional in or out-of-class flipped components have evolved. Flipped models will need to expand to support seamless experiences across time, modalities, future focused technologies and learning partners. New collaborative models could involve professional eLearning platforms, industry partners, multidisciplinary teaching teams or even AI (Wiley, 2020).

5.6.2 Contextualizing the CABLS Framework

Wang et al.'s (2015) CABLS framework provides a holistic and realistic systems approach to study the interaction between key drivers of BL within the dynamic and complex educational landscape. The framework includes Learning Support as a separate component. At the site institution, lecturers play the critical role of providing learning support and additionally serve as student mentors (with assistance from other institutional departments). To align with the site institution's objectives to prepare post-secondary students for industry, the role of industry is proposed to be brought to the forefront as a major component in the framework. Learning Support is placed as sub-roles in the Lecturer, Technology and Institution components. (Chapter 2.2.2)

5.6.3 Explanatory Theory about Lecturer Perspectives on Designing BL

In response to the central research question, this study has generated a local, explanatory theory about how the lecturers at the site adopt and adapt to BL. Lecturers' application of design thinking skills to iterative development cycles in a supported environment can shape future technology enabled initiatives and related PD efforts at the site. The evidence-based support in the literature for the theory and related propositions, suggests possibilities for adaptation to other IHLs reculturing efforts.

As BL adoption intensifies, this study could prompt other studies in an under-researched area of lecturer perspectives on designing BL (Torrisi-Steele & Drew, 2013; Sun & Chen, 2016; Verpoorten et al., 2020) and more specifically the role of design thinking skills when adopting and adapting to technology for learning (Tsai & Chai, 2012).

5.6.4 Local Theory about Institutional Support

The analysis and interpretation of lecturers' perspectives indicate that the phased implementation approach tied to suspension of formal student teaching evaluations encouraged experimentation and exploration. The staged roll-out approach included timely prototyping focused workshops, with technology support and mentorship. These enabling factors can be adapted to shape/inform future institution-wide initiatives Additionally, several studies highlight a lack of institution level BL adoption literature (Graham, 2019; Wang et al., 2015; Halverson et al., 2014). This study could inform institutions with similar contexts of possible strategies for promoting buy-in and enabling implementation of future digital initiatives.

5.7 Dissemination of the Findings

The present study and its findings will be shared as a summary presentation, through my professional networks and specifically to the academic developers at the five polytechnics in Singapore. The polytechnics have similar institutional contexts, program domains and student profiles; but have adopted different approaches to BL implementation. Despite the contextual differences, there are always significant opportunities to learn from evidence-based practices of other IHLs.

The BL models that emerged from this study were presented as a full virtual conference paper entitled "The Role of the Lecture in Post Pandemic Institutions of Higher Learning: Possibilities and Implications from a Singapore Case Study" (Viswanathan & O'Neill, 2021) at the 38th International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education (29 November – 1 December). Additionally, the main themes that emerged from this study will be disseminated as articles through peer reviewed journals and inform the development of several online PD workshops.

5.8 Conclusion

More than a decade ago, Norberg et al. (2011) predicted OL and BL will cause the "autocatalytic transformation" of education. What followed was a decade of uneven, fragmented BL adoption (DeVaney et al., 2020; Lim & Graham, 2021). The devastating pandemic of 2020 has made BL a forced reality for institutions around the world. For the participants in this study, BL has become a "part of everyday life"; there is no going back to pre-COVID practices. Digital literacies are imperative to prepare students for the workforce and lifelong learning (Lim & Graham, 2021; Tiwari, 2021; Hu, 2021). As the primary delivery agents of education, lecturers play a pivotal role in ensuring sustainable institution-wide changes. Based on this study's findings, nurturing lecturers' design thinking skills and encouraging

(internal and external) partnerships can lead to transformative BL practices that prepare students (and lecturers) for the future of work and learning.

Although this is a small scale study, it foreshadows a tectonic shift in the way IHLs worldwide will need to think about design and delivery of higher education, allocation and utilisation of resources, industry partnerships and government support. IHLs will need to reconsider the wisdom of investing in bricks and mortar facilities rather than investment in sophisticated approaches to BL online, with its concomitant financial implications for hard and soft resources and substantial investment in human resources, both through restructuring of existing workload agreements and increased training and support of lecturers engaged in design and delivery. The new urgency for remote teaching caused by COVID-19 has propelled institutions to accelerate BL practices. More importantly it has provided an opportunity to re-imagine education: one that prepares students and lecturers for a dynamic, complex and digital-first world that is still human-centric and socially connected. Institutions will need policies and practices that empower lecturers to evolve and grow into their roles as 21st century educators.

REFERENCES

Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. *Higher education research & development*, *34*(1), 1-14. https://doi-org/10.1080/07294360.2014.934336

Abu Baker, J. (2020, April 9). MOE suspends use of Zoom in home-based learning following breaches involving obscene images. *Channel News Asia*. https://www.channelnewsasia.com/singapore/moe-suspends-zoom-home-based-learning-obscene-images-763036

Adel, A., & Dayan, J. (2021). Towards an intelligent blended system of learning activities model for New Zealand institutions: an investigative approach. *Humanities and Social Sciences Communications*, *8*(1), 1-14. https://doi-org./10.1057/s41599-020-00696-4

Agarwal, A. (2021). The future of learning is blended. Georgia Institute of Technology. https://smartech.gatech.edu/handle/1853/64299

Al-Freih, M. (2021). The Impact of Faculty Experience with Emergency Remote Teaching: An Interpretive Phenomenological Study. *IAFOR Journal of Education*, *9*(2), 7-23. https://doi.org/10.22492/ije.9.2.01

Allen, R., Jerrim, J., & Simms, S. (2020). How did the early stages of the COVID-19 pandemic affect teacher wellbeing? *Centre for Education Policy and Equalising Opportunities (CEPEO)* (No. 20-15). UK: 2020. Working Paper. https://EconPapers.repec.org/RePEc:ucl:cepeow:20-15

American Council of Education. (2020). AACRAO, ACE Survey Finds Uncertainty About Current College Student Fall Enrollment Plans, Optimism About Completing Spring Coursework. https://www.acenet.edu/News-Room/Pages/AACRAO-ACE-Survey-Finds-Uncertainty-About-Current-College-Student-Fall-Enrollment-Plans-Optimism.aspx

Anderson, T., Liam, R., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. http://hdl.handle.net/2149/725

Ang, H.M (2020, April 20). About 12,500 laptops and tablets loaned out to students for home-based learning: MOE. *Channel News Asia*. https://www.channelnewsasia.com/singapore/covid19-laptops-schools-moe-education-home-based-learning-765516

Ang, J. (2020, February 4). Coronavirus: Assemblies, large group activities in S'pore schools to be suspended. *The Straits Times Online.* https://www.straitstimes.com/singapore/coronavirus-assemblies-and-other-large-group-activities-in-schools-and-pre-schools-to-be

Arbaugh, J. B. (2014). What might online delivery teach us about blended management education? Prior perspectives and future directions. *Journal of Management Education*, *38*(6), 784-817. https://doi-org/10.1177/1052562914534244

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The internet and higher education*, *11*(3-4), 133-136. https://doi.org/10.1016/j.iheduc.2008.06.003

Bader, J. D., & Lowenthal, P. R. (2018). Using visual design to improve the online learning experience: a synthesis of research on aesthetics. In *Learner Experience and Usability in Online Education* (pp. 1-35). IGI Global. http://doi.org/ 10.4018/978-1-5225-4206-3.ch001

Bailey, D.R. & Lee, A.R. (2020). Learning from experience in the midst of COVID-19: benefits, challenges, and strategies in online teaching. *Computer-Assisted Language Learning*, 21 (2), 178-198. http://callej.org/journal/21-2/Bailey-Lee2020.pdf

Bailey, S. (2020). Ensuring continuity of learning during enforced absence. https://www.jisc.ac.uk/guides/ensuring-continuity-of-learning-during-enforced-absence#

Baran, E., Correia, A. P., & Thompson, A. (2011). Transforming online teaching practice: Critical analysis of the literature on the roles and competencies of online teachers. *Distance Education*, *32*(3), 421-439. https://doi-org/10.1080/01587919.2011.610293

Bates, A. W. (2015). *Teaching in a digital age: Guidelines for designing teaching and learning*. https://openlibrary-repo.ecampusontario.ca/jspui/handle/123456789/276

Bawane, J. & Spector, J.M. (2009). Prioritization of Online Instructor Roles: Implications for Competency-Based Teacher Education Programs. *Distance Education, 30*(3), 383-397. https://www.learntechlib.org/p/106156/

Bennett, S., & Lockyer, L. (2004). Becoming an online teacher: Adapting to a changed environment for teaching and learning in higher education. *Educational Media International*, 41(3), 231-248. https://doi-org/10.1080/09523980410001680842

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. International Society for Technology in Education.

Beteille, T., Ding, E., Molina, E., Pushparatnam, A., & Wilichowski, T. (2020). Three principles to support teacher effectiveness during COVID-19. https://openknowledge.worldbank.org/handle/10986/33775

Beatty, B. (2014). Hybrid courses with flexible participation: The HyFlex course design. In *Practical applications and experiences in K-20 blended learning environments* (pp. 153-177). IGI Global. https://doi-org/10.4018/978-1-4666-4912-5.ch011

Bhattacherjee, A. (2012). Social science research: Principles, methods, and practices. Textbook Collections 3. http://scholarcommons.usf.edu/oa_textbooks/3. *USF Tampa Library Open Access Collections.*

Bhunia, P. (2017, 30 October). SkillsFuture Singapore launches training programmes in eight priority and emerging skills areas. https://opengovasia.com/skillsfuture-singapore-launches-training-programmes-in-eight-priority-and-emerging-skills-areas/

Bichsel, J. (2013). The state of e-learning in higher education: An eye toward growth and increased access (research report). *Louisville, CO: EDUCAUSE Center for Analysis and Research*.

Biglan, A. (1973). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology*, 57(3), 195–203. https://doi.org/10.1037/h0034701

Birbal, R., Ramdass, M., & Harripaul, M. C. (2018). Student teachers' attitudes towards blended learning. *Journal of Education and Human Development*, *7*(2), 9-26. https://doi.org/10.15640/jehd.v7n2a2

Blackledge, D., & Hunt, B. (1985). Sociological Interpretations of Education (1st ed.). Routledge. https://doi-org/10.4324/9780367351663

Bliuc, A. M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. The Internet and Higher Education, 10(4), 231-244.

Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, *22*, 1-18. https://doi.org/10.1016/j.edurev.2017.06.001

Bonk, C. J., & Graham, C. R. (2005). *The Handbook of Blended Learning: Global Perspectives, Local Designs*. Wiley.

Boschman, F., McKenney, S., & Voogt, J. (2015). Exploring teachers' use of TPACK in design talk: The collaborative design of technology-rich early literacy activities. *Computers & Education*, *82*, 250-262. https://doi.org/10.1016/j.compedu.2014.11.010

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education*, *15*(1), i-vi. Retrieved from http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/462

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., ... & Paskevicius, M. (2020). A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education*, *15*(1), 1-126. https://doi.org/10.5281/zenodo.3878572

Brandt, C. (2020, July 2). Instructing & Assessing 21st Century Skills: A Focus on Self-Directed Learning. *National Center for the Improvement of Educational Assessment*. https://www.nciea.org/blog/educational-assessment/instructing-assessing-21st-century-skills-focus-self-directed-learning

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101. https://doi.org/ 10.1191/1478088706qp063oa

Bredow, C. A., Roehling, P. V., Knorp, A. J., & Sweet, A. M. (2021). To flip or not to flip? A meta-analysis of the efficacy of flipped learning in higher education. *Review of Educational Research*, *91*(6), 878-918. https://doi-org/10.3102/00346543211019122

Brown, A., Lawrence, J., Basson, M., & Redmond, P. (2020). A conceptual framework to enhance student online learning and engagement in higher education. *Higher Education Research & Development*, 1-16. https://doi-org/10.1080/07294360.2020.1860912

Brown, M. G. (2016). Blended instructional practice: A review of the empirical literature on instructors' adoption and use of online tools in face-to-face teaching. *Internet and Higher Education*, *31*, 1–10. http://doi.org/10.1016/j.iheduc.2016.05.001

Bruggeman, B., Tondeur, J., Struyven, K., Pynoo, B., Garone, A., & Vanslambrouck, S. (2021). Experts speaking: Crucial teacher attributes for implementing blended learning in higher education. *The Internet and Higher Education*, *48*, 100772. https://doi-org/10.1016/j.iheduc.2020.100772

Butler, D. (2016). Tomorrow's world: technological change is accelerating today at an unprecedented speed and could create a world we can barely begin to imagine. *Nature*, *530*(7591), 398-402. https://doi-org/10.1038/530398a

Castellanos-Reyes, D. (2020). 20 years of the community of inquiry framework. *TechTrends*, *64*(4), 557-560. https://doi-org/10.1007/s11528-020-00491-7

Chandran, R. (2011). National University of Singapore's Campus-Wide e-Learning Week. Retrieved from http://www.cdtl.nus.edu.sg/tech-in-he/pdf/Section1-Article1.pdf

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* London: Sage Publications.

Chen, Z., Ang, B., binte Hardy, S., & Andre, N. (2021). COVID-19 Educator Survey. Singapore: Institute for Adult Learning

Clow, D. (2012, April). The learning analytics cycle: closing the loop effectively. In *Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 134-138).

Cochrane, T., Birt, J., Cowie, N., Deneen, C., Goldacre, P., Narayan, V., ... & Worthington, T. (2020, November). A collaborative design model to support hybrid learning environments during COVID19. In Proceedings of the ASCILITE 37th International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education, Armidale, Australia, 30 November–1 December 2020. https://doi-org/10.14742/ascilite2020.0119

Collins, J. B., & Pratt, D. D. (2011). The teaching perspectives inventory at 10 years and 100,000 respondents: Reliability and validity of a teacher self-report inventory. *Adult Education Quarterly*, *61*(4), 358-375. https://doi.org/ 10.1177/0741713610392763

Compton, S., Kamei, R., & Cook, S. (2016). The history and future of Team-Based Learning. *Proceedings of Singapore Healthcare*, *25*(1), 3-4. https://doi-org/10.1177/2010105815624427

Cosnefroy, L., & Carré, P. (2014). Self-regulated and Self-directed Learning: Why Don't Some Neighbors Communicate?. International journal of self-directed learning, *11*(1-12). https://hal.parisnanterre.fr//hal-01410802

Cox, S., & Graham, C. R. (2009). Diagramming TPACK in practice: Using and elaborated model of the TPACK framework to analyze and depict teacher knowledge. *TechTrends 53*, 60– 69. https://doi-org/10.1007/s11528-009-0327-1

Creswell, J. W. (2013). *Qualitative Inquiry & Research Design: Choosing among Five Approaches* (3rd ed.). Thousand Oaks, CA: SAGE.

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, 11, 100. https://doi.org/10.1186/1471-2288-11-100

Darling-Hammond, L., & Hyler, M. E. (2020). Preparing educators for the time of COVID… and beyond. *European Journal of Teacher Education*, *43*(4), 457-465. https://doi.org/10.1080/02619768.2020.1816961

Davie, S. (2018, December 17). New polytechnic entry scheme for working adults. *The Straits Times Online*. https://www.straitstimes.com/singapore/education/new-poly-entry-scheme-for-working-adults-starts-today

Davie, S. (2020, June 28). Home-based learning set to be regular part of schooling post COVID-19, says Education Minister Ong Ye Kung. *The Straits Times Online.* https://www.straitstimes.com/singapore/education/home-based-learning-set-to-be-regular-part-of-schooling-post-covid-19-says

Davie, S. (2021, February 5). ST Education Forum: Covid-19 presents opportunity to revitalise university education. *The Straits Times Online*. https://www.straitstimes.com/singapore/parenting-education/covid-19-presents-opportunity-to-revitalise-university-education

Deeva, G., Bogdanova, D., Serral, E., Snoeck, M., & De Weerdt, J. (2021). A review of automated feedback systems for learners: Classification framework, challenges and opportunities. *Computers & Education*, *162*, 104094. https://doi.org/10.1016/j.compedu.2020.104094

DeLozier, S. J., & Rhodes, M. G. (2017). Flipped classrooms: A review of key ideas and recommendations for practice. *Educational Psychology Review*, 29(1), 141–151. https://doi.org/10.1007/s10648-015-9356-9

Denzin, N. K., & Lincoln, Y. S. (2005). *The SAGE handbook of qualitative research*. Thousand Oaks: Sage Publications.

DeVaney, J., Shimshon, G., Rascoff, M., & Maggioncalda, J. (2020, May 5). Higher Ed needs a long-term plan for virtual learning. *Harvard Business Review*. https://hbr.org/2020/05/higher-edneeds-a-long-term-plan-for-virtual-learning.

Díaz, S. R., Swan, K., Ice, P., & Kupczynski, L. (2010). Student ratings of the importance of survey items, multiplicative factor analysis, and the validity of the community of inquiry survey. *The Internet and Higher Education*, *13*(1-2), 22-30. https://doi.org/10.1016/j.iheduc.2009.11.004

Diep, A. N., Zhu, C., Cocquyt, C., De Greef, M., Vo, M. H., & Vanwing, T. (2019). Adult learners' needs in online and blended learning. *Australian Journal of Adult Learning*, *59*(2), 223-253. https://search.informit.org/doi/10.3316/ielapa.592385127057281

Donitsa-Schmidt, S., & Ramot, R. (2020). Opportunities and challenges: teacher education in Israel in the Covid-19 pandemic. *Journal of Education for Teaching*, *46*(4), 586-595. https://doi-org /10.1080/02607476.2020.1799708

Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International journal of educational technology in Higher education*, *15*(1), 1-16. https://doi-org/10.1186/s41239-017-0087-5

Economic Development Board. (2021). Future Ready Infrastructure. https://www.edb.gov.sg/en/why-singapore/future-ready-infrastructure.html

Economic Intelligence Unit. (2018). Preparing for Disruption: Technological Readiness Ranking. https://www.eiu.com/public/topical_report.aspx?campaignid=TechReadiness

Educause. (2010). *7 Things You Should Know About Backchannel Communication*. https://library.educause.edu/resources/2010/2/7-things-you-should-know-about-backchannel-communication

Entwistle, N. J., & Peterson, E. R. (2004). Conceptions of learning and knowledge in higher education: Relationships with study behaviour and influences of learning environments. *International journal of educational research*, *41*(6), 407-428. https://doi.org/10.1016/j.ijer.2005.08.009

Erlam, G. D., Garrett, N., Gasteiger, N., Lau, K., Hoare, K., Agarwal, S., & Haxell, A. (2021). What Really Matters: Experiences of Emergency Remote Teaching in University Teaching and Learning During the COVID-19 Pandemic. In *Frontiers in Education* (p. 397). Frontiers. https://doi.org/10.3389/feduc.2021.639842

Ertmer, P. A. (1999). Addressing first- and second-order barriers to CHANGE: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47–61. https://doi.org/10.1007/bf02299597

Evans, J. C., Yip, H., Chan, K., Armatas, C., & Tse, A. (2020). Blended learning in higher education: professional development in a Hong Kong university. *Higher Education Research & Development*, 39(4), 643-656. https://doi-org/10.1080/07294360.2019.1685943

Ewing L. A. (2021). Rethinking Higher Education Post-COVID-19. The Future of Service Post-COVID-19 Pandemic, *Volume 1: Rapid Adoption of Digital Service Technology*, 37–54. https://doi.org/10.1007/978-981-33-4126-5_3

EY Oceania (2021, 13 August). COVID-19 Brings Forward Demise of University Campus. https://www.ey.com/en_au/news/2021/08/covid-19-brings-forward-demise-of-university-campus

Eyles, A., Gibbons, S., & Montebruno, P. (2020). *Covid-19 school shutdowns: What will they do to our children's education?*. Centre for Economic Performance, LSE. http://eprints.lse.ac.uk/id/eprint/104675

Fathema, N., & Akanda, M. H. (2020). Effects of instructors' academic disciplines and prior experience with learning management systems: A study about the use of Canvas. *Australasian Journal of Educational Technology*, 36(4), 113-125. https://doi.org/10.14742/ajet.5660

Fernández-Batanero, J. M., Román-Graván, P., Reyes-Rebollo, M. M., & Montenegro-Rueda, M. (2021). Impact of educational technology on teacher stress and anxiety: A literature review. *International Journal of Environmental Research and Public Health*, *18*(2), 548. https://doi.org/10.3390/ijerph18020548

Fullan, M. (1998). Leadership for the 21st century: Breaking the bonds of dependency. *Educational leadership*, 55, 6-11.

Fung, M. (2020). Developing a Robust System for Upskilling and Reskilling the Workforce: Lessons from the SkillsFuture Movement in Singapore. In *Anticipating and Preparing for Emerging Skills and Jobs* (pp. 321-327). Springer, Singapore. https://doi-org/10.1007/978-981-15-7018-6_39

Gallaghar, R. (2020, 29 March). Zoom for Online Learning Updates: Expanded Access for Schools. https://blog.zoom.us/how-to-use-zoom-for-online-learning/

Garrison, D.R. (2016). *E-Learning in the 21st Century: A Community of Inquiry Framework for Research and Practice* (3rd ed.). Routledge. https://doi-org/10.4324/9781315667263

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education*, 13(1–2), 31–36. http://doi.org/10.1016/j.iheduc.2009.10.002

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157-172. https://doi.org/10.1016/j.iheduc.2007.04.001

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, *7*(2), 95-105. https://doi.org/10.1016/j.iheduc.2004.02.001

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education*, *2*(2-3), 87-105. https://doi.org/10.1016/S1096-7516(00)00016-6

Garrison, R., & Vaughan, H. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco: Jossey-Bass.

Geng, S., Law, K. M., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal of Educational Technology in Higher Education*, 16(1), 1-22. https://doi-org/10.1186/s41239-019-0147-0

Gilmore, D. (2020). Implementing a coaching model for the development of online teachers. *International Journal for Academic Development*, *26*(2), 121-133. https://doi-org /10.1080/1360144X.2020.1822847

Glantz, E. J., & Gamrat, C. (2020, October). The new post-pandemic normal of college traditions. In *Proceedings of the 21st annual conference on information technology education* (pp. 279-284). Retrieved from https://doi.org/10.1145/3368308.3415375

Global Shaper Survey (2016). Global Shapers Survey. World Economic Forum. http://www.shaperssurvey2017.org/static/data/GSC_AS16_Report.pdf

Global-Is-Asian. (2020). After the Pandemic: Reimagining Education. Lee Kuan Yew School of Public Policy. https://lkyspp.nus.edu.sg/gia/article/after-the-pandemic-reimagining-education

Goel, A. K., & Polepeddi, L. (2016). *Jill Watson: A virtual teaching assistant for online education*. Georgia Institute of Technology. Retrieved from https://smartech.gatech.edu/bitstream/handle/1853/59104/goelpolepeddi-harvardvolume-v7.1.pdf?sequence=1

Goeman, K., De Grez, L., van den Muijsenberg, E., & Elen, J. (2020). Investigating the enactment of social presence in blended adult education. *Educational Research*, *62*(3), 340-356. https://doi-org /10.1080/00131881.2020.1796517

Gog, S.J. (2017). Innovative Learning 2020: Candid Q&A with Dr. Gog Soon Joo of SkillsFuture Singapore. Retrieved from http://www.hrinasia.com/people-development/innovative-learning-2020-candid-qa-with-dr-gog-soon-joo-of-skillsfuture-singapore/

Goodyear P. (2002) Psychological Foundations for Networked Learning. In: Steeples C., Jones C. (eds) Networked Learning: Perspectives and Issues. Computer Supported Cooperative Work. Springer, London. https://doi-org/10.1007/978-1-4471-0181-9_4

Goodyear, P., & Dimitriadis, Y. (2013). In medias res reframing design for learning. *Research in Learning Technology*, *21*. https://doi.org/10.3402/rlt.v21i0.19909

Goodyear, P., Salmon, G., Spector, J. M., Steeples, C., & Tickner, S. (2001). Competences for Online Teaching: A Special Report. *Educational Technology Research and Development*, 49(1), 65–72. http://www.jstor.org/stable/30220300

Graham, C. R. (2006). Blended learning systems. In C.J. Bonk, C.R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs*. Pfeiffer, San Francisco, CA (2006), pp. 3-21

Graham, C. R. (2013). Emerging practice and research in blended learning. In *Handbook of distance education* (pp. 351-368). Routledge.

Graham, C. R. (2019). Current research in blended learning. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 173–188). New York, NY: Routledge.

Graham, C. R., Allen, S., & Ure, D. (2003). Blended learning environments: A review of the research literature. *Unpublished manuscript, Provo, UT*, 3-5.

Graham, C. R., Allen, S., & Ure, D. (2005). Benefits and challenges of blended learning environments. In *Encyclopedia of Information Science and Technology, First Edition* (pp. 253-259). IGI Global.

Graham, C. R., Henrie, C. R., & Gibbons, A. S. (2014). Developing models and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning: Research perspectives*, 2,13–33. New York, NY: Taylor & Francis.

Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education*, *18*, 4-14. https://doi.org/10.1016/j.iheduc.2012.09.003

Greene, M. D., & Jones, W. M. (2020). Analyzing Contextual Levels and Applications of Technological Pedagogical Content Knowledge (TPACK) in English as a Second Language Subject Area: A Systematic Literature Review. *Educational Technology & Society*, 23(4), 75–88. https://www.jstor.org/stable/26981745

Gregory, J., & Salmon, G. (2013). Professional development for online university teaching. *Distance Education*, 34(3), 256–270. https://doi-org/10.1080/01587919.2013.835771

Guo, P.J., Kim, J., and Rubin, R. (2014, March). How video production affects student engagement: An empirical study of MOOCs. Paper Presented at *ACM Conference on Learning at Scale*, p. 41-50. Atlanta, GA. Retrieved from http://dx.doi.org/10.1145/2556325.2566239.

Halverson, L. R., Graham, C. R., Spring, K. J., Drysdale, J. S., & Henrie, C. R. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *The Internet and Higher Education*, 20, 20–34. http://doi.org/10.1016/j.iheduc.2013.09.004

Han, X., & Wang, Y. (2021). System-Driven Blended Learning for Quality Education: A Collective Case Study of Universities and Vocational Colleges and Schools in China. In *Blended Learning for Inclusive and Quality Higher Education in Asia* (pp. 1-23). Springer, Singapore. https://doi.org/10.1007/978-981-33-4106-7

Hanoa, E. (2020, 27 February). Kahoot! offers free access to all features to support distance learning in schools closed by the coronavirus outbreak. https://kahoot.com/blog/2020/02/27/kahoot-free-access-schools-higher-education-coronavirus/

Hargreaves, A. (2021). What the COVID-19 pandemic has taught us about teachers and teaching. *Facets*. *6*(1), 1835-1863. https://doi.org/10.1139/facets-2021-0084

Harindranathan, P., & Folkestad, J. (2019). Learning Analytics to Inform the Learning Design: Supporting Instructors' Inquiry into Student Learning in Unsupervised Technology-Enhanced Platforms. *Online Learning*, *23*(3), 34-55. (EJ1228819). ERIC. https://files.eric.ed.gov/fulltext/EJ1228819.pdf

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research*, *77*(1), 81-112. https://doi-org/10.3102/003465430298487

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Houlden, S., & Veletsianos, G. (2020, 12 March). Coronavirus pushes universities to switch to online classes –but are they ready? *The Conversation*. https://theconversation.com/coronaviruspushes-universities-toswitch-to-online-classes-but-arethey-ready-132728.

Howard, N. J. (2021). Navigating blended learning, negotiating professional identities. *Journal of Further and Higher Education*, *45*(5), 654-671. https://doi-org /10.1080/0309877X.2020.1806214

Hrastinski, S. (2019). What do we mean by blended learning?. *TechTrends*, *63*(5), 564-569. https://doi.org/10.1016/j.edurev.2017.06.001

Hu, D. (2021, July 20). Blended learning: a new normal for higher education? *The Association of Commonwealth Universities*. https://www.acu.ac.uk/news/blended-learning-a-new-normal-for-higher-education/

Huang, J. & Hung, D. (2020, July 30). Tackling 3 obstacles to digital transformation in education. *Today Online*. https://www.todayonline.com/commentary/tackling-3-obstacles-digital-transformation-education?cid=h3_referral_inarticlelinks_03092019_todayonline

Hunt, L. & Sankey, M.D. (2013). 'Getting the Context Right for Quality Teaching and Learning'. In D. Salter (Ed) *Cases on Quality Teaching Practices in Higher Education*. IGI Global, London. pp 261-279.

Hwang, G. J., Lai, C. L., & Wang, S. Y. (2015). Seamless flipped learning: a mobile technology-enhanced flipped classroom with effective learning strategies. *Journal of Computers in Education*, *2*(4), 449-473. https://doi-org/10.1007/s40692-015-0043-0

Ifenthaler, D., & Yau, J. Y. K. (2020). Utilising learning analytics to support study success in higher education: a systematic review. *Educational Technology Research and Development*, *68*(4), 1961-1990. https://doi-org/10.1007/s11423-020-09788-z

Jahanian, F. (2020, January). How higher education can adapt to the future of work. *World Economic Forum Annual Meeting*. https://www.weforum.org/agenda/2020/01/how-can-higher-education-adapt-to-a-constantly-evolving-future-of-work/

Jeffrey, L. M., Milne, J., Suddaby. G., & Higgins, A. (2014). Blended learning: How teachers balance the blend of online and classroom components. *Journal of Information Technology Education*:*Research, 13*, 121-140. Retrieved from http://www.jite.org/documents/Vol13/JITEv13ResearchP121-140Jeffrey0460.pdf

Jenkins, M., Bokosmaty, R., Brown, M., Browne, C., Gao, Q., Hanson, J., & Kupatadze, K. (2017). Enhancing the design and analysis of flipped learning strategies. *Teaching & Learning Inquiry*, *5*(1), 65-77. https://doi.org/10.20343/teachlearninqu.5.1.7

Johansen, R. (1988). *Groupware: Computer support for business teams*. The Free Press.

Johnson, N., Veletsianos, G., & Seaman, J. (2020). US Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic. *Online Learning*, *24*(2), 6-21. http://dx.doi.org/10.24059/olj.v24i2.2285

Jonker, H., März, V., & Voogt, J. (2018). Teacher educators' professional identity under construction: The transition from teaching face-to-face to a blended curriculum. *Teaching and Teacher Education*, *71*,120-133. https://doi.org/10.1016/j.tate.2017.12.016

Joshi, A., Vinay, M., & Bhaskar, P. (2020). Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments. Interactive Technology Smart Education, *18*(2), 205-226. https://doi-org/10.1108/ITSE-06-2020-0087

Kearns, L. R. (2016). The experience of teaching online and its impact on faculty innovation across delivery methods. *The Internet and Higher Education*, 31, 71–78. https://doi.org/10.1016/j.iheduc.2016.06.005

Kebritchi, M., Lipschuetz, A., & Santiague, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems*, *46*(1), 4-29. https://doi-org/10.1177/0047239516661713

Kember, D., Leung, D. Y., & McNaught, C. (2008). A workshop activity to demonstrate that approaches to learning are influenced by the teaching and learning environment. *Active Learning in Higher Education*, *9*(1), 43-56. https://doi-org /10.1177/1469787407086745

Kennedy, A. (2014). Understanding continuing professional development: the need for theory to impact on policy and practice. *Professional development in education*, *40*(5), 688-697. https://doi-org /10.1080/19415257.2014.955122

Kennedy, G., Corrin, L., Lockyer, L., Dawson, S., Williams, D., Mulder, R., ... & Copeland, S. (2014, January). Completing the loop: Returning learning analytics to teachers. In *Proceedings of ASCILITE 2014-Annual Conference of the Australian Society for Computers in Tertiary Education*. http://hdl.handle.net/11343/52690

Kereluik, K., Mishra, P., & Koehler, M. J. (2011). On learning to subvert signs: Literacy, technology and the TPACK framework. *California Reader*, *44*(2), 12-18.

Korr, J., Derwin, E. B., Greene, K., & Sokoloff, W. (2012). Transitioning an adult-serving university to a blended learning model. *The Journal of Continuing Higher Education*, *60*(1), 2-11. https://www.learntechlib.org/p/72388/

Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2014). Community of inquiry: Social presence revisited. *E-learning and Digital Media*, *11*(1), 5-18. https://doi-org/10.2304/elea.2014.11.1.5

Kumar, V. (2014). Making" freemium" work. (2014, May). *Harvard Business Review*. https://hbr.org/2014/05/making-freemium-work

Kurohi, R. (2020, April 8). Singapore schools to shift to full home-based learning from April 8 to May 4 amid Covid-19 pandemic. *The Straits Times Online*. https://www.straitstimes.com/singapore/education/schools-to-shift-to-full-home-based-learning-from-april-8

Kvale, S. (1996). *Interview An introduction to qualitative research interviewing*. Thousand Oaks, CA Sage

Lage, M., Platt, G., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education*, 3(1), 30–43. https://doi-org/10.1080/00220480009596759

Lau, J. (2020, 10 August). Singapore experiments with 'very agile' teaching methods. *Times Higher Education*. https://www.timeshighereducation.com/news/singapore-experiments-very-agile-teaching-methods

Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies*. Routledge.

Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (pp. 153–175). London: WLE Centre.

Laurillard, D. (2009). The pedagogical challenges to collaborative technologies. *International Journal of Computer Supported Collaborative Learning, 4*(1), 5–20. https://doi.org/10.1007/s11412-008-9056-2

Laurillard, D. (2012). *Teaching as a design science*. New York, NY: Routledge.

Laurillard, D., & Masterman, E. (2010). TPD as online collaborative learning for innovation in teaching. In *Online learning communities and teacher professional development: Methods for improved education delivery* (pp. 230-246). IGI Global.

Lawrence, J., Brown, A., Redmond, P., & Basson, M. (2019). Engaging the disengaged: Exploring the use of course-specific learning analytics and nudging to enhance online student engagement. *Student Success*, *10*(2), 47-58. http://dx.doi.org/10.5204/ssj.v10i2.1295

Lee, V. & Yeo, S. (2020, April, 18). How home-based learning shows up inequality in Singapore - a look at three homes. *The Straits Times Online*. https://www.straitstimes.com/lifestyle/how-home-based-learning-hbl-shows-up-inequality-in-singapore-a-look-at-three-homes

Lee, Y. (2021, 12 July) The world must start preparing for the next pandemic, Singapore's senior minister says. *CNBC*. https://www.cnbc.com/2021/07/12/singapores-tharman-shanmugaratnam-on-the-next-pandemic-after-covid.html

Leong, H., Singh, M.N., & Sale, D. (2016, June 12-16). Enhancing teaching skills: a professional development framework for lecturers. *Proceedings of the 12th International CDIO Conference*. http://www.cdio.org/files/document/cdio2016/153/153_Paper_PDF.pdf

Lidolf, S., & Pasco, D. (2020, May). Educational technology professional development in higher education: A systematic literature review of empirical research. *Frontiers in Education 5*, 35 https://doi.org/10.3389/feduc.2020.00035

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Educational Technology & Society*, *12*(4), 282-293. https://www.jstor.org/stable/10.2307/jeductechsoci.12.4.282

Lim, C. P., & Graham, C. R. (Eds.). (2021). *Blended learning for inclusive and quality higher education in Asia*. Singapore: Springer. https://doi.org/10.1007/978-981-33-4106-7

Lim, C. P., & Wang, T. (2016). A framework and self-assessment tool for building the capacity of higher education institutions for blended learning. In C. P. Lim & L. Wang (Eds.), *Blended learning for quality higher education: Selected case studies on implementation from Asia-Pacific*, 1-38. https://unesdoc.unesco.org/ark:/48223/pf0000246851.locale=en

Lim, C. P., Wang, T., & Graham, C. (2019). Driving, sustaining, and scaling up blended learning practices in higher education institutions: A proposed framework. *Innovation and Education*, *1*(1), 1-12. https://doi.org/10.1186/s42862-019-0002-0

Lim, C. P., Yang, D., & Gao, Y. (2021). A Grassroots Approach Towards Professional Development in Blended Learning of a Faculty at a University in Hong Kong. *Blended Learning for Inclusive and Quality Higher Education in Asia*. Singapore: Springer. https://doi.org/10.1007/978-981-33-4106-7

Lim, M. (2020, 20 May). Educating despite the COVID-19 outbreak: lessons from Singapore. *Times Higher Education*. https://www.timeshighereducation.com/blog/educating-despite-COVID-19-outbreak-lessons-singapore

Lincoln, Y.S. & Guba, G.E. (2000) The Only Generalization Is There Is No Generalization. In: Gomm, R., Hammersley, M. and Foster, P., (Eds.), *Case Study Method*, SAGE, London, 27-45.

Lingard L. (2019). Beyond the default colon: Effective use of quotes in qualitative research. *Perspectives on Medical Education*, 8(6), 360–364. https://doi.org/10.1007/s40037-019-00550-7

Lorenz, T., & Alba, D. (2020, April 6). Zoom video calling app exposing users to 'zoombombing' that leads to online abuse. *The New York Times*. https://www.nytimes.com/2020/04/03/technology/zoom-harassment-abuse-racism-fbi-warning.html

Lo, C. K., & Hew, K. F. (2017). Using "first principles of instruction" to design secondary school mathematics flipped classroom: The findings of two exploratory studies. *Journal of Educational Technology & Society*, *20*(1), 222-236. https://www.jstor.org/stable/10.2307/jeductechsoci.20.1.222

Loyens, S. M., Magda, J., & Rikers, R. M. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educational Psychology Review*, *20*(4), 411-427. https://doi-org /10.1007/s10648-008-9082-7

Lucardie, A. T., Berkenbosch, L., van den Berg, J., & Busari, J. O. (2017). Flipping the classroom to teach Millennial residents medical leadership: a proof of concept. *Advances in Medical Education and Practice, 8*, 57-61. https://doi.org/10.2147/AMEP.S123215

Ma, G., Black, K., Blenkinsopp, J., Charlton, H., Hookham, C., Pok, W. F., ... & Alkarabsheh, O. H. M. (2021). Higher education under threat: China, Malaysia, and the UK respond to the COVID-19 pandemic. *Compare: A Journal of Comparative and International Education*, 1-17. https://doi-org /10.1080/03057925.2021.1879479

Ma'arop, A. H., & Embi, M. A. (2016). Implementation of blended learning in higher learning institutions: A review of the literature. *International Education Studies*, *9*(3), 41-52 (EJ1093338). ERIC. https://eric.ed.gov/?id=EJ1093338

Maimaiti, G., Jia, C., & Hew, K. F. (2021). Student disengagement in web-based videoconferencing supported online learning: an activity theory perspective. *Interactive Learning Environments*, 1-20. https://doi-org/10.1080/10494820.2021.1984949

Marinoni, G., Van't Land, H., & Jensen, T. (2020). The impact of COVID-19 on higher education around the world. *IAU Global Survey Report*. https://www.iau-aiu.net/COVID-19-impact-on-Higher-Education-Institutional-and-Students-Perspectives

Martin, F., Polly, D., & Ritzhaupt, A.D. (2020). Bichronous online learning: Blending asynchronous and synchronous online learning. *Educause Review*. https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning

Martin, F., Ritzhaupt, A., Kumar, S., & Budhrani, K. (2019). Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. *The Internet and Higher Education*, *42*, 34-43. https://doi.org/10.1016/j.iheduc.2019.04.001

Martin-Barbero, S. (2020, October). COVID-19 has accelerated the digital transformation of higher education. Retrieved from https://www.weforum.org/agenda/2020/07/COVID-19-digital-transformation-higher-education/

Mayes, T., & de Freitas, S. (2004). Review of e-learning theories, frameworks and models. *JISC e-learning models study report*. Retrieved from https://curve.coventry.ac.uk/open/file/8ff033fc-e97d-4cb8-aed3-29be7915e6b0/1/Review+of+e-learning+theories.pdf

McCray, G. E. (2000). The hybrid course: Merging on-line instruction and the traditional classroom. *Information Technology and Management*, *1*, 307-327. https://doi-org /10.1023/A:1019189412115

McKinsey (2020, October). How COVID-19 has pushed companies over the technology tipping point—and transformed business forever. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-COVID-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever

Means, B., Bakia, M., & Murphy, R. (2014). *Learning online: What research tells us about whether, when and how*. Routledge.

Medina, L. C. (2018). Blended learning: Deficits and prospects in higher education. *Australasian Journal of Educational Technology*, *34*(1). https://doi.org/10.14742/ajet.3100

Mei, X. Y., Aas, E., & Medgard, M. (2019). Teachers' use of digital learning tool for teaching in higher education: Exploring teaching practice and sharing culture. *Journal of Applied Research in Higher Education*, *11* (3), 522-537. https://doi-org/10.1108/JARHE-10-2018-0202Ministry of Education. (2015). Our ICT Journey. Retrieved from https://ictconnection.moe.edu.sg/masterplan-4

Meyers, C. G. (2018). Coactive vicarious learning: Toward a relational theory of vicarious learning in organizations. *Academy of Management review*, *43*(4), 610-634. https://doi.org/10.5465/amr.2016.0202

Ministry of Education. (2020a, December 29). *Blended Learning to Enhance Schooling Experience and Further Develop Students into Self-Directed Learners* [Press release]. https://www.moe.gov.sg/news/press-releases/20201229-blended-learning-to-enhance-schooling-experience-and-further-develop-students-into-self-directed-learners

Ministry of Education, (2020b). Strengthening Digital Literacies – Committee of Supply 2020. https://www.moe.gov.sg/microsites/cos2020/refreshing-our-curriculum/strengthen-digital-literacy.html

Ministry of Education. (2021a). *Frequently Asked Questions: COVID-19 Related Matters*. https://www.moe.gov.sg/faqs-covid-19-infection

Ministry of Education. (2021b). *Desired Outcomes of Education*. Retrieved from https://www.moe.gov.sg/education-in-sg/desired-outcomes

Miroshnikov, G. (2021, April 20). Applying design frameworks for a new perspective on digital learning. *Learning Innovation Exchange*. https://teaching.london.edu/exchange/applying-design-frameworks-digital-learning/

Mishra, P. (2019). Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade. *Journal of Digital Learning in Teacher Education*, *35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054. http://www.learntechlib.org/p/99246/

Micheli, P., Wilner, S. J., Bhatti, S. H., Mura, M., & Beverland, M. B. (2019). Doing design thinking: Conceptual review, synthesis, and research agenda. *Journal of Product Innovation Management*, *36*(2), 124-148. https://doi-org /10.1111/jpim.12466

Mok, H. N. (2014). Teaching tip: The flipped classroom. *Journal of Information Systems Education*, *25* (1), 7-11. http://jise.org/Volume25/n1/JISEv25n1p7.html

Moralista, R., & Oducado, R. M. (2020). Faculty perception toward online education in higher education during the coronavirus disease 19 (COVID-19) pandemic. *Universal Journal of Education, 8*(10), 4736-4742. https://doi.org/10.13189/ujer.2020.081044

Munir, M. T., Baroutian, S., Young, B. R., & Carter, S. (2018). Flipped classroom with cooperative learning as a cornerstone. *Education for Chemical Engineers*, *23*, 25-33. http://doi.org/ 10.1016/j.ece.2018.05.001

Muñoz Carril, P. C., González Sanmamed, M., & Hernández Sellés, N. (2013). Pedagogical roles and competencies of university teachers practicing in the e-learning environment. *International Review of Research in Open and Distributed Learning, 14*(3), 462-487. https://doi.org/10.19173/irrodl.v14i3.1477

Murphy, T. (2019). Classifying the management of the blend: a typology of the management of blended learning course development. *Tertiary Education and Management, 25*(3), 211-224. http://dx.doi.org/10.1007/s11233-019-09032-1

Nanyang Technological University (2018, 21 February). The Arc is equipped with the latest technologies to support the flipped classroom pedagogy. https://www.ntu.edu.sg/news/detail/the-arc-sets-sail-as-a-new-flagship-building-of-the-ntu-smart-campus

National Institute of Education. (2021, 1 June). Tips for Faculty & Teachers for Home-based learning (HBL). https://www.nie.edu.sg/teacher-education-undergraduate-programmes/useful-resources-for-HBL-WFH-EdCo/tips-for-faculty-teachers-for-home-based-learning-(hbl)

National University of Singapore. (2019, Code of Student Conduct. https://nus.edu.sg/osa/docs/default-source/osa-doc/resources-and-policies/code-of-student-conduct.pdf?sfvrsn=14040e3d_4

National University of Singapore. (2020, 2 April). NUS Quick Guide to Online Teaching. https://wiki.nus.edu.sg/display/NQGTOT

Nabizadeh, A. H., Leal, J. P., Rafsanjani, H. N., & Shah, R. R. (2020). Learning path personalization and recommendation methods: A survey of the state-of-the-art. *Expert Systems with Applications*, *159*, 113596. https://doi.org/10.1016/j.eswa.2020.113596

Nerantzi, C. (2020). The use of peer instruction and flipped learning to support flexible blended learning during and after the COVID-19 Pandemic. *International Journal of Management and Applied Research*, *7*(2), 184-195. https://doi.org/10.18646/2056.72.20-013

Neuwirth, L. S., Jović, S., & Mukherji, B. R. (2021). Reimagining higher education during and post-COVID-19: Challenges and opportunities. *Journal of Adult and Continuing Education, 27*(2), 141–156. https://doi.org/10.1177/1477971420947738

Ng, P. (2019, July 10-12). *As Effective Online As in Face-to-Face: Developing both Staff and Students in Self-Directed Learning and Profession-specific Digital Competence – A Change Management Journey* [Paper presentation]. International Conference on Open and Innovative Education (ICOIE), Hong Kong SAR, China. http://icoie2019.ouhk.edu.hk/abs/104.html

Ngee Ann Polytechnic (2021). Every Student Matters. https://www.np.edu.sg/admissions/Pages/aid.aspx

Ngee Ann Polytechnic (2020). Ngee Ann Polytechnic Student Code of Conduct. https://www.np.edu.sg/studentlife/pages/code-of-conduct.aspx

Ngee Ann Polytechnic (n.d). The 1990s. Retrieved from https://www.np.edu.sg/Modals/explore-1990.aspx

Nguyen, T. (2015). The effectiveness of online learning: Beyond no significant difference and future horizons. *MERLOT Journal of Online Learning & Teaching, 11*(2), 309-319. http://jolt.merlot.org/Vol11no2/Nguyen_0615.pdf

Norberg,A., Stöckel, B. and Antti, M. (2017). Time Shifting and Agile Time Boxes in Course Design. *International Review of Research in Open and Distributed Learning, 18* (6), 88-103. https://doi.org/10.19173/irrodl.v18i6.3182

O'Donoghue, T. (2019). *Planning your qualitative research thesis and project: an introduction to interpretivist research in education and the social sciences* (Second edition.). Abingdon, Oxon;: Routledge, an imprint of the Taylor & Francis Group.

Ocak, M. A. (2011). Why are faculty members not teaching blended courses? Insights from faculty members. *Computers & Education*, *56*(3), 689–699. http://doi.org/10.1016/j.compedu.2010.10.011

OECD (2021), *The state of higher education: One year in to the COVID-19 pandemic*, OECD Publishing, Paris. https://doi.org/10.1787/83c41957-en.

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education*, *25*, 85-95. https://doi.org/10.1016/j.iheduc.2015.02.002

Oh, T. (2020, February 9). Dorscon Orange: NUS, NTU, SMU move large lectures online. *Today Online*. https://www.todayonline.com/singapore/wuhan-coronavirus-dorscon-orange-nus-ntu-smu-move-large-lectures-online-suspend-mass-events

Oliver, M., & Trigwell, K. (2005). Can 'blended learning' be redeemed?. *E-learning and Digital Media*, *2*(1), 17-26. https://doi-org/10.2304/elea.2005.2.1.17

Olney, T., & Piashkun, S. (2021). Professional Development for Sustaining the 'Pivot': The impact of the Learning Design and Course Creation Workshop on Six Belarusian HEIs. *Journal of Interactive Media in Education, 10*(1), 1–15. https://doi. org/10.5334/jime.639

Onah, D. F., Pang, E. L., & Sinclair, J. E. (2020). Cognitive optimism of distinctive initiatives to foster self-directed and self-regulated learning skills: A comparative analysis of conventional and blended-

learning in undergraduate studies. *Education and Information Technologies*, *25*(5), 4365-4380. https://doi-org/10.1007/s10639-020-10172-w

Online Learning Consortium (2021). Online Learning Consortium Quality Scorecard. https://onlinelearningconsortium.org/consult/olc-quality-scorecard-blended-learning-programs/

Onwuegbuzie, A. J., Frels, R. K., & Hwang, E. (2016). Mapping Saldana's Coding Methods onto the Literature Review Process. *Journal of Educational Issues, 2*(1), 130-150. (EJ1127478). ERIC. https://eric.ed.gov/?id= EJ1127478

Onyema, E. M., Eucheria, N. C., Obafemi, F. A., Sen, S., Atonye, F. G., Sharma, A., & Alsayed, A. O. (2020). Impact of Coronavirus pandemic on education. *Journal of Education and Practice*, *11*(13), 108-121. https://doi.org/10.7176/JEP/11-13-12

Owston, R. (2013). Blended learning policy and implementation: Introduction to the special issue. *Internet and Higher Education*, *18*, 1-3. https://doi.org/10.1016/j.iheduc.2013.03.002

Oyarzun, B., Martin, F., & Moore, R. L. (2020). Time management matters: Online faculty perceptions of helpfulness of time management strategies. *Distance Education*, *41*(1), 106-127. https://10.1080/01587919.2020.1724773

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online Education: Worldwide Status, Challenges, Trends, and Implications. *Journal of Global Information Technology Management, 21*(4), 233-241. https://doi.org/10.1080/1097198x.2018.1542262

Patton, M. Q. (1990). *Qualitative evaluation and research methods*. SAGE Publications, inc.

Perera, A., Rainsbury, L., & Bandara, S. (2020). Face-to-face delivery this week; online the next: a reflection. *Accounting Research Journal*, *34*(3), 270-278. https://doi.org/ 10.1108/ARJ-09-2020-0294

Petchprasert, A. (2020, July 9). *Student Readiness for Online Learning: A Case Study of COVID-19 Outbreak in Thailand* [Paper presentation]. 12th NPRU National Academic Conference, Nakhon Pathom, Thailand. https://publication.npru.ac.th/jspui/handle/123456789/1172

Picciano, A. G. (2021). Theories and frameworks for online education: Seeking an integrated model. In *A Guide to Administering Distance Learning* (pp. 79-103). Brill. https://doi.org/10.1163/9789004471382_005

PolyMall Uses Blackboard on AWS for Continuous Learning. (2018, December 18). Retrieved from https://aws.amazon.com/blogs/publicsector/polymall-uses-blackboard-on-aws-for-continuous-learning/

Poon, J. (2013). Blended learning: An institutional approach for enhancing students' learning experiences. *Journal of online learning and teaching*, *9*(2), 271-288. http://hdl.handle.net/10536/DRO/DU:30057995

Porras-Hernández, L. H., & Salinas-Amescua, B. (2013). Strengthening TPACK: A broader notion of context and the use of teacher's narratives to reveal knowledge construction. *Journal of Educational Computing Research*, *48*(2), 223-244. https://doi-org/10.2190/EC.48.2.f

Power, M. (2008). The emergence of a blended online learning environment. *MERLOT Journal of online Learning and Teaching*, *4*(4), 503-514. Retrieved from https://jolt.merlot.org/vol4no4/power_1208.pdf

Pratt, D.D. and Associates. (1998). *Five Perspectives on Teaching in Adult and Higher Education*. Malabar, FL: Krieger Publishing. https://www.academia.edu/317235/Five_Perspectives_on_Teaching

PricewaterhouseCoopers (2020). COVID-19 Recovery and Transformation. Impact on Higher Education Sector. https://www.pwc.com/sg/en/publications/a-resilient-tomorrow-covid-19-response-and-transformation/higher-education.html

Punch, K. (2014). *Introduction to social research: Quantitative and qualitative approaches*. London: SAGE Publications.

Qing, A. (2020, 22 September). More than 80% of S'pore teachers say COVID-19 pandemic has hurt their mental health: Survey. *The Straits Times Online*. https://www.straitstimes.com/singapore/parenting-education/more-than-80-of-teachers-say-the-pandemic-has-hurt-their-mental-health

Quality Learning & Teaching (2021). Quality Learning and Teaching (QLT) Framework. https://www.csun.edu/it/qlt

Quality Matters Program. (2021). Quality matters higher education rubric (6th ed.) https://www.qualitymatters.org/qa-resources/rubric-standards/higher-ed-rubric

Rajhans, V., Memon, U., Patil, V., & Goyal, A. (2020). Impact of COVID-19 on academic activities and way forward in Indian Optometry. *Journal of Optometry*, *13*(4), 216-226. https://doi.org/10.1016/j.optom.2020.06.002

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, *2*(3), 923-945. https://doi-org/10.1007/s42438-020-00155-y

Rapley, T. (2004). Interviews. In Seale, C., Gobo, G., Gubrium, J. F., & Silverman, D. *Qualitative Research Practice* (pp. 16-34). London: SAGE Publications Ltd. http://doi.org/10.4135/9781848608191

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education*, *144*, 103701. https://doi.org/10.1016/j.compedu.2019.103701

Reay, J. (2001). Blended learning-a fusion for the future. *Knowledge Management Review*, *4*(3), 6.

Republic Polytechnic, (2020). Industry Collaboration. https://www.rp.edu.sg/industry/work-with-our-students/internships/internship-guidelines

Richardson, J. C., Maeda, Y., Lv, J., & Caskurlu, S. (2017). Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis. *Computers in Human Behavior*, 71, 402–417. https://doi-org/10.1016/j.chb.2017.02.001

Richter, S., & Idleman, L. (2017). Online teaching efficacy: A product of professional development and ongoing support. *International Journal of Nursing Education Scholarship*, 2017, 1–8. https://doi.org/10.1515/ijnes-2016-0033

Rohman, M., Marji, D. A. S., Sugandi, R. M., & Nurhadi, D. (2020). Online learning in higher education during COVID-19 pandemic: students' perceptions. *Journal of Talent Development and Excellence*, *12*(2s), 3644-3651.

Rosenberg, J. M., & Koehler, M. J. (2015). Context and technological pedagogical content knowledge (TPACK): A systematic review. *Journal of Research on Technology in Education*, *47*(3), 186-210. https://doi.org/ 10.1080/15391523.2015.1052663

Rourke, L., & Kanuka, H. (2009). Learning in communities of inquiry: A review of the literature (Winner 2009 Best Research Article Award). *International Journal of E-Learning & Distance Education/Revue internationale du e-learning et la formation à distance*, *23*(1), 19-48. Retrieved from http://www.ijede.ca/index.php/jde/article/view/474

Rubin, H. J. & Rubin, I. S. (2005). *Qualitative interviewing* (2nd ed.): The art of hearing data (pp. 1-18). Thousand Oaks, CA: Sage Publications Ltd. https://doi.org/10.4135/9781452226651

Runeson, P., Host, M., Rainer, A., & Regnell, B. (2012). *Case study research in software engineering: Guidelines and examples*. Wiley.

Ruth, S. (2018). Faculty Opposition to Online Learning: Challenges and Opportunities. *International Journal of Technology in Teaching and Learning*, *14*(1), 12-23. (EJ1211994). ERIC. https://eric.ed.gov/?id=EJ1211994

Sabzalieva, E., Chacon, E., & Liu, B. L. (2021). Thinking higher and beyond: perspectives on the futures of higher education to 2050. http://hdl.voced.edu.au/10707/577502

Saghafi, M. R., Franz, J. and Crowther, Ph. (2014). A Holistic Model for Blended Learning. *Journal of Interactive Learning Research, 25*(4), pp. 531-549. http://www.learntechlib.org/p/39678/

Saldana, J. (2011). *Fundamentals of qualitative research*. New York: Oxford. Retrieved from https://ebookcentral-proquest-com.ezproxy.library.uwa.edu.au

Sailsman, S. (2020). ESL STUDENTS LEARNING ONLINE A review of literature. *Quarterly Review of Distance Education, 21*(1), 45-52. https://www-proquest-com/scholarly-journals/esl-students-learning-online-review-literature/docview/2457326354/

Sankey. M (2021). 'Returning to lectures in 2021: An ACODE Whitepaper'. *Australasian Council on Open Distance and eLearning* (ACODE). Canberra. Australia. (28 January). https://www.acode.edu.au/mod/resource/view.php?id=4469

Sankey, M. D., & Hunt, L. (2013). Using technology to enable flipped classrooms whilst sustaining sound pedagogy. In *ASCILITE-Australian Society for Computers in Learning in Tertiary Education Annual Conference* (pp. 785-795). Australasian Society for Computers in Learning in Tertiary Education. https://www.learntechlib.org/p/171212/

SAP (2020, 20 June). What is the future for universities? *GovInsider*. https://govinsider.asia/smart-gov/what-is-the-future-for-universities/

Schwartz-Shea, P., & Yanow, D. (2012). *Interpretative Research Design. Concepts and Processes*. New York: Routledge. http://doi.org/10.1002/9781118836477.ch3

Scott, K. M. (2016). Change in university teachers' elearning beliefs and practices: A longitudinal study. *Studies in Higher Education*, *41*(3), 582–598. https://doi.org/10.1080/03075079.2014.942276

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning

environments. *Computers & education*, *55*(4), 1721-1731. https://doi.org/10.1016/j.compedu.2010.07.017

Shim, T. E., & Lee, S. Y. (2020). College students' experience of emergency remote teaching due to COVID-19. *Children and youth services review*, *119*, 105578. https://doi.org/10.1016/j.childyouth.2020.105578

Shinde, J. (2020) Faculty Experiences of Delivering Blended Learning Courses. In: Mishra, S., & Panda, S. (Eds.), *Technology-Enabled Learning: Policy, Pedagogy and Practice. Perspectives on Open and Distance Learning*. Vancouver, Canada: Commonwealth of Learning, pp. 143–164. http://hdl.handle.net/11599/3655

Shulman, L. S. (2005). Signature pedagogies in the professions. *Daedalus*, *134*(3), 52-59. https://www.jstor.org/stable/20027998

Sia, J. K. M., & Adamu, A. A. (2020). Facing the unknown: pandemic and higher education in Malaysia. *Asian Education and Development Studies*. https://doi.org/10.1108/AEDS-05-2020-0114

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review*, *46*(5), 30. (EJ950794). ERIC. https://eric.ed.gov/?id=EJ950794

Singapore Government Press Release (2003, March 26). Closure of Schools: Joint Press Release by MOE and MOH. Retrieved from http://www.nas.gov.sg/archivesonline/speeches/view-html?filename=2003032606.htm

Singapore ranks 32 out of 40 for work-life balance, second most overworked city. (2019, August 7). *Channel News Asia*. https://www.channelnewsasia.com/singapore/singapore-bottom-ranks-work-life-balance-second-most-overworked-863786

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *American Journal of Distance Education*, *33*(4), 289–306. https://doi-org/10.1080/08923647.2019.1663082

Singh, H. (2003). Building effective blended learning programs. *Educational Technology, 43*(6), 51-54. (EJ679022). ERIC. https://eric.ed.gov/?id=EJ679022

Skills Future SG (2020, November 13). About Skills Future Singapore. https://www.ssg-wsg.gov.sg/about.html

Skrypnyk, O., Joksimović, S., Kovanović, V., Dawson, S., Gašević, D., & Siemens, G. (2015). The history and state of blended learning. *Preparing for the digital university: a review of the history and current state of distance, blended, and online learning*, 55-92. Retrieved from https://www.researchgate.net/profile/Vitomir-Kovanovic/publication/313751703_The_history_and_state_of_blended_learning/links/58a4b57ba6fdcc0e075e7d4e/The-history-and-state-of-blended-learning.pdf

Smart Nation (2021). Transforming Singapore Through Technology. https://www.smartnation.gov.sg/about-smart-nation/transforming-singapore

Smith, G. G., Torres-Ayala, A. T., & Heindel, A. J. (2008). Disciplinary differences in e-learning instructional design. *Journal of Distance Education, 22*(3), 63–88 (EJ812564). ERIC. https://files.eric.ed.gov/fulltext/EJ812564.pdf

Stake, R. E. (1995). *The art of case study research.* Sage.

Stein, J., & Graham, C. R. (2014). *Essentials for blended learning: A standards-based guide*. Routledge. https://doi-org/10.4324/9780203075258

Stosich, E. L. (2020). Central office leadership for instructional improvement: Developing collaborative leadership among principals and instructional leadership team members. *Teachers College Record*, *122*(9), 1-42. https://doi-org/10.1177/016146812012200908

Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research*, *15*, 157-190. https://doi.org/10.28945/3502

Sun, L., Tang, Y., & Zuo, W. (2020). Coronavirus pushes education online. *Nature Materials, 19*(6), 687-687. https://doi.org/10.1038/s41563-020-0678-8

Swan, K., Matthews, D., Bogle, L., Boles, E., & Day, S. (2012). Linking online course design and implementation to learning outcomes: A design experiment. *The Internet and Higher Education*, *15*(2), 81-88. https://doi.org/10.1016/j.iheduc.2011.07.002

Tabachnick, B. Robert. & Zeichner, Kenneth M. (1985). *The development of teacher perspectives final report*. [Madison, Wis.] : Wisconsin Center for Education Research, School of Education, University of Wisconsin-Madison.(ED266099). ERIC. https://eric.ed.gov/?id=ED266099

Tan, A. (2020). Zoom is your new classroom: will online education become the norm after COVID-19?. https://vulcanpost.com/701216/university-online-education-COVID-19-singapore/

Tan, S. C., Divaharan, S., Tan, L., & Cheah, H. M. (2011). *Self-directed learning with ICT: Theory, practice and assessment*. Ministry of Education, Singapore.

Tan, S.C. & Wangyal, T. (2021, March, 23). Here's how technology can transform learning and education. *Today Online*. https://www.todayonline.com/commentary/heres-how-technology-can-transform-learning-and-education?cid=h3_referral_inarticlelinks_03092019_todayonline

Tang, Y., & Hew, K. F. (2019). Examining the utility and usability of mobile instant messaging in a graduate-level course: A usefulness theoretical perspective. *Australasian Journal of Educational Technology*, *35*(4). https://doi.org/10.14742/ajet.4571

Tay, L. Y., Lee, S.-S., & Kalaivani Ramachandran. (2021). Implementation of online home-based learning and students' engagement during the COVID-19 pandemic: A case study of Singapore mathematics teachers. *The Asia-Pacific Education Researcher*, 30, 299-310. https://doi.org/10.1007/s40299-021-00572-y

Teng, A. (2021, 19 January). S'pore Poly ramps up industry training for students. *The Straits Times Online*. https://www.straitstimes.com/singapore/parenting-education/spore-poly-ramps-up-industry-training-for-students

Teng, A. (2020, May 5). About 96% of students took part in home-based learning. *The Straits Times Online.* https://www.straitstimes.com/politics/about-96-of-students-took-part-in-home-based-learning

Teo, C.L., & Tan, S.C. (2021, July 6). Why AI can better help students as a learning buddy and not as a teacher. *Today Online*. https://www.todayonline.com/commentary/why-ai-can-better-help-students-as-learning-buddy-not-teacher

Thompson, K., Jowallah, R., & Cavanagh, T. B. (2019). "Solve the Big Problems": Leading Through Strategic Innovation in Blended Teaching and Learning. In Y. Qian, & G. Huang (Ed.), *Technology Leadership for Innovation in Higher Education* (pp. 26-48). IGI Global. http://doi:10.4018/978-1-5225-7769-0.ch002

Times Higher Education. (2021, January 7). *More universities planning to drop lectures after pandemic*. https://www.timeshighereducation.com/news/more-universities-planning-drop-lectures-after-pandemic

Tiwari, P.R. (2021, May 31). Blended Learning: A new normal for 21st century learners. *Hindustan Times Online*. https://www.hindustantimes.com/education/news/blended-learning-a-new-normal-for-21st-century-learners-101622464626789.html

Tomita, K. (2018). Does the Visual Appeal of Instructional Media Affect Learners' Motivation Toward Learning?. *TechTrends*, *62*(1), 103-112. https://doi-org/10.1007/s11528-017-0213-1

Torrisi-Steele, G., & Davis, G. (2000). " A website for my subject": The experiences of some academics' engagement with educational designers in a team based approach to developing online learning

materials. *Australasian Journal of Educational Technology*, *16*(3). https://doi.org/10.14742/ajet.1841

Torrisi-Steele, G., & Drew, S. (2013). The literature landscape of blended learning in higher education: The need for better understanding of academic blended practice. *The International Journal for Academic Development*, *18*(4), 371-383. https://doi.org/10.1080/1360144X.2013.786720

Trigwell, K., Prosser, M., & Waterhouse, F. (1999). Relations between teachers' approaches to teaching and students' approaches to learning. *Higher education, 37*(1), 57-70. https://doi-org /10.1023/A:1003548313194

Trowler, P. (2011). Researching your own institution: Higher education. http://www.bera.ac.uk/files/2011/06/researching_your_own_institution_higher_education.pdf

Trust, T., & Whalen, J. (2021). Emergency remote teaching with technology during the COVID-19 pandemic: using the whole teacher lens to examine educator's experiences and insights. *Educational Media International*, 1-16. https://doi-org /10.1080/09523987.2021.1930479

Tsai, C. C., & Chai, C. S. (2012). The" third"-order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology*, *28*(6). https://doi.org/10.14742/ajet.810

Tseng, J. J., Cheng, Y. S., & Yeh, H. N. (2019). How pre-service English teachers enact TPACK in the context of web-conferencing teaching: A design thinking approach. *Computers & Education*, *128*, 171-182. http://dx.doi.org/10.1016/j.compedu.2018.09.022

United Nations Educational, Scientific and Cultural Organization. (2020). *COVID-19 Educational disruption and response*. https://en.unesco.org/covid19/educationresponse

Vaill, A. L., & Testori, P. A. (2012). Orientation, mentoring and ongoing support: A three-tiered approach to online faculty development. *Journal of Asynchronous Learning Networks*, *16*(2), 111–119. (EJ971048). ERIC. https://eric.ed.gov/?id=EJ971048

Valsaraj, B. P., More, B., Biju, S., Payini, V., & Pallath, V. (2021). Faculty experiences on emergency remote teaching during COVID-19: a multicentre qualitative analysis. *Interactive Technology and Smart Education*. https://doi-org/10.1108/ITSE-09-2020-0198.

van der Spoel, I., Noroozi, O., Schuurink, E., & van Ginkel, S. (2020). Teachers' online teaching expectations and experiences during the Covid19-pandemic in the Netherlands. *European journal of teacher education*, *43*(4), 623-638. https://doi-org/10.1080/02619768.2020.1821185

Van Laer, S., & Elen, J. (2020). Adults' self-regulatory behaviour profiles in blended learning environments and their implications for design. *Technology, Knowledge and Learning*, *25*(3), 509-539. https://doi-org/10.1007/s10758-017-9351-y

Van Leeuwen, A. (2019). Teachers' perceptions of the usability of learning analytics reports in a flipped university course: When and how does information become actionable knowledge?. *Educational Technology Research and Development*, *67*(5), 1043-1064. https://doi-org/10.1007/s11423-018-09639-y

Vaughan, N. (2007). Perspectives on Blended Learning in Higher Education. *International Journal on E-Learning, 6*(1), 81-94. Waynesville, NC USA: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/6310/

Vaughan, N. D. (2010). A blended community of inquiry approach: Linking student engagement and course redesign. *The Internet and Higher Education*, *13*(1-2), 60-65. https://doi.org/10.1016/j.iheduc.2009.10.007

Verpoorten, D., Huart, J., Detroz, P., & Jérôme, F. (2020). Blended Learning in Higher Education: Faculty Perspective through the Lens of the Planned Behaviour Theory. In (Ed.), E-Learning and Digital

Education in the Twenty-First Century [Working Title]. IntechOpen. https://doi.org/10.5772/intechopen.95375

Viberg, O., Hatakka, M., Bälter, O., & Mavroudi, A. (2018). The current landscape of learning analytics in higher education. *Computers in Human Behavior*, *89,* 98-110. https://doi.org/10.1016/j.chb.2018.07.027

Viswanathan, G. (2014, December 10-11). *Designing and Facilitating a Constructivist Online Module: Reflections and Lessons Learnt*. [Paper presentation]. *7th International Conference on Teaching and Learning in Higher Education* (TLHE), Singapore. Retrieved from https://nus.edu.sg/cdtl/docs/default-source/engagement-docs/conferences/past-conferences/pdf_tlhe2014_programme.pdf?sfvrsn=7ebf3102_2

Viswanathan, G., & O'Neill, M. (2021). The role of the lecture in post pandemic institutions of higher learning: Possibilities and implications from a Singapore case study. In Gregory, S., Warburton, S., & Schier, M. (Eds.), Back to the Future – ASCILITE '21. Proceedings ASCILITE 2021 in Armidale (pp. 267277). https://doi.org/10.14742/ascilite2021.0139

Vlachopoulos, D. (2020). COVID-19: Threat or opportunity for online education? *Higher Learning Research Communication*, 10(1), 16–19. 10.18870/hlrc.vhttps://doi.org/10i1.1179

Voogt, J., Laferriere, T., Breuleux, A., Itow, R. C., Hickey, D. T., & McKenney, S. (2015). Collaborative design as a form of professional development. *Instructional science*, *43*(2), 259-282. https://doi-org/10.1007/s11251-014-9340-7

Wang, L. (2021). Foreword. In Lim, C. P., & Graham, C. R. (Eds.), *Blended Learning for Inclusive and Quality Higher Education in Asia* (pp. V-VIII). Springer Nature. https://doi.org/10.1007/978-981-33-4106-7

Wang, Y, & Han, X. (2017). Institutional roles in blended learning implementation: A case study of vocational education in China. *International Journal of Technology in Teaching and Learning*, *13*(1), 16-32. (EJ1211997). ERIC. https://eric.ed.gov/?id=EJ1211997

Wang, Y., Han, X., & Yang, J. (2015). Revisiting the Blended Learning Literature: Using a Complex Adaptive Systems Framework. *Educational Technology & Society*, *18* (2), 380–393. https://www.jstor.org/stable/10.2307/jeductechsoci.18.2.380

Wargadinata, W., Maimunah, I., Eva, D., & Rofiq, Z. (2020). Student's responses on learning in the early COVID-19 pandemic. *Tadris: Journal of Education and Teacher Training*, *5*(1), 141-153. https://doi.org/10.24042/tadris.v5i1.6153

WeareSocial (2020). Digital 2021 Singapore. https://wearesocial.com/sg/blog/2021/01/digital-2021-singapore/

Weijers, R. J., de Koning, B. B., & Paas, F. (2021). Nudging in education: From theory towards guidelines for successful implementation. *European Journal of Psychology of Education*, *36*(3), 883-902. https://doi-org/10.1007/s10212-020-00495-0

Westbroek, H., De Vries, B., Walraven, A., Handelzalts, A., & McKenney, S. (2019). Teachers as co-designers: Scientific and colloquial evidence on teacher professional development and curriculum innovation. In *Collaborative curriculum design for sustainable innovation and teacher learning* (pp. 35-54). Springer, Cham. https://doi.org/10.1007/978-3-030-20062-6

Wiley Education Services. (2020, April 13). 2025: A Look Into the Future of Higher Education [Infographic]. https://edservices.wiley.com/wp-content/uploads/2018/03/WES_2025-Future-State-of-Higher-Ed-Infographic_FINAL.pdf

Wingo, N. P., Ivankova, N. V., & Moss, J. A. (2017) Faculty perceptions about teaching online: exploring the literature using the technology acceptance model as an organizing framework. *Online Learning, 21*(1), 15-35. https://doi.org/10.10.24059/olj.v21i1.761

Woods, P. (1992). Symbolic Interactionism: Theory and Method. In J.P. Goetz (Ed.) *The Handbook of Qualitative Research in Education.* London: Sage. (Original work published 1983)

World Health Organization. (2020). *Coronavirus disease (COVID-19) Pandemic*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Xu, B., Chen, N.-S., & Chen, G. (2020). Effects of teacher role on student engagement in WeChat-based online discussion learning. *Computers & Education*. *157*, 103956. https://doi.org/10.1016/j.compedu.2020.103956

Xue, S., & Churchill, D. (2019). A review of empirical studies of affordances and development of a framework for educational adoption of mobile social media. *Educational Technology Research and Development*, *67*(5), 1231-1257. https://doi-org/10.1007/s11423-019-09679-y

Yang, C. (2015, July 13). Universities adopting 'flipped classroom' learning. *The Straits Times Online.* https://www.straitstimes.com/opinion/universities-adopting-flipped-classroom-learning

Yang, D. F., Catterall, J., & Davis, J. (2013). Supporting new students from vocational education and training: Finding a reusable solution to address recurring learning difficulties in e-learning. *Australasian Journal of Educational Technology*, *29*(5). https://doi.org/10.14742/ajet.196

Yang, J. C., Quadir, B., Chen, N. S., & Miao, Q. (2016). Effects of online presence on learning performance in a blog-based online course. *The Internet and Higher Education*, *30*, 11-20. https://doi.org/10.1016/j.iheduc.2016.04.002

Yen, S. C., Lo, Y., Lee, A., & Enriquez, J. (2018). Learning online, offline, and in-between: comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities. *Education and Information Technologies*, *23*(5), 2141-2153. https://doi-org /10.1007/s10639-018-9707-5

Yip, W.Y. (2018, May 17). Technology will never replace teachers: Ong Ye Kung. *The Straits Times Online.* https://www.straitstimes.com/tech/technology-will-never-replace-teachers-ong-ye-kung

Yong, M. (2020, April 18). Timeline: How the COVID-19 outbreak has evolved in Singapore so far. *Channel News Asia*. https://www.channelnewsasia.com/singapore/singapore-covid-19-outbreak-evolved-coronavirus-deaths-timeline-764126

Young, J. (2021). Coursera Is Now a Public Company. What Does That Mean for Higher Education? *EdSurge*. https://www.edsurge.com/news/2021-03-31-coursera-is-now-a-public-company-what-does-that-mean-for-higher-education

Zhao, Y. (2020). COVID-19 as a catalyst for educational change. *Prospects*. https://doi.org/10.1007/s11125-020-09477-y

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal, 40*(4), 807-840. https://doi-org /10.3102/00028312040004807

Zhao, Y., & Watterston, J. (2021). The changes we need: Education post-COVID-19. *Journal of Educational Change*, *22*(1), 3-12. https://doi-org/10.1007/s10833-021-09417-3

Zhu, C. (2017). University student satisfaction and perceived effectiveness of a blended learning course. *International Journal of Learning Technology, 12*(1), 66-83. https://doi-org /10.1504/IJLT.2017.083996

Zhu, X., & Liu, J. (2020). Education in and after Covid-19: Immediate responses and long-term visions. *Postdigital Science and Education*, *2*(3), 695-699. https://doi-org/10.1007/s42438-020-00126-3

Zimmerman, J. (2020, 10 March). Coronavirus and the Great Online Learning Experiment. *The Higher Education Chronical*. https://www.chronicle.com/article/coronavirus-and-the-great-online-learning-experiment/

APPENDICES

Appendix A: Interview Guide

Background Questions:
Domain/Course/Level
How long have you been teaching?
How long have you been teaching online? OLi?
What platform/tools have you used to design and teach online?
How would you describe your OLi class structure?
- Fully online (80–100% is offered online)
- Blended (less than 50% is offered online)

How would you describe the approach to your OL segments?
- 100% Asynchronous
- Mostly Asynchronous with some Synchronous
- Mostly Synchronous with some Asynchronous
- Blend of both Asynchronous and Synchronous

Guiding Questions	*Possible SSI Questions, Probing Questions*	*Interview Notes*
i. What are the aims or intentions of the lecturers with regard to designing and delivering online learning? What reasons do they give for these intentions?	What were your intentions when designing this online learning experience? If that was your intention, can you talk me through how you actualized it through the design? Could you elaborate on ……? How have your intentions evolved over the semesters?	
ii. What strategies do the lecturers say they adopt to achieve their aims? What reasons do they give for utilising those strategies?	What did you build into your online course to meet these intentions? What strategies do you use to achieve (intentions)? Could you describe/show your process for designing and developing (this) OL session? Could you elaborate on why you chose to use this approach? Do you use different approaches for different experiences? Could you elaborate? (If lecturer has developed OL for more than 1 module)	

	What challenges did you face when designing for OLi? OR What factors do you consider when delivering OL? What challenges do you face when delivering OL? Could you elaborate? Which aspect of the session? How have you adjusted your strategies over the semesters?	
iii. What significance do the lecturers attach to the aims and strategies adopted? What reasons can they give for this?	Why were these strategies important to you? Why were these (intentions) important to you? Why is this important?	
iv. What outcomes do lecturers expect from pursuing their aims and strategies? What reasons can they give for this?	Did you manage to achieve the aims you had planned for OL? Could you elaborate on why or why not? Overall, which elements in the OL experience were highly satisfying to you? Which elements were disappointing? Could you elaborate? Have you thought about what changes you would make in the coming semester? Could you share reasons for the changes? What would make OL more successful for you? For your students?	

Appendix B: Participant Details

Participant Number	Domain (Mapped to SkillsFuture)	Selected/ Choice/School OLi Committee Member (Early Adopter = Pre OLi)	Years of Teaching (at institution)	Year of OL initiative	Pre-Covid OL Percentage (30% is CET course requirements)
1	ICT	Choice	38	2017	25%+
2	Healthcare	Selected	12	2017	80-100%
3	Design/Media	OLi Comm	11	2016	30%
4	Bioinformatics	Selected (Early Adopter)	9	2015 2013 (Choice)	80-100%
5A	Electrical/Real Estate	OLi Comm	20	2017	30%
5B	Financial Services	OLi Comm		2015	25%
6	Critical Core Skills	Choice	13	2017	80-100%
7	Critical Core Skills	OLi Comm (Early Adopter)	10	2015 2013 (Choice)	80-100%
8	Electronics	Selected	7	2016	25%
9	Retail	Choice	10	2017	25%
10	Energy and Chemicals/ Environmental Management	Choice (Early Adopter)	20	2016 2013 (Choice)	25-30%
11	Electronics	Choice (Early Adopter)	9	2017 (OL) 2014 (Choice)	25-30%
12A	Financial Services	Selected	12	2017	25%
12B	Financial Services	Selected		2018	100%

13	Critical Core Skills	Choice	3.5	2017	80-100%
14	Financial Services	Selected	13	2015	25%
15	Electronics	OLi Comm	9	2015	25%
16	Electronics/Engineering Services	OLi Comm	14	2016	25%
17	Early Childhood Education	Selected	4	2017	35%
18A	Built Environment	Selected	11	2015	80-100%
18B	Engineering Services	Selected		2017	30%
19	ICT	OLi Comm	12	2016	30%
20	Design/Media	OLi Comm (Early Adopter)	21	2016 2010 (Choice)	80-100%
21	Built Environment	Selected	35	2017	25%
22	Healthcare	Selected	9	2018	30%
23A	Financial Services	Selected	9	2016	30%
23B	Financial Services	Selected		2017	30%

Appendix C: Sample Invitation Email

Dear XXX,

Hope this finds you well and you've made it through this semester without major hiccups.

I am conducting a study to learn about the perspectives of experienced OLi lecturers like yourself. The aim is to interpret and synthesize these experiences and make it available to new/less experienced OLi lecturers in the poly sector. I hope this will help to shape future institutional practices as well as shed light on how lecturers transition into new learning spaces online. This study is part of my Educational Doctorate. This is a self-sponsored study with approval.

As one of the pioneer OLi lecturers there would be a lot of valuable insights you could share especially for the XXX domains

I am writing to seek your help to participate in this study. It will involve **an online interview for approximately one hour (a F2F interview of one hour)**. No preparation required. During the interview it would be helpful if you could show me aspects of your online design to demonstrate. All individual identifying data will be anonymized.

If you are agreeable to participate, please let me know any date and time that works best for in the coming weeks for a virtual meeting (F2F meeting at XXX or a venue of your choice).

I have attached an Introduction to Study document for your perusal.

Looking forward to a positive response.

Best Regards,

Appendix D: Introduction Letter to Participant

THE UNIVERSITY OF WESTERN AUSTRALIA

Dr Marnie O'Neill
Senior Honorary Research Fellow
Graduate School of Education

DD/MM/YY

Dear ,

You are invited to participate in the following research project: Polytechnic Lecturers and the Design of Online Learning in Singapore: An Interpretivist Study.

This research project is being conducted by Ms Ganthimathi Viswanathan under my supervision as a senior honorary research fellow at the University of Western Australia and will contribute to her thesis for the Doctorate of Education at University of Western Australia.

The aim of this study is to generate local theory regarding polytechnic lecturers' perspectives on designing online learning in Singapore. It is anticipated that the outcomes of the study will have individual benefits for participants in reflecting on their practices and considering those factors which provide opportunities to enhance, or conversely limit their professional practices. Furthermore, the outcomes of the study should have positive benefits for policy professional development and practice within the institution, and perhaps more widely, to other institutions in Singapore and beyond.

As one of the most experienced staff members in design and delivery of on-line learning, you are invited to participate in the study. The data collection phase will consist of face-to-face interviews of approximately one hour conducted by Ms Viswanathan at a mutually convenient time and place. To facilitate better understanding of practices and the rationale for design decisions, we request that you access live or archived online courses to illuminate your discussion. With your permission the interview will be recorded, to ensure accurate representation of your contribution. A transcript or summary of your interview will be provided as soon as possible after the interview for you to check and amend if necessary.

The study is designed as a single site collective case study of the perspectives of multiple lecturers from different schools (domains) at this institution. Participation is invited from lecturers within the institution who have experiences of designing online learning for at least six semesters. Because of the design and the parameters for identifying potential participants, it is probable that you will know some of the participants personally. This means that it is not possible to guarantee **anonymity** within your institution, although neither you nor the institution will be identifiable in any subsequent publications, including the thesis.

Confidentiality: Your answers will be confidential. This means that recorded interviews will be destroyed after the interview has been transcribed and verified. Research records (including transcripts) will be de-identified (assigned a code number) and stored securely in a password protected file. All information provided is treated as confidential and will not be released by the researcher to a third party unless required to do so by law. All data will be destroyed after seven years.

It is important for the credibility and trustworthiness of this study, that participants' contributions represent their own opinions, and are not influenced by others. For this reason, we also request that you do not discuss your interview with colleagues until after all interviews have been completed, which may take several months. The confidentiality undertaking ensures that any disclosure, however limited must be your decision.

The University of Western Australia
M000, Perth WA 6009 Australia

T +61 8 6488 2388
M +61 0419988845

E Marnie.O'Neill@uwa.edu.au
CRICOS Provider Code 00126G

Taking part in this research is completely voluntary. You may skip any questions that you do not want to answer and you have the right to withdraw at any time without a need to explain why and without prejudice. If you do wish to withdraw, the information you have supplied will also be withdrawn unless you give permission for Ms Viswanathan to retain it. However, if you make the decision to withdraw late in the research process, it may not be possible to withdraw your data if it cannot be identified or extracted from the wider body of research data/information that has been collected. There is no foreseeable risk for participants in this research.

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time.

In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics Office at the University of Western Australia on +61 8 6488 3703 or by emailing to humanethics@uwa.edu.au

All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.

If you have any questions you may use the following contact details:

Ms Ganthimathi Viswanathan
Graduate School of Education
University of Western Australia
Phone: +65 64606919
Email: ganthi_viswanathan@np.edu.sg

Dr Marnie O'Neill
Senior Honorary Research Fellow
University of Western Australia
Phone: +61 0419 988 845
Email: marnie.oneill@uwa.edu.au

Yours sincerely,

[redacted]

Dr Marnie O'Neill

Senior Honorary Research Fellow

Graduate School of Education

Appendix E: Participant Consent Form

THE UNIVERSITY OF WESTERN AUSTRALIA

Dr Marnie O'Neill
Senior Honorary Research Fellow
Graduate School of Education

10 July 2019

Participant Consent Form

Re: Polytechnic Lecturers and the Design of Online Learning in Singapore: An Interpretivist Study.

I , _____ (name) have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this study, realising that I may withdraw it at any time without reason and without prejudice.

I understand that all identifiable (attributable) information provided for this study is treated as strictly confidential and will not be released by the investigator in any form that may identify this institution or participants. The only exception to this principle of confidentiality is if documents are required by law.

I have been advised as to what data is being collected, the purpose for collecting the data, and what will be done with the data upon completion of the research.

I agree that research data gathered for the study may be published provided neither the name of this institution nor other identifying information is used.

I agree that my interview may be recorded. Yes ☐

No ☐

_____ _____

(Signature) (Date)

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time.

In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Ethics Office at the University of Western Australia on +61 8 6488 3703 or by emailing to humanethics@uwa.edu.au

All research participants are entitled to retain a copy of any Participant Information Form and/or Participant Consent Form relating to this research project.

The University of Western Australia
M000, Perth WA 6009 Australia

T +61 8 6488 2388
M +61 0419988845

E Marnie.O'Neill@uwa.edu.au
CRICOS Provider Code 00126Q

Appendix F: Samples of OLi Learning Activities (Adapted from Laurillard, 2012, p111)

Learning Activity Type	**Acquisition**	**Practice**	**Inquiry**	**Production**	**Collaboration**	**Discussion**
F2F Format	Lectures	Tutorials/Practicals/ Labs	Tutorials/Practicals/Labs (F2F/asynchronous homework - assessment tasks e.g. Problems, Lab based learning)	Tutorials/Practicals/Labs (F2F/asynchronous homework - assessment tasks e.g. Projects, presentations)	Tutorials/Practicals/Labs and (F2F/asynchronous - group assessment tasks)	Lectures/Tutorials
OL Initiative (25%-100%)	Asynchronous (and F2F) (Most frequent OL activities)		Mainly F2F (25% OL). Asynchronous for 100% OL courses	F2F + asynchronous for projects. Asynchronous for 100% OL courses	Mainly F2F (25%). Asynchronous (100%)	Preference for F2F (25%) Asynchronous for 100% OL courses. Synchronous back channels
ERT Period	Asynchronous and Synchronous (fully or partially flipped)	Asynchronous and Synchronous (for some tactile experiences - delayed till post ERT)	Synchronous, Asynchronous	Asynchronous (+offline) and Synchronous	Synchronous and Asynchronous	Synchronous and Asynchronous. Synchronous back channels
Types of Activities	Listening, Watching, Reading CF: TCC	Quizzes/test, role play, immersive environments with automated feedback CF: TMC	Research, explore OL resources to complete tutorial questions/ problems and submit summaries/responses/ reflections for teacher's review and feedback CF: TCC	Demonstrate learning through presentations (visual, audio, video, text), reports, artefacts CF: TCC, PCC	Discussing, brainstorming - group based activity CF: PMC, PCC	Discussing, communicating, debating, presenting, articulating, writing CF: PCC

Purpose	Students acquire factual, procedural, and conceptual knowledge (to an extent) Exceptions: • student created content (as part of production activity) • Student identified content (as part of inquiry activity)	Experiment, practice with immediate feedback, interact with simulated adaptive environments, to facilitate internal reflection and consolidation of feedback to repeat practice	Explore and investigate tasks/resources independently (mostly teacher identified tasks, assessment tasks include student choice)	Articulate, visualise, demonstrate learning through creating artefacts for evaluation	Problem solving, brainstorming, collaborative production type activities with discussion and feedback.	Students share knowledge, articulate, viewpoints, consider and critique alternate views of peers and teachers Norm: Use of informal back channels for discussion. Not uniform/consistent participation by all.
Form and Tools	Narrative (Teacher controlled): narrated presentations, videos, immersive 360 videos, screencast for how to explainers involving "whiteboard" talk to visualize calculations, processes	Adaptive quizzes with automated feedback, Virtual simulation labs, automated overall summary responses to tutorial problems (LMS, Google Classroom)	Teacher curated/created resources, Tools for sharing ideas and reflections - documents, spreadsheets, screen recordings, photos, visuals submitted via LMS or other shared communication channels for teacher's written/live synchronous individual or group feedback.	Productive: platforms like Google Apps - Microsoft Office 365, videos, visuals, domain specific products (e.g., 3D drawings, animations websites)	Communicative, Productive: including collaborative platforms like Google Apps, Microsoft Office 365	Communicative tools - email discussions, instant messaging discussion groups, discussion forums, web-conferencing tools, synchronous and asynchronous. technology, collaborative document platforms LMS features, Google Classroom features

Examples of Participant OL Practices	"the lesson has to be kept short and sweet... bite size… learning objective spelled out to the students...with teacher presence in videos". P15 "Start with YouTube videos… so that they (students) are able to relate to the real world, that they are not just learning theories". P14 "Short video as playlists to organize chapters and topics (on institution's interactive video platform) allows for easy searching and replayability". P16	"Google Forms quizzes, because … students will have immediate feedback. And we (teachers).. have analytics to have a sensing of how students are performing". P14 P13 uses quizzes with auto marking and auto feedback for concept/skill based content (questions with correct answers) to address large cohort of 600 students "The quiz is just one form of feedback. And it may be a true, it may be false feedback, because we do not know whether the student doing is the actual student or they did in a group, you have no idea, right?". P1	"... search for information…share three points, four points, of what have you found...common shared platform wiki or padlet ... with the class team members, so that they can compare notes, can learn". P3 on short OL research explorations "Use of 360 degree videos to replace field visits during Covid HBL ...gave students control of exploration…because I'm not there to say next, next. without this... They would have depended on me a bit more than themselves." P17 "...ask(ed) them to do a tutorial question... take a picture (calculations) and send to me… I annotate, mark, and send back…I really know whether they understand and it's more personalized… different student may have different problem dealing with the same question. I also consolidate common mistakes for this tutorial	"(students) need to make a two minute elevator pitch, video to explain …key highlights of design project to me". P18 "I found e-options ...opened up a whole bunch of project opportunities as we adapt to the 'new normal'. Students took the activity very seriously and applied themselves to creating interactive sites with images." P10	"Learning from peers is always better than from lecturer. Initially…no participation…. so, I said, compulsory, must do one of these things …. ask a question, answer a friend's question or make a comment about experience." P18 "every week, students show work in progress, collaborate by giving comment on each other projects, provide feedback to each student" P20	"The discussion question includes one to three questions. We encourage discussion in class by asking people to post at least one comment on someone else's post. At the end of the week, ..., I sum up for the class ..I hyperlink to certain postings, which were very insightful for them to check out...discussion questions are contextualized, difficult to plagiarize." P6

	"OL lectures for standardization of content delivery for large cohorts". P13 "… theory components allows me to actually put in more OL, not because that is easy, but it allows me room to do it.. they can pick up the information when they need to, and they can always refer back". P3 I used screen recording app and I recorded exactly how I would do it on the whiteboard. P10		and share. In a F2f class I don't need to do that... it's very easy to share". P16			

BLANK PAGE