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Contextual complexities shaping primary teachers' pedagogical practices with digital technologies: An interpretive phenomenological study in the Maldivian ESL context

A thesis

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by

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Abstract

Literature on digital technology (DT) integration has revealed a range of complexities around DT use for teaching and learning. Previous research suggests that frequent DT use does not necessarily lead to the pedagogically purposeful use of DTs for student learning. However, the literature overlooks the impact the various contextual and subject content factors may have when exploring teachers' technological pedagogical practices. This thesis examines teachers' practices with DTs in relation to the subject content and multilevel context within which teachers' practices are situated. My study's context is that of primary education in Maldivian urban and rural schools, with a specific focus on how teachers use DTs in teaching English as a second language (ESL). I also examine the influence of national, school, classroom, and teacher-level factors at play on the participant primary teacher group. The research questions guiding my study are:

1. What impacts do DT use have on ESL pedagogical practices of primary teachers in two Maldivian schools?
2. What contextual factors affect teaching and learning English with and through DTs in two Maldivian schools, and do they differ across schools?
3. What interplay of factors influence Maldivian primary teachers' DT use in their English lessons?

Adopting an interpretive phenomenological research design meant I could capture the lived experience of nine (four urban and five rural) primary teachers in two Maldivian schools over 8 months. Data collected through lesson observations, postobservation conversations, lesson plans, semistructured interviews, mini surveys and field notes helped in understanding their practices, beliefs, and attitudes about using DTs in ESL lessons. Additionally, other data collected from mini surveys and postobservation conversations with students of the participant teachers, plus interview data and school documents that principals and IT staff provided, helped my understanding of the multilevel contextual factors that influenced teachers' DT use for teaching and learning.

The findings indicate that an important reason for using DTs was as an attention grabber, perhaps as a set induction, video explanations, form-focused instruction (FFI), and exam-format listening. These findings were examined in relation to the SAMR model to ascertain the pedagogical level of DT use teachers usually applied. The findings also point to the national, school, and classroom factors affecting primary teachers' practices with DTs in ESL lessons, and these are addressed fully in the Discussion and Conclusion chapters. At the national level, the two factors that have a potential influence on teachers' DTs use include the development and promulgation of a national educational ICT policy and teacher education, the focus of which needs to move from developing teachers' technological knowledge to pedagogical applications of tools. While technology leadership and DT-based professional learning and development were factors at the school level, access to DTs and technical support were classroom-level factors that significantly influenced participant teachers' decisions around DT use. Apart from these external factors, internal or teacher-level factors such as teachers' knowledge, beliefs, attitudes, and existing pedagogical practices shaped their practices with DTs when teaching English.

This study has contributed to the literature by identifying primary teachers' ESL pedagogical practices with DTs. For one thing, it fills a significant gap in TPACK research which often considers TPACK to be subject-independent. My research, therefore, contributes by showing the connection between technology, pedagogy, and subject-specific content (English language). Another contribution is the use of classroom observation data to capture teachers' DT use, as DT integration literature predominantly uses self-reported data. My research also contributes to a TPACK-in-Context framework (Figure 2.4) adapted from the TPACK framework (Mishra & Koehler, 2006) to provide a contextually situated understanding of primary teachers' DT use in ESL lessons. Additionally, the NVivo-enhanced Spiral QDA process (Figure 3.7) I adapted from Seidel's (1998) qualitative data analysis (QDA) model contributes to understanding the nonlinear, recursive, and iterative nature of the qualitative data analysis process. Finally, my illustration of the complex interplay of factors affecting the pedagogical use of DTs (Figure 5.2) contributes to the understanding of the relationships between TPACK (Mishra & Koehler, 2006), TAM (Davis, 1989), and SAMR (Puentedura, 2012), three dominant models/frameworks in DT literature.

Dedication

To my beloved parents:

my late Mamma, Hawwa Ibrahim (1936–2002)
and
my Bappa, Mohamed Adam

Your support, guidance, and dua have made me the person I am today. May Allah SWT bless you always!

This is for you.

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Alhamdhulillah!

All praise and thanks are due to Almighty Allah, the most gracious and the most merciful, for bestowing courage, wisdom, and knowledge to complete my doctoral journey successfully. I would also like to thank all the individuals without whose help and support this thesis would not have been possible.

First, I would like to express my gratitude to my team of supervisors. My chief supervisor, Dr Noeline Wright, thank you for your thorough feedback, insightful comments, and thought-provoking questions and for playing 'the devil's advocate' to make the arguments in my thesis stronger and clearer. Your vast knowledge, experience, and unique style of guidance were significant in successfully completing my thesis. My supervisor, Dr Dilani Gedera, I thank you for seeing my potential when I applied for my PhD. I appreciate your support, guidance, and faith in me ever since. I also appreciate the opportunities to work with you on research projects which helped me gain confidence and develop as a researcher. My supervisor, Dr Maryam Mariya, thank you for being more than a supervisor to me. I thank you for your encouragement, support, and motivational talks that kept me going during my journey's most difficult times. Finally, my former chief supervisor, Dr Lynn Parmenter, I thank you for accompanying me until I crossed the confirmation milestone. Although our time together may have been short, I learned much from you about research.

Second, my appreciation goes to my participants and their schools. Particularly, I thank the nine primary teachers in the two schools who graciously welcomed me to observe their lessons for 12 weeks and willingly gave up their free time to answer my questions. I am also thankful for the support from the schools' principals, IT staff, students, and parents.

Third, I am grateful to the University of Waikato for awarding me a University of Waikato Doctoral Scholarship, which allowed me to do my doctoral studies at this prestigious institution. This research would not have been possible without the generous assistance from the scholarship.

Fourth, I am thankful to Gillian O'Neill for proofreading my thesis.

Fifth, my heartfelt thanks to my lovely children and my amazing husband. My daughter, Zil, deserves a big thanks for patiently accompanying me through the ups and downs of this journey. You have been my lifeline, taking care of me when I could not, although these have been your most critical preteen to teen years. Your ‘dad jokes’ make me smile even on my gloomiest days. I must agree that I needed your hugs more than you did. I am also thankful to my son, Zaleeshan, for being so patient, caring, and supportive despite being miles apart. You cannot imagine how much your random jokes, entertaining 1-hour talks, and aspirations for a better tomorrow mean to me. I love both of you unconditionally. I am also grateful to my wonderful husband, Ali Saud, for your patience and understanding. Despite the distance and time difference, your love, support, encouragement, and faith in me kept me going even during the most challenging times.

Sixth, I am grateful to my lovely extended family. I am forever indebted to my late *Mamma*, Hawwa Ibrahim and my *Bappa*, Mohamed Adam, for your endless sacrifices and struggles to support my dreams. I also thank my sisters (Zareena, Zunaira, Zaheera, Zameera, Zuhaira, Mariyam), brothers (Shareef, Ali, Musthafa, Mujuthaba), their spouses, and beautiful children for always being my supporting pillars. My niece, Reenee, deserves thanks for helping me illustrate my data analysis framework. Also, a special thanks go to *Thuttha* (Zameera), *Dhontha* (Zuhaira), *Thitthibe* (Ali Naseer), and *Thutthube* (Musthafa) for being second parents to me rather than siblings. Your love, care, and unwavering support enabled me to get through this emotional rollercoaster ride.

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Presentations and Publications from this Thesis

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Mohamed, Z. (2021, November 28–December 2). *Quite a 'well-oiled machine': School context facilitating technology integration in a Maldivian urban school* [Paper presentation]. Australian Association for Research in Education (AARE) 2021 Conference (Hybrid), Adelaide, Australia.

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List of Abbreviations

AV	audio-visual
BYOD	bring your own device
CALL	computer-assisted language learning
CAQDAS	computer-assisted qualitative data analysis software
CoP	community of practice
DT	digital technology
EFL	English as a foreign language
ESL	English as a second language
FFI	form-focused instruction
GCE	General Certificate of Education
GIF	graphic interchange format
ICT	information communications technology
IGCSE	International General Certificate of Secondary Education
ITE	initial teacher education
L1	first language
L2	second language
LMS	learning management system
MALL	mobile-assisted language learning
MoE	Ministry of Education
NCF	national curriculum framework
OBN	observation notes
PCK	pedagogical content knowledge
PD	professional development
PEU	perceived ease of use
PLC	professional learning community
PLD	professional learning and development
PLSD	professional learning, support, and development
PPP	presentation practice production
PPT	PowerPoint
PU	perceived usefulness
QDA	qualitative data analysis
SAMR	substitution, augmentation, modification, and redefinition
SLA	second language acquisition
SMT	senior management team
TAM	technology acceptance model
TELL	technology-enhanced language learning
TESOL	teaching English to speakers of other languages
TK	technological knowledge
TPACK	technological, pedagogical, and content knowledge
VLC	VideoLan client
VoIP	Voice over Internet Protocol

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Chapter 1

Introduction

This introductory chapter begins with a note on my inspiration for undertaking this research project for my doctoral studies. The next section situates my research within its geographical, educational, and technological contexts. The chapter ends with an overview of how I have organised this thesis.

Inspiration for this Project

The first time I saw any form of digital technology (DT) being used in a lesson was during my primary teacher education programme in Male’ in the late ’90s. The classrooms were equipped with overhead projectors, and our lecturers brought plastic projector sheets with texts or images they wanted to show us. It was a revelation that the lecturers did not have to write everything on the board. The opportunity to use the overhead projectors (OHPs) for some of our peer teaching sessions became a fascination. Then again, I thought OHPs were for tertiary teaching but not primary classrooms because I had never seen them used in schools.

After completing my teacher education programme, I began teaching English to primary-aged children. In 2001, I was lucky enough to travel to Japan for a month-long educational trip, where I saw the potential of DTs in transforming life in general and education in particular. From the visits to Japanese schools, I realised the wonders that DTs could do in a classroom. In my trip journal, I noted that the computer room in an elementary school in Tomisato, Chiba Prefecture, had 20 computers and four printers that were used for teaching and learning purposes. A few months later, back at my school on one of the Maldives islands, I was thrilled when a group of computer experts visited our island to conduct a crash course on computer literacy. Of course, I completed the course with flying colours and kept looking for other opportunities! It was such a big deal for me.

In the meantime, my interest in teaching English also grew. This interest led to not only completing a bachelor's degree in teaching English as a foreign language but also teaching English to secondary students. By 2010, I was working as an English lecturer at a college in Male’ and pursuing my master’s in education, centred on the influence of Dhivehi (first language) on written English (second language) of Maldivian secondary students. By this time, I had also made the connection between the two areas I was most passionate about: teaching English and using DTs. As a lecturer, using PowerPoint presentations (PPTs) for content delivery became a routine in my everyday lessons, but I always felt there were many more possibilities.

By 2014, I had become a Smart Learning Research Group (SLRG) member while working as a teacher educator. While part of the SLRG, I realised that DTs were a treasure trove for nonnative English teachers like me who were looking for ways to improve teaching and learning English. The group examined the challenges of using tablets for learning at a high school in the Maldives. This experience led me to reflect on my life as a primary teacher and the impact DTs might have on teaching and learning English in primary classrooms. While still thinking about my own development, I started to ponder how teachers learn to use DTs pedagogically and their sources of advice and help. I also wondered how they decided what worked in classrooms to support learning and what classrooms were like when teachers used DTs to teach English. I also wanted to know the extent to which teachers' practices changed when they regularly incorporated DTs into their practices, what tools were most common, and why. With these wonderings came the burning desire to know more about the use of DTs for teaching and learning English in primary classes, and, therefore, I embarked on this PhD research journey.

The rest of this introductory chapter offers a few details about the context of my research: the geography and political structure of the Maldives and its education system. This includes initial teacher education (ITE) and professional development (PD). I also discuss the dominance of English as the most frequently used language after Dhivehi, the official and national language, followed by nationwide attempts at DT integration in education. This chapter ends with the definition of key terms and an overview of my thesis.

Research Context

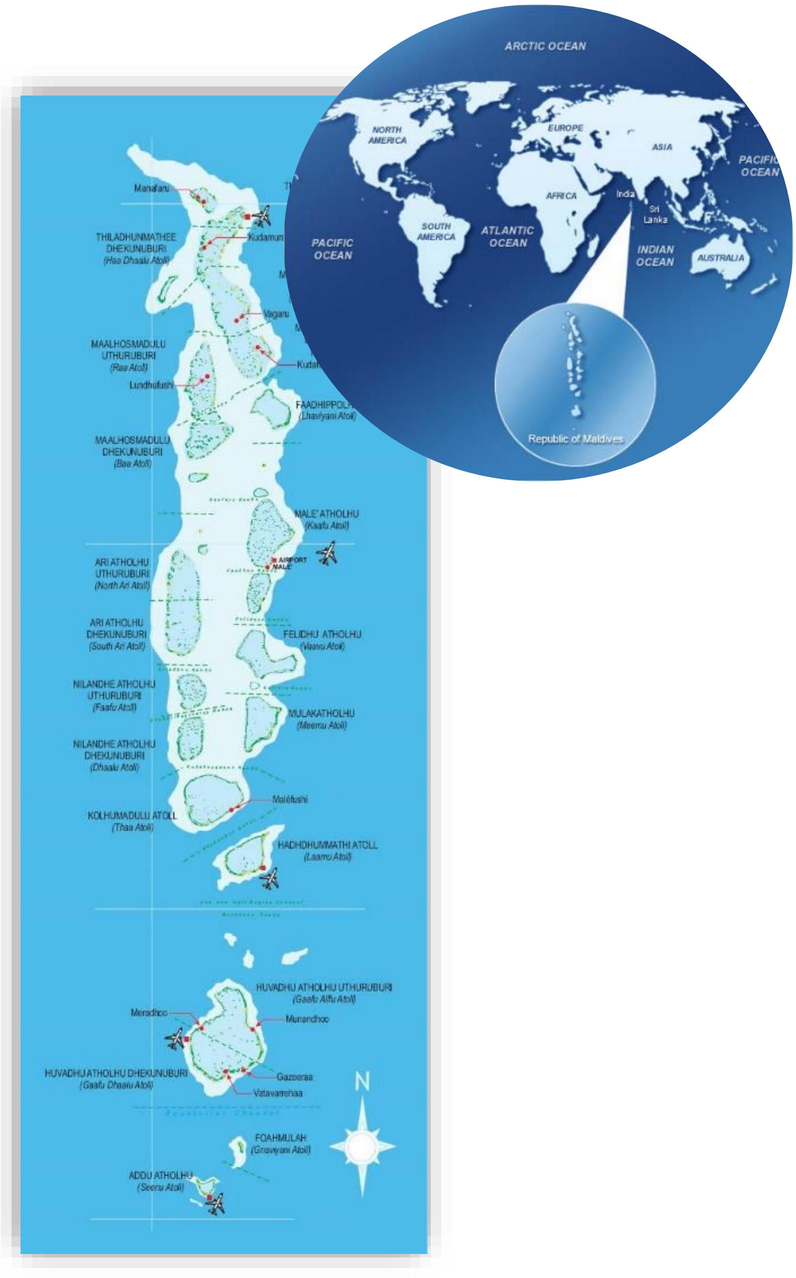
The Maldives

The Republic of the Maldives is an archipelago of approximately 1190 coral islands scattered on the equator in the Indian Ocean (see Figure 1.1). The island nation stretches over 800 kilometres from north to south and 130 kilometres from east to west, making it one of the most dispersed countries in the world (Asian Development Bank, 2015). About 99% of the Maldivian territory is the sea. The remaining 1% of the land consists of 26 natural clusters of islands known as atolls. For administrative purposes, these atolls are divided into 20 administrative divisions (Ministry of Finance and Treasury and UNDP in the Maldives, 2014). The resident population of the Maldives (including migrant workers) was 515,132 in 2022 (Maldives Bureau of Statistics [MBS], 2023). Although there are 188 inhabited islands (MBS, 2015), approximately 41% of the population resides in Male', the capital city (MBS, 2023), which is geographically less than 2 square kilometres (Asian Development Bank, 2015). As Male' is the centre of government and most business activities, significant differences and disparities exist between the capital and the outlying rural islands in accessing services, including education (Di Biase, 2017).

Although the Maldives is famous for its natural beauty, it is highly vulnerable to climate change, specifically sea-level rise. Over 80% of the country is less than 1 metre above sea level, while 96% of the islands are less than 1 square kilometre in area (World Bank, 2016). The number of inhabited islands has reduced through soil erosion and calamities, such as the 2004 tsunami that badly affected Maldivian islands. Such vulnerabilities make plain the precarious nature of many of the islands in this archipelago and highlight the constraints in providing infrastructural facilities and services to schools in remote islands with small populations. These vulnerabilities complicate infrastructure issues like broadband when it is needed in schools.

Figure 1.1

Map of the Maldives


ARCTIC OCEAN
NORTH AMERICA
EUROPE
ASIA
PACIFIC OCEAN
AFRICA
India
Sri Lanka
SOUTH AMERICA
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
AUSTRALIA
Republic of Maldives
Manafaru
THILADHUNMATHEE DHEKUNUBURI
(Haa Dhaalu Atoll)
Kudamura
Vagaru
MAALHOSMADULU UTHURUBURI
(Raa Atoll)
Lundhufushi
FAADHIPPOL
(Lhaviyani Atoll)
MAALHOSMADULU DHEKUNUBURI
(Baa Atoll)
MALE' ATHOLHU
(Kaafu Atoll)
AIRPORT
MALE'
ARI ATHOLHU UTHURUBURI
(North Ari Atoll)
ARI ATHOLHU DHEKUNUBURI
(South Ari Atoll)
FELIDHU ATHOLHU
(Vaavu Atoll)
NILANDHE ATHOLHU UTHURUBURI
(Faafu Atoll)
MULAKATHOLHU
(Meemu Atoll)
NILANDHE ATHOLHU DHEKUNUBURI
(Dhaalu Atoll)
Maléfushi
KOLHUMADULU ATOLL
(Thaa Atoll)
HADHDHUMMATHI ATOLL
(Laamu Atoll)
HUVADHU ATHOLHU UTHURUBURI
(Gaafu Alifu Atoll)
Meradhoo
Murandhoo
HUVADHU ATHOLHU DHEKUNUBURI
(Gaafu Dhaalu Atoll)
Gazeeraa
Vatavarrehaa
FOAHMULAH
(Gnaviyani Atoll)
ADDU ATHOLHU
(Seenu Atoll)
N

Note. Adapted from “The latest map of the Maldives,” (2011) and “Explore the Maldives on a luxury charter yacht!” by L. Tsolakis (2015). In the public domain.

Education in the Maldives

Historically, the Maldivian education system was based mainly on religious education, literacy, and numeracy. Home-based tutoring, known locally as *Edhuruge,* was the foundation on which the Maldivian education system was built. Through *Edhuruge,* children learned to recite the Holy *Qur'an* in Arabic and read and write in *Thaana*, the script of the local language, *Dhivehi*. Some basic arithmetic was also taught (UNESCO, 2010/2011). This system contributed to a gradual increase in the literacy rate of Maldivians so that by 2014, 98% of Maldivians were literate (MBS, 2015).

As government schools were established first in Male' (1927) and later in the atolls, traditional education slowly became more formal. The very first government school taught only boys. Girls could not access education at the same school until 1944 (Latheef & Gupta, 2007). By 1960, English-medium schools were introduced in Male'. However, schools in atolls continued following a Dhivehi-medium curriculum (UNESCO, 2010/2011). Later, Atoll Education Centres (AECs) and Atoll Primary Schools (APSs) were established in each atoll to achieve a unified national education system. By 2004, primary education was available in all then-inhabited 199 islands (UNESCO, 2010/2011).

Even many decades after establishment of the unified national education system, a common feature of education practices in the Maldives has been rote learning and fact memorisation (Adam, 2015; Mariya, 2012; Mohamed, 2006; Nazeer, 2006; Shareef, 2010). Adam (2015), for example, argued that teacher educators' childhood experiences of rote learning the *Qur'an* were highly influential in their practices. Similar transmissive pedagogical practices are visible in the way they organise their classroom activities as they teach others to teach. Perhaps, this is why transmissive teaching appears to be well-established in Maldivian classrooms. For my own project, I felt it was important to see whether primary teachers' practices were any less transmissive when they used DTs.

The school system

At present, education is provided at government, private, and community schools from kindergarten to higher secondary. While government schools provide free education, a monthly fee is charged for schooling in private and community sectors. In addition, tertiary education is provided by public universities and institutions and private colleges (Ministry of Higher Education, 2020). In the Maldives, universities have better scope than colleges, for example, in terms of the programmes that can be offered. For instance, doctoral programmes are offered only at universities.

As illustrated in Figure 1.2, the four main phases of schooling in the Maldives are the foundation, primary, lower secondary, and higher secondary phases (Ministry of Education [MoE], 2015). Formal schooling in the Maldives begins when children turn four and enter the foundation phase; this consists of lower kindergarten (LKG) and upper kindergarten (UKG). The primary phase has Key Stages that are quite similar to the UK Key Stages. In the Maldives, they are organised as follows:

Key Stage 1: grades 1–3, ages 6–9

Key Stage 2: grades 4–6, ages 9–12.

From there, two more Key Stages of the lower secondary phase form the transition to higher secondary as follows:

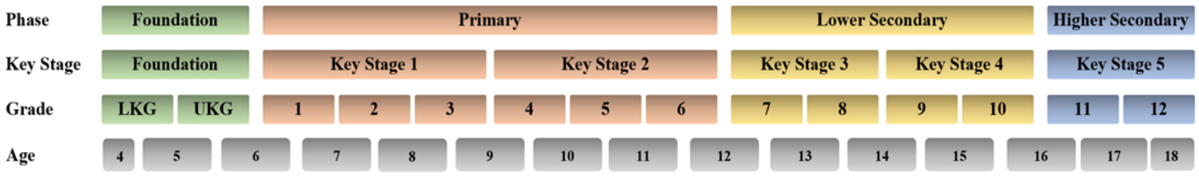
Key Stage 3: grades 7–8, ages 12–14

Key Stage 4: grades 9–10, ages 14–16.

The final phase consists of Key Stage 5 (grades 11–12, ages 16–18). Overall, 14 years of free and compulsory education are guaranteed for all the students in the Maldives (UNICEF, 2016).

Figure 1.2

School System in the Maldives


Phase
Foundation
Primary
Lower Secondary
Higher Secondary
Key Stage
Foundation
Key Stage 1
Key Stage 2
Key Stage 3
Key Stage 4
Key Stage 5
Grade
LKG
UKG
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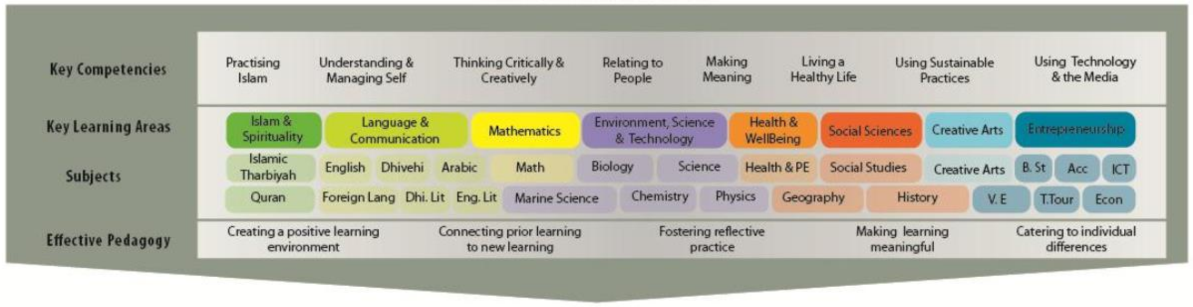
Note. Adapted from *The National Curriculum Framework*, by the Ministry of Education (2015). In the public domain.

The national curriculum framework

The national curriculum framework (NCF), developed by a division of the MoE, the National Institute of Education (NIE), came into force in 2015. This outcomes-based curriculum, which emphasises catering to the needs of 21st-century learners, is based on several key competencies and key learning areas, as illustrated in Figure 1.3. The eight key competencies are: practising Islam, understanding and managing self, thinking critically and creatively, relating to people, making meaning, living a healthy life, using sustainable practices, and using technology and the media (MoE, 2015). These competencies form the foundation for the eight key learning areas: Islam and spirituality, language and communication, mathematics, environment, science and technology, health and wellbeing, social sciences, creative arts, and entrepreneurship (MoE, 2015).

Figure 1.3

Map of the National Curriculum


Key Competencies
Practising Islam
Understanding & Managing Self
Thinking Critically & Creatively
Relating to People
Making Meaning
Living a Healthy Life
Using Sustainable Practices
Using Technology & the Media
Key Learning Areas
Islam & Spirituality
Language & Communication
Mathematics
Environment, Science & Technology
Health & WellBeing
Social Sciences
Creative Arts
Entrepreneurship
Subjects
Islamic Tharbiyah
English
Dhivehi
Arabic
Math
Biology
Science
Health & PE
Social Studies
Creative Arts
B. St
Acc
ICT
Quran
Foreign Lang
Dhi. Lit
Eng. Lit
Marine Science
Chemistry
Physics
Geography
History
V. E
T.Tour
Econ
Effective Pedagogy
Creating a positive learning environment
Connecting prior learning to new learning
Fostering reflective practice
Making learning meaningful
Catering to individual differences

Note. From *The National Curriculum Framework*, by the Ministry of Education (2015, p. 7). In the public domain.

With ‘using technology and the media’ identified as a key competency and ‘environment, science and technology’ as a key learning area in the NCF (MoE, 2015), the MoE developed its first ICT in education master plan for 2015–2018 and its second for 2021–2024 (MoE, 2021). Such initiatives clearly indicate the importance given to using DTs for teaching and learning purposes in the Maldives. Hence, my research was an opportunity to shed light on what it meant to use DTs for teaching and learning, especially when using DTs are considered a key competency as well as a learning area in the NCF.

Assessment and pedagogical practices

While the national curriculum advocates multiple modes of formative and summative assessments, it places a stronger emphasis on formative assessment in the primary grades (MoE, 2015). However, an exam-driven culture prevails in Maldivian schools because the school’s efficiency and effectiveness are measured based on students’ performance in national and international examinations. So, with such performative cultures across all the Maldivian schools, parents expect pen-and-paper exams as summative assessments (Shiyama, 2020). In the Maldives, students’ performances in examinations are used to measure teachers’ effectiveness, however erroneous this connection may prove to be. With such an emphasis on testing, there is a greater chance of a ‘backwash’ (Cheng & Curtis, 2004) or ‘washback’ (Wall, 2012) effect. Wall (2012) defines this effect as the influence of tests and examinations on classroom practices, affecting both teaching and learning. Much research in Maldivian primary, secondary, and tertiary education contexts has highlighted such backwash by suggesting that teaching in schools is influenced by the high-stakes exit examinations students sit at the end of both secondary (grade 10, ages 15–16) and higher secondary (grade 12, ages 17–18) school (Kinaanath, 2013; Mariya, 2012; Mohamed, 2006; Mohamed et al., 2016; Shareef, 2010; Shiyama, 2020).

Such exam-oriented instruction appears to have reinforced transmissive practices. In this way, teachers feel that they have been able to get through the syllabus that the exams cover. For example, Kinaanath (2013) argued that traditional pedagogical practices are not only evident in schools but also in higher education institutions, which Adam’s (2015) thesis similarly highlighted. In primary schools, much emphasis is also placed on syllabus and textbook completion. While there are prescribed textbooks for each subject, school management and parents expect that teachers will ensure all students will complete textbook tasks by the end of each semester. This pressure has existed for a number of years. For example, one primary teacher in the Maldives said this about the pressure from parents about prescribed texts: “Sometimes, parents complain if we don’t use the pupil’s books. Sometimes we don’t think the pages are appropriate but have to use them anyway” (Voluntary Service Overseas [VSO], 2005, p. 23). In such circumstances, it is understandable that teachers feel pressured to adopt syllabus/textbook-driven pedagogical approaches. About a decade later, as the national curriculum was about to be implemented, Fittell (2014) asked, “Will it [the national curriculum] make a difference? Will the teachers continue to use textbooks as a de facto curriculum?” (p. 71). Questions were raised in response to Fittell’s observation that the lessons across classrooms, islands, and atolls were taught from textbooks. And 5 years after the implementation of the national curriculum, Shiyama’s (2020) study indicates that teachers are still entrapped in a web of textbooks. She raised concerns about the amount of teacher authority and agency for implementing the primary science curriculum when subject content and pedagogies are prescribed with the mandated use of nationally developed textbooks and teachers’ guides. Perhaps this is another reason that explains the teacher-centric, transmissive pedagogical culture pervading the Maldivian education system. I, therefore, wondered if this culture also persisted in what primary teachers did when they used DTs for teaching ESL.

Background to teacher education in the Maldives

A common expectation is that both preservice and in-service teacher education influence pedagogical practices. So, what is the teacher education landscape like in the Maldives? Formal teacher education did not begin until 1979 (Latheef & Gupta, 2007) and was the responsibility of the Education Development Centre (EDC), a division of the MoE. In 1984, the Institute for Teacher Education was established. It offers both English-medium and Dhivehi-medium certificate- and diploma-level qualifications in initial teacher education for teaching primary-aged students. Secondary teacher education programmes began in 1997 with the universalisation of basic education (Muna, 2014). Undergraduate degree-level ITE programmes began at the Faculty of Education after the establishment of Maldives College of Higher Education in 1998, which subsequently became the Maldives National University in 2011. Currently, ITE programmes are offered at government universities and private colleges. By the end of 2015, the minimum qualification for being a teacher in the Maldives was raised to a diploma, and a further target was set to upgrade this qualification to a minimum of a bachelor’s degree by 2020 (MoE, 2019). I wondered the extent to which pre- and in-service education really affected teachers' pedagogical practices, or whether other factors had a greater impact.

Recently DTs also became a part of teacher education. An instructional technology module was included in the ITE programmes to help student teachers write their assignments and do presentations using a proprietary suite of software packages. These modules focused on providing knowledge of some DTs that can be used in lesson preparation, such as writing lesson plans, making teaching aids, and browsing the internet for information. The earliest form of DT used by teacher educators was overhead projectors. Later, ceiling-mounted projectors connected to a computer system in delivering lessons became a norm in teacher education programmes. For instance, in her study in the Maldivian higher education context, Adam (2015) found that teacher educators used PPTs as the main tool for content delivery.

In addition to ITE, practising teachers’ school-based professional development (PD) is an essential part of teacher education in the Maldives. The first educational PD policy was formulated in 2009, and to date it is still in place. According to this policy, three Teacher-Only days are allocated in the academic calendar dedicated to PD; it is to be self-initiated at the school level based on teacher needs analysis. In addition, the policy stipulates that 15 PD hours annually are mandatory for all practising teachers in the Maldives (MoE, 2009). Since the policy was implemented, schools have been conducting their school-based PD sessions either independently or in collaboration with the MoE. However, school-based PDs often take the form of conventional workshops or lectures where teachers remain passive recipients of content delivered to them by the PD provider (Naseer, 2018). Since few of these development sessions are robustly evaluated, it is difficult to know the extent to which they have value to practising teachers or make it easy to translate their content to their classroom realities.

When the 2015 national curriculum was introduced, many in-service PD sessions facilitated the implementation of the national curriculum. Most of these sessions were centred around familiarising teachers with the outcome-based teaching and assessment introduced in the curriculum. Nevertheless, a technology-related one-off short online course was also conducted for all the teachers before the MoE distributed tablets to the teachers and students in 2018. However, the course attracted criticism from some teachers who believed it was ineffective and insufficient to provide them with the knowledge and skills required to use DTs in teaching and learning. So, what value did these sessions have for teachers in using tablets as learning devices? I wanted to know from the teachers themselves how they used mobile devices in classrooms.

Significance of the English language

English is one of the most important languages spoken in the Maldives. Despite Dhivehi's being the national and official language of the Maldives and the first language of the Maldivians, English has had a strong influence on the lives of Maldivians. The everyday conversations of many young Maldivians, whether face-to-face or using social media, are now a mixture of both Dhivehi and English (Mohamed, 2013). English is widely spoken among young people, especially in urban settings, but Dhivehi still remains the language for communication at home with family, relatives, and close friends.

English is "rapidly establishing itself as a second language" in the Maldives (Meierkord, 2018, p. 2) due to its prominence in different aspects of the everyday life of Maldivians. As well as being the most widely spoken language apart from Dhivehi, English is also used in public places, such as on street signs, on TV, on radio announcements, and in graffiti (Maria, 2012). English has become, alongside Dhivehi, the language for advertisements, media, and business (Meierkord, 2018). Moreover, in formal school settings, students and teachers are often advised and encouraged to communicate in English rather than in Dhivehi.

English is formally introduced at Foundation Stage (at age 4) and is the medium of instruction (MOI) for all but two subjects: Dhivehi and Islam (religious education) from primary to higher secondary and even at the tertiary level (Meierkord, 2018; Riyaz & Smith, 2012). Although Dhivehi used to be the MOI in some primary schools in the past, English has replaced Dhivehi in almost all schools, except for a very few Arabic-medium schools. According to Mohamed (2013), "for over a decade, there have been no schools in the Maldives using the local language [Dhivehi] as an MOI" (p. 186).

English is also recognised as one of the world's lingua francas to prepare the young generation for a globalised world. As a result, educational success at Maldivian schools is usually based on proficiency in English. The result of the IGCSE English as a second language examination at the end of secondary school (grade 10, ages 15–16) generally determines the student's future in securing a higher education placement or a decent career. Mohamed (2013) highlighted the dominance of English when she stated that "proficiency in English is seen to be a passport to higher education at home or abroad, lucrative employment in a public or private sector, professional advancement and social prestige" (p. 189). With such a high regard for English, I wanted to find out if and how teachers' pedagogical practices with DTs facilitated learning English in primary classes.

DT Integration in Schools

In the Maldives, the earliest formal education settings consisted of classrooms with tables or benches and chairs in rows and a blackboard. Over time, and in common with other schooling systems, blackboards were later replaced with whiteboards. This change did not fundamentally alter how students learned nor how teachers taught, however. Sources of information were still limited to textbooks and teachers' knowledge. Establishing school audio-visual (AV) rooms with a projector and sound system was one of the first steps toward using DTs for learning. However, soon a booking system for using AV rooms did not meet demand.

In addition to AV rooms, computer laboratories were initially established in schools in Male'. Later, schools in the atolls also gained computer labs with generous donations from parents, community sponsors, and government funding. The computer systems with internet connections meant teachers and students could access information and materials to enhance teaching and learning. A Basic Computer Literacy Project was also launched in 2000 to provide computer literacy for all students who completed the primary level (MoE, 2001, as cited in Shareef, 2005). However, only 40% of the schools in the Maldives had computer laboratories by 2012 (UNESCO Institute for Statistics, 2014).

A critical step towards integrating DTs in the Maldives was the opening of 20 broadband-enabled teacher resource centres (TRCs), establishing one learning community by linking administrators and teachers across the country to a common network (United Nations [UN], 2007). This project, which aimed at bridging the distance using DTs, was a collaborative effort of UNICEF and the government of the Maldives. According to the UN (2007), as about 80% of teacher education costs are related to transportation, these TRCs would enable teachers living on islands far from the capital city, Male' to connect remotely and would become a platform for in-service teachers' interaction and PD.

Another noteworthy MoE initiative was the digital classroom project. This pilot project was initiated in 2010 at Majeediyya School, one of the oldest schools in the country (Samath, 2010). After this project, many schools in Male' and some atolls were identified as smart classrooms, which means they are equipped with computer systems connected to the internet, projectors, and also LCD televisions. Smart boards are also found in some schools across the Maldives.

A more recent, significant attempt at DT integration in schools was the MoE's decision to make a substantial investment in tablets with the allocation of MVR 138.8 million (US$ 8.9 million) in the 2018 state budget to digitise Maldivian schools (Ministry of Finance and Treasury, 2018). Approximately 71,000 tablets were distributed to all the grades 1 to 10 teachers and students in public (government-funded) schools. According to Maldives Independent (2018), wireless connections were set up in schools. Also, before the MoE began distributing tablets to all students and teachers in public schools, all teachers had to complete an online training programme to learn how to use tablets. While access to tablets opened up great opportunities for teachers and students, I was curious to understand how they used these tablets and other available DTs to enhance teaching and learning English in primary schools.

Impact of COVID-19 on DT provision and schooling

The COVID-19 outbreak affected over 91,000 students from pre-K to higher education in the Maldives when schools were closed for 3 months from March 2020 (MoE, 2020). To mitigate adverse effects on learning, the government introduced televised lessons (locally known as

Telikilaas) and online classes via G-Suite, leading to schools' shifting to online teaching and learning. Schools gradually reopened in July 2020, beginning with a blended model. Students attended school for 4 hours of face-to-face classes every day, in addition to online classes via Google Classroom and watching lessons broadcast on local television channels. While public schools used Google Classroom as their learning management system (LMS), some private schools continued using Microsoft 365 as they had previously been using this platform for their bring-your-own-device (BYOD) programmes. The government had distributed tablets in public schools a couple of years before the lockdown. This initiative made it easier for public school teachers and students to move to online learning. However, as tablet distribution was a one-off programme, students in grades 1 and 2 who joined their school after 2018 did not have a device for online learning. As a result, they relied only on the few broadcasted lessons until in-person classes began later in the year 2020. In addition, many students, especially students in the far-flung rural islands, had issues with internet access for remote online learning. Hence, the government offered 5 gigabytes of mobile data to students, 10 gigabytes to teachers, and Wi-Fi dongles to anyone who requested them (Muna et al., 2021).

Transitioning to online teaching was daunting for many teachers as they were not used to this modality of schooling. So, with support from UNICEF, the MoE began training teachers on G-Suite applications, as Google Classroom was the platform the ministry recommended for remote online learning. As a result, 42.5% of primary and secondary teachers in public schools completed the training and gained Google Certified Educator status between July and November 2020 (UNICEF, 2021). This training provided teachers with mainly technological knowledge on how to use the online platform. Highlighting that such one-off training is insufficient for online teaching, Fikuree et al. (2021) reported that teachers in their research had to "teach themselves and seek help from their more competent colleagues" (p. 16).

Therefore, with the crucial role that English plays as a second language in the Maldives and the increasing use of DTs, it was important to explore primary teachers' DT use for teaching and learning English in Maldivian schools. This chapter concludes with an outline of how I organised my thesis.

Definition of Key Terms

Digital technologies (DTs) in my study refers to hardware (computers, smart boards, projector, etc.), software (Microsoft PowerPoint, Skype, iMovie, apps etc.), internet, mobile devices (tablets, iPads, digital cameras, etc.), and the peripherals used to perform various tasks on the devices. I use digital technology instead of technology in this study because ‘technology’ is a generic term which could be anything invented for practical use such as a vehicle, a pesticide, a highlighter marker or a toothpick, which does not necessarily involve any digital aspect to it.

Technological is of, involving, related to or caused by DTs.

Technological pedagogical practices are practices that involve the use of one or more DTs for teaching and learning purposes.

English as a second language (ESL) learner is a student whose first language is other than English and who learns English as a second language. All the students in this study are ESL learners as English is considered a second language in the Maldives.

Primary education in this research refers to the education provided at Key Stages 1 and 2, which corresponds to grades 1 to 6 (ages 6 to 12 years) as in the Maldives national curriculum framework (MoE, 2015).

Primary teachers in my study include both generalist teachers and subject teachers who teach at the primary level. While generalist teachers teach the core curricular subjects of literacy and numeracy and specialised subjects such as science and social studies, subject teachers teach a specific subject to the parallel classes in a grade(s).

Thesis Overview

The chapters are organised as follows:

Chapter 1: Introduces my inspiration for conducting this research and the research context, including the geographical, educational, and technological contexts of the Maldives, followed by definition of key terms.

Chapter 2: Reviews literature on DTs in education, teaching English as a second language with DTs, theoretical frameworks on DT integration, and contextual complexities around using DTs for teaching and learning purposes.

Chapter 3: Justifies the study’s methodology and methods, including paradigm, research design, sampling, ethics considerations, data collection, data analysis, and the trustworthiness of the research process.

Chapter 4: Presents findings on pedagogical practices with DTs in ESL lessons, perceived benefits of DTs, DT enablers, and barriers to effective DT use.

Chapter 5: Discusses the findings from the previous chapter with reference to literature reviewed earlier to answer the three main research questions of this study.

Chapter 6: Concludes the thesis with a final thought on my learnings and realisations from the research and my PhD journey, followed by this study’s limitations, implications, contributions, and recommendations for further research.

Chapter 2

Literature Review

In this chapter, I chose to review literature related to three main themes. The first theme is DTs in education, particularly how they connect with teaching and learning. A subtheme is exploring what is known of DT use in teaching English as a second language (ESL). In the second theme, I reviewed literature on three DT-integration frameworks/models, including the TPACK framework, TAM, and the SAMR model. The third theme is contextual complexities as they relate to national situations, schools, and teachers. I wanted to understand the extent of the attention given to these contexts in DT-integration literature and how the complexities may affect teachers' decisions around DT use in their pedagogical practices. In turn, these themes helped me frame how I conceptualise DT use in primary ESL classrooms and formulate my research questions.

Digital Technologies (DTs) in Education

Pedagogical Practices and DTs

"The technology sets the beat and creates the music, while the pedagogy defines the moves" is how Anderson and Dron (2011, p. 81) describe what they argue is, using a dance metaphor, an intertwined relationship between technology and pedagogy. Their contention implies that if teachers prioritise one over the other, the dance may be thrown out of synchronisation. This might mean that when instruction is more technology-driven rather than in balance with pedagogical goals, teachers will choose DTs (maybe because they are accessible, popular or preferred) before deciding on learning goals and pedagogical approaches. Pedagogical intent thus becomes an afterthought rather than its being central to purpose. Such an orientation is likely to result in adapting the lesson to suit the chosen DTs instead of the learning goals, and thus may constrict teachers' flexibility to choose a specific pedagogical approach that may have better links to learning purposes. On the other hand, putting the "pedagogic horse" in front of the "technology cart", as Sankey (2020, p. 46) recommends, may also be problematic. For example, if the instruction is driven solely by pedagogical preferences, teachers might not be able to take full advantage of DT affordances for student learning.

Affordances is a term coined by Gibson (1979), and later adopted by Norman (2013), which denotes perceived possibilities offered by DTs. In this next section, I review literature on the interconnection between pedagogy and technology and possible complexities, such as teachers' beliefs and sociocultural norms that may impact teachers' actual use of DTs in their pedagogical practices.

For instance, Tsui and Taraves (2021) argue against the dichotomisation of pedagogy and technology as it undermines what should be a dynamic relationship and may ignore other factors, such as teachers, students, the curriculum, and physical/virtual classrooms. They claim that while DTs could help in re-shaping and re-imagining pedagogical approaches, re-tooling is involved when DTs are adapted for a specific pedagogical approach, highlighting the interconnection and interdependence of technology and pedagogy. Fawns (2022) contends that instruction should be neither technology-driven nor pedagogy-driven as the "*Actual* educational activity is always a complex entanglement of factors, iteratively and mutually shaping each other [author's italics]" (p. 4). Fawns' view appears to align with Anderson and Dron (2011) and Tsui and Taraves (2021), who also argued similar ideas. Viewing instruction practices as a complex *entanglement* of factors makes us realise that teachers' practices with DTs are influenced not only by prioritising pedagogy or technology in lesson planning but also by various complexities surrounding DT use in the classroom. Going beyond the pedagogy-or-technology-first debate draws our attention to teachers' actual DT practices in their lessons and various factors that could directly or indirectly influence their decisions around DT use.

It appears, then, that how teachers actually use DTs plays a significant role in determining the extent to which they can realise the full potential of DTs for student learning. In a general sense, teachers' practices with DTs can be placed on a continuum from a traditionalist orientation to a constructivist orientation. For example, Prestridge and Aldama (2016) describe traditional pedagogical practices as activities that direct students to learn and produce intended and target knowledge through scaffolded challenges. They describe constructivist pedagogical practices as activities that enable students to actively participate in "discussions, collaboration, inquiry, and reflection to support the development of more accurate and reasoned knowledge" (p. 907). Ertmer et al. (2012) differentiate two pedagogical orientations: teacher-centred approaches and student-centred approaches. In traditional teacher-centred approaches, teachers tend to use DTs for content delivery, monitoring student progress, and administrative purposes, while students use DTs for content consumption. In contrast, constructivist student-led approaches suggest that teachers encourage students when using DTs to collaborate with others, create new knowledge, create new learning products or think critically to find solutions to real problems. Researchers, for example Prestridge (2012) and Tran (2020), argue that constructivist pedagogical practices, where DT use is student-centred rather than teacher-centred, are more meaningful for student learning because learners are constructing knowledge actively.

However, what DT literature has repeatedly highlighted over the past two decades is that teachers' practices with DTs have largely been teacher-centric even with access to a wide range of DTs—both hardware and software (Chen, 2008; Cuban et al., 2001; Er & Kim, 2017; Ertmer, 1999, 2005; Hew & Brush, 2007; Li et al., 2018, 2019; Orlando, 2013; Waseela, 2022). For instance, lesson observations conducted over 3 years in primary and secondary schools across 11 countries indicate that in two-thirds of classrooms (90,241 out of 142,586), there was little evidence of students using DTs for meaningful learning, such as to solve problems, conduct research or work collaboratively (van Broekhuizen, 2016). Instead, teachers used DTs to make their teacher-centred instruction more efficient and convenient. For example, in her study on English language teachers' practices with DTs in Chinese schools, Li (2014) reported that all eight participant teachers highlighted that DT use made their lesson delivery more efficient, which essentially reflected "the traditional knowledge-transmission approach" (p. 14). The teachers were generally of the view that DTs help them present more language examples (grammar and vocabulary) so that student learning can be facilitated. Based on a more recent study with primary EFL teachers in a rural school in China, Li et al. (2019) concluded that DTs were mainly used to present information in a manner similar to teaching resources such as textbooks and chalkboards. If teachers equate language exposure with language learning, they may not feel the need to provide students with opportunities to use DTs for more meaningful active learning. Research in the Maldives indicates the prevalence of teacher-centric practices (as explained in chapter 1). Therefore, it was important for my study to explore teachers' pedagogical orientation (teacher-/student-centred) when they use DTs and what may inform their decisions about using DTs in particular ways.

The influence of traditional pedagogical beliefs on how teachers actually use DTs in their lessons is a recurrent theme in DT-integration literature (Adam, 2015; Ertmer et al., 2012; Liu et al., 2018; Prestridge & Aldama, 2016; Tran, 2020). Teachers with traditional beliefs about the role of the teacher tend to be authoritative, believe teaching is about transmitting knowledge, and have teacher-centred approaches (Liu et al., 2018). Such approaches include rote learning, drill and practice, direct instruction, and deductive teaching. Adam (2015) found that her participant teacher educators were heavily influenced by their early experiences of learning, which consisted of rote learning the *Qur'an* as children. She identified this as teacher educators' pedagogical and technological cultural habitus. She highlighted that her six participant teacher educators were more inclined to select DTs that "fitted their pedagogical orientation of content delivery" (p. 191). Using PowerPoint (PPT) was a common practice in their content delivery. The drill and practice nature of learning to recite the *Qur'an* as children, coupled with the country's examination-oriented systems that value recall and recitation, appeared to be major influences on pedagogical practices. I needed to know if similar influences affected primary teachers' practices with DTs in teaching ESL.

More recently, in a study on factors affecting the teaching and learning of English in a blended learning environment in a Vietnamese university, Tran (2020) reported that teachers' practices with a learning management system (LMS) aligned with common Vietnamese traditional pedagogies. Tran's participant teachers used an LMS to present language knowledge, assign drill and practice tasks, and monitor students' online task completion. According to Tran, these teacher-centred approaches may be attributed to Confucianism, a cultural and religious phenomenon deeply influencing Vietnamese educational philosophy and practice. With Confucianism, students view teachers as the main source of knowledge and tend to *blindly* accept what teachers teach, meaning knowledge transmission is preferred over questioning, problem-solving, and critical thinking. As a result, teaching and learning based on Confucian ideas emphasise textbook-based knowledge memorising rather than self-reflection. Although the studies discussed here argue that student-centred approaches are more beneficial for student learning, both Adam's (2015) and Tran's (2020) findings indicate that teachers' practices with DTs appear to align with teacher-led approaches influenced by traditional conceptions of teaching and learning, which may be hard to shift, if indeed this is a goal for developing these teachers' practices.

When teachers have preferred teaching approaches (probably established over several years), there is a tendency for teachers to simply assimilate new tools like DTs into their existing pedagogical practices rather than to use the new tools as opportunities to explore new options for teaching and learning. For example, in a paper describing three secondary teachers' pedagogical practices with iPads, Wright (2015) found that DT use *reinforced* their existing pedagogy rather than *disrupting* it. While Francis, a participant teacher, preferred teacher-centric approaches to his music teaching, both Erika and Alex (who taught mathematics and French, respectively) were already more student-centric in their pedagogical practices. Irrespective of the differences in their usual modus operandi, all three teachers in Wright's study married DTs with their existing practices rather than transforming them. Therefore, in my study, I needed to closely observe teachers' practices with DTs to understand whether DT use brings about a paradigm shift in their pedagogical orientation or whether DTs are assimilated into their existing practices.

Additionally, in a case study exploring teacher educators' practices with DTs in a South African university, Tunjera and Chigona (2020) concluded DTs were used in ways that aligned with teacher educators' existing traditional practices. While some teacher educators relied on PowerPoint to present teaching notes, others used applications for drills and practices. Here, by "adding-on" (Prestridge, 2005, p. 10) DTs into existing transmissive pedagogy, traditional teaching is "technologised" (Lankshear & Bigum, 1998, p. 12). Despite increased access to DTs over the years, the potential of DTs to bring about a paradigm shift from teacher-centred to student-centred approaches remains unexplored. Such findings support the argument that DT presence does not automatically result in innovative teaching practices (Bang & Luft, 2013; Fullan & Langworthy, 2014). Nonetheless, DTs could be a catalyst for teachers who favour student-centred approaches to transform their pedagogical practices, as Windschitl and Sahl (2002) found. One out of the three teachers they studied who had pre-existing dissatisfaction with teacher-centric pedagogies used DTs for collaborative student work and project-based learning. Such findings give hope that teachers could learn to use DTs in more pedagogically meaningful ways and suggests that DTs have the potential to have a range of positive effects on teachers' pedagogical practices.

DT-integration literature often associates meaningful DT integration with teachers' backgrounds. Such associations may result in blaming teachers for failing to capitalise on the potential of DTs for student learning. Although teachers play a critical role in the process, we should not ignore the complexities affecting their practices. Their practices are not only influenced by institutional expectations and policies but are also situated and contextual within "a complex tapestry of conditions and parameters" (Fawn, 2019, p. 138). Therefore, to acknowledge the "messy realities" of DT use (Selwyn, 2010, p. 70), it is important to pay attention to the sociocultural and institutional contexts of teachers' practices when they incorporate DTs into lessons. In this sense, studying DT integration involves exploring it not only at the micro level of individual teachers but also against the backdrop of meso-level processes and procedures of the educational institutions and macro levels linked to wider sociocultural values (Selwyn, 2010). For example, even if teachers strongly believe in constructivist student-centric DT use, their beliefs may not always come to fruition in actual classroom practices if they are required to fit into specific sociocultural norms (for example, following textbooks, completing syllabi, and preparing students for tests). A case in point is an ethnographic case study exploring teachers' reluctance to use DTs in Swedish secondary schools. Tallvid (2016) found that teachers' hesitation to use the internet was often related to their heavy reliance on textbooks to cover the syllabus content. He argued that when teachers:

> …used the book strictly, they did not risk putting anything at stake and they could be sure that all parts of the curriculum were covered. Leaving the textbook and starting to use the Internet challenged this way of teaching. The challenge seemed to be that the Internet-connected laptop did not provide the well-framed, unquestioned, sequential organisation of educational tasks that a book did. Hence, it made it harder to be sure that all parts of the curriculum were covered. (p. 511)

For Tallvid's (2016) participants, a textbook is *certain* and logically ordered, making it easier for them to control learning. However, because DTs open up possibilities, teachers feared they could no longer control what content students could access. A fear of losing control may also have meant that because of their usual reliance on textbooks to structure learning, they now had to work out not only how to present online information but also to work out how to facilitate learning with DTs. Getting through the curriculum is something teachers often say is important. In some cases, this focus takes precedence over learning needs. In a qualitative, 5-year longitudinal study of five Australian teachers' DT practices in primary and secondary schools, Orlando (2013) found that participant teachers' highest priority was to cover syllabus content. While all the teachers believed the syllabus (with its heavy content and sequential organisation of information) required them to rely heavily on teacher-centric approaches, they felt that DT use was at odds with this focus. For example, Beth (a pseudonym) referred to students as "going off on a tangent" when using the internet and worried she could not confine her students' learning to her lesson plan and syllabus outcomes (p. 238). Three out of the five teachers in Orlando's study believed that DTs were a diversion from the limited time they had to complete the syllabus. The participants' hesitation in using DTs can be understood as disrupting what they believed was expected or required.

It seems that there is a strong relationship between teachers' focus on syllabus and summative examinations. For example, Bindu (2017), Hew and Brush (2007), Lim and Chai (2008), and

Mohamed et al. (2016) suggest that examinations exert considerable influence on teachers' pedagogical practices with DTs (Li, 2014). This effect is variously known as 'backwash' (Cheng & Curtis, 2004) or 'washback' (Wall, 2012). For instance, in exploring how eight secondary teachers integrated DTs into their English lessons in Chinese schools, Li (2014) found that the heavy pressure from examinations significantly shaped how teachers used DTs in their lessons. While all six teachers' primary goal was to "coach students to get good results" in the examination (Li, 2014, pp. 16-17), they were not convinced that DTs could be linked to improving students' test results. Teachers believed memorising content was crucial to achieving good results in examinations, believing that DTs acted as distractions rather than language learning opportunities. At times, parents' and school leaders' expectations put pressure on teachers to ensure their students perform well on tests. In a qualitative study on beliefs and practices about DT integration, Chen (2008) reported that 9 out of the 12 teachers admitted that pressure from parents was a substantial obstacle to DT integration in meaningful ways. Teachers also felt that DT use was time-consuming and feared skipping some syllabus content that might appear in the exam. One participant feared that: "If the students fail to answer the relevant questions while taking exams, their parents will call administrators to complain" (p. 72). Such findings indicate that pressure and expectations of parents and school leaders can affect how teachers manifest their pedagogical beliefs about DT use in their classrooms and affect what they think is important to focus on.

When teachers' pedagogical intent is to prepare students for examinations, DTs are used as substitution tools in their pedagogical practices (for example, a means to provide students with digital notes instead of printed notes). In a case study exploring factors that affected one teacher's DT use in Zoom ESL lessons, Cheung (2021) found that her transmissive pedagogies were influenced by pressure to prepare her students for examination. In a preobservation interview, she said, "My pedagogy has to meet the needs for equipping students to take the DSE [Diploma of Secondary School Exam]. That's why it's all about teaching vocabulary, grammar rules, and analysing past papers" (p. 8). Cheung further argued that while higher levels would require adopting relatively more student-centred approaches, this teacher's form-focused, exam-oriented pedagogies resulted in low levels of DT integration. She had concentrated her efforts on using PowerPoint/Microsoft Word to present the target language features.

The above studies indicate that when teachers are unable to apply new ideas within the existing parameters of syllabi, textbooks, and examinations, there may be inconsistencies in teachers' beliefs and practices. At times, they may compromise their ideal instruction to meet the needs and the expectations of others (for example, school leadership or parents). Since the Maldives has its own sociocultural norms (Adam, 2015), examining such norms in relation to participants' classroom efforts with DTs could be useful for my study. As highlighted in chapter 1, content/textbook/exam-oriented pedagogical practices among Maldivian teachers have been highlighted by many researchers (Adam, 2015; Fittell, 2014; Mariya, 2012; Mohamed, 2006; Shiyama, 2020). Understanding if and how various sociocultural norms in the Maldives affect primary teachers' practices with DTs in their classrooms was an important aspect that I was keen to explore in my research.

Going back to Anderson and Dron's (2011) technological pedagogical dance metaphor, I contend that it is the content that decides the dance genre (for example, jazz, hip-hop or ballet) to which technology sets the beat and pedagogy defines the moves. However, more often than not, DT-based studies focus on DT integration in general without focusing on a specific content or subject (Adam, 2015; Cuban et al., 2001; Ertmer et al., 2012; Prestridge, 2012; Prestridge & Aldama, 2016; Tallvid, 2016; van Broekhuizen, 2016; Walsh & Farren, 2018). Limited studies have examined teachers' DT use in various content areas (Chen, 2008; Lim & Chai, 2008; Tunjera & Chigona, 2020; Wright, 2015). Also, comparatively limited research is done entirely based on a single subject, for example, science (Bang & Luft, 2013), mathematics (McCulloch et al., 2018) or English (Cheung, 2021; Li, 2014; Ranganath et al., 2017; Tran, 2020). Teachers' decisions around DT use may vary depending on the subject they teach, as certain DTs may offer greater affordances for specific content (Howard et al., 2015; Tay et al., 2015, 2017). For example, while Google Docs could be ideal for collaborative writing tasks, it may not be the most convenient tool for completing exercises that require solving mathematical equations. It is, therefore, important to understand how teachers take advantage of the affordances of a certain DT to facilitate students' learning in a specific subject (in my case English).

The next section briefly explores the history regarding the role of DTs in English as a second language (ESL) learning in relation to language exposure, language use, and learners' affective filter.

DTs in English as a Second Language (ESL)

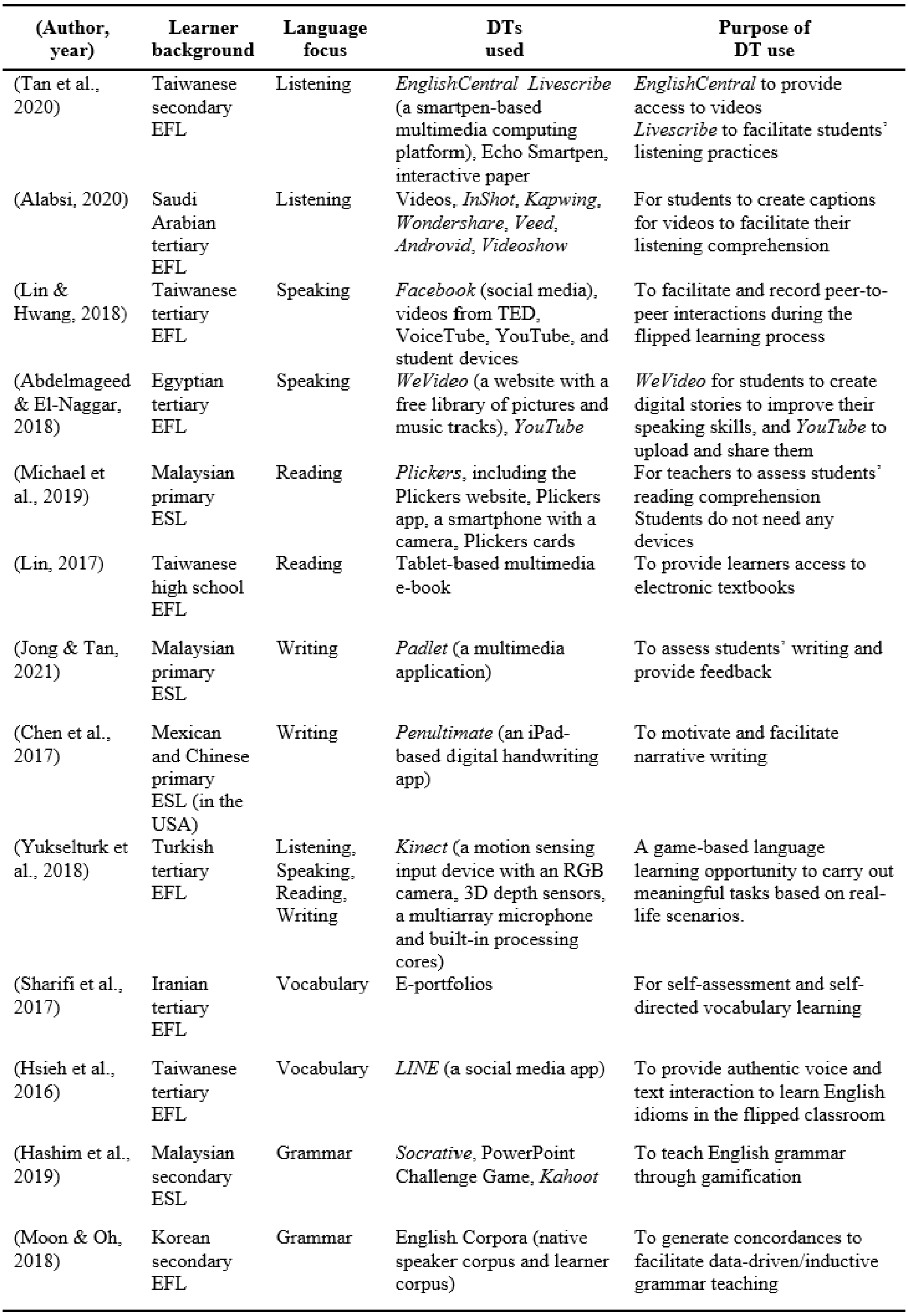
Computer use for language teaching dates back to the 1960s (Warschauer & Healey, 1998) and has become widely known as computer-assisted language learning (CALL). CALL initially involved "using the audio-visual, tactile, and interaction affordances of computers to improve student acquisition of second and foreign languages" (Warren et al., 2014, p. 95). However, with the rapid technological advancements to encompass DTs other than computers, researchers also use the terms mobile-assisted language learning (MALL) and technology-enhanced language learning (TELL) instead of CALL. To describe the shift in the focus of CALL over several decades, Warschauer and Healey (1998) divide CALL history into three phases. They are: (1) behaviourist CALL (featuring drill and practice in the 1960s and 1970s); (2) communicative CALL (emphasising implicit rather than explicit grammar teaching in the 1980s and 1990s); and (3) integrative CALL (focusing on language use in authentic social contexts in the 21st century). Such divisions could shed light on potential practices with DTs in a language classroom. However, dividing CALL history into eras might also lead to assumptions that current (21st century) DT use for language learning is integrative, although DT use in actual pedagogical practices might be a combination of behaviourist, communicative, and integrative in nature.

About two decades ago, Bax (2003) argued that the end goal of CALL needed to be understood through the concept of "normalisation", which is the stage where the DTs become "invisible, embedded in everyday practice" like a wristwatch or a pen that "have [has] become normalised to the extent that we hardly recognise them as technologies" (p. 23). Bax anticipated that at the normalisation stage, language learners and teachers would use DTs as an integral part of every lesson without any inhibition or fear, just as they use a pen or a book. At this stage, while DTs will not be the centre of the lesson, they will play a crucial part in almost all the lessons. Instead, student learning will be at the heart of the instruction.

While it is possible we have not yet reached Bax's 'normalisation' stage, DT use for language teaching and learning has undoubtedly increased over the 50+ year history of CALL. Because of the pedagogical affordances of DTs in language classrooms, English as a second/foreign language (ESL/EFL) teachers have been "busy" using various DTs to facilitate teaching and learning English language skills (listening, speaking, reading, writing), vocabulary, and grammar. Table 2.1 summarises recent studies on DT integration in the ESL/EFL context. A striking limitation was the paucity of studies conducted with ESL primary students (the focus of my study) compared with those conducted at tertiary and secondary levels.

Table 2.1

DT Use in ESL/EFL Context

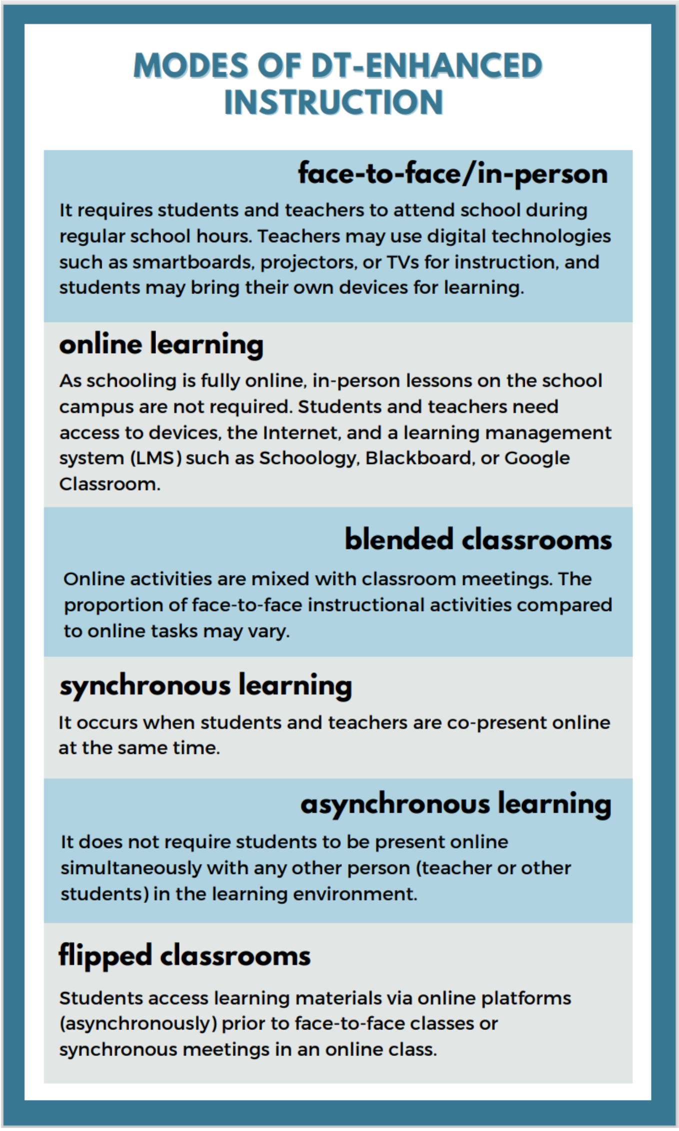


(Author, year)	Learner background	Language focus	DTs used	Purpose of DT use
(Tan et al., 2020)	Taiwanese secondary EFL	Listening	*EnglishCentral* *Livescribe* (a smartpen-based multimedia computing platform), Echo Smartpen, interactive paper	*EnglishCentral* to provide access to videos *Livescribe* to facilitate students' listening practices
(Alabsi, 2020)	Saudi Arabian tertiary EFL	Listening	Videos, *InShot*, *Kapwing*, *Wondershare*, *Veed*, *Androvid*, *Videoshow*	For students to create captions for videos to facilitate their listening comprehension
(Lin & Hwang, 2018)	Taiwanese tertiary EFL	Speaking	*Facebook* (social media), videos from TED, VoiceTube, YouTube, and student devices	To facilitate and record peer-to-peer interactions during the flipped learning process
(Abdelmageed & El-Naggar, 2018)	Egyptian tertiary EFL	Speaking	*WeVideo* (a website with a free library of pictures and music tracks), *YouTube*	*WeVideo* for students to create digital stories to improve their speaking skills, and *YouTube* to upload and share them
(Michael et al., 2019)	Malaysian primary ESL	Reading	*Plickers*, including the Plickers website, Plickers app, a smartphone with a camera, Plickers cards	For teachers to assess students' reading comprehension Students do not need any devices
(Lin, 2017)	Taiwanese high school EFL	Reading	Tablet-based multimedia e-book	To provide learners access to electronic textbooks
(Jong & Tan, 2021)	Malaysian primary ESL	Writing	*Padlet* (a multimedia application)	To assess students' writing and provide feedback
(Chen et al., 2017)	Mexican and Chinese primary ESL (in the USA)	Writing	*Penultimate* (an iPad-based digital handwriting app)	To motivate and facilitate narrative writing
(Yukselturk et al., 2018)	Turkish tertiary EFL	Listening, Speaking, Reading, Writing	*Kinect* (a motion sensing input device with an RGB camera, 3D depth sensors, a multiarray microphone and built-in processing cores)	A game-based language learning opportunity to carry out meaningful tasks based on real-life scenarios.
(Sharifi et al., 2017)	Iranian tertiary EFL	Vocabulary	E-portfolios	For self-assessment and self-directed vocabulary learning
(Hsieh et al., 2016)	Taiwanese tertiary EFL	Vocabulary	*LINE* (a social media app)	To provide authentic voice and text interaction to learn English idioms in the flipped classroom
(Hashim et al., 2019)	Malaysian secondary ESL	Grammar	*Socrative*, PowerPoint Challenge Game, *Kahoot*	To teach English grammar through gamification
(Moon & Oh, 2018)	Korean secondary EFL	Grammar	English Corpora (native speaker corpus and learner corpus)	To generate concordances to facilitate data-driven/inductive grammar teaching

The DT-integration literature also shows that teachers have adopted various modes to deliver their ESL/EFL lessons (see Figure 2.1 for definitions). These modes of DT-enhanced instructions include (a) face-to-face (Hashim et al., 2019; Lin, 2017; Michael et al., 2019), (b) online (Jong & Tan, 2021), (c) blended (Ramalingam et al., 2021), (d) synchronous (Yeh & Lai, 2019), (e) asynchronous (Alkan & Bümen, 2020), and (f) flipped classrooms (Hsieh et al., 2016; Lin & Hwang, 2018). Keeping in mind that DT integration in Maldivian schools was still at a nascent stage, I intended to explore DT use in face-to-face ESL classes in the Maldives. However, as some schools had already begun to use learning management systems (LMS) and student devices, I expected to get the opportunity to observe other lesson delivery modes with DTs in Maldivian primary classes.

Figure 2.1

Modes of DT-Enhanced Instruction Definitions



MODES OF DT-ENHANCED INSTRUCTION

face-to-face/in-person

It requires students and teachers to attend school during regular school hours. Teachers may use digital technologies such as smartboards, projectors, or TVs for instruction, and students may bring their own devices for learning.

online learning

As schooling is fully online, in-person lessons on the school campus are not required. Students and teachers need access to devices, the Internet, and a learning management system (LMS) such as Schoology, Blackboard, or Google Classroom.

blended classrooms

Online activities are mixed with classroom meetings. The proportion of face-to-face instructional activities compared to online tasks may vary.

synchronous learning

It occurs when students and teachers are co-present online at the same time.

asynchronous learning

It does not require students to be present online simultaneously with any other person (teacher or other students) in the learning environment.

flipped classrooms

Students access learning materials via online platforms (asynchronously) prior to face-to-face classes or synchronous meetings in an online class.

In the following sections, I review literature on DT use in relation to three important themes in second language acquisition (SLA) literature; these are (a) language exposure, (b) language use, and (c) learners' affective state. These related to my study because the classrooms and teachers I connected with involved teaching English to primary school students in the Maldives and whose first language is Dhivehi.

Language exposure

While first language (L1) learners are immersed from birth in a "language bath" (Piske & Young-Scholten, 2008, p. 16), second language (L2) learners need to be exposed to rich samples of language. Ellis (2005) strongly argues that the quality and amount of 'input' (language data that learners are exposed to) influences the proficiency level L2 students achieve. As both aural and visual language input are important, what students listen to or hear and watch, read or see is significant for L2 learning. Children acquire their L1 or mother tongue quite naturally as they get exposure to a massive amount of L1 input in their everyday lives. In contrast, when learning L2, it is unlikely that teachers can fully replicate such exposure for L2. Instead, they would create opportunities for students to be exposed to L2 input. DTs have the potential to play a significant role in this process, and this potential has been researched for some time. For example, Marefat and Hassanzadeh (2016) used video podcasts (vodcasts) from *NBC Nightly News* as an audiovisual language input in vocabulary instructions with Iranian tertiary EFL students. With regards to exposing learners to vocabulary in meaningful contexts, they argued that decontextualised, discrete language input "happens to desensitise learners to the contextual clues which are otherwise a huge asset in making words remain in their memories" (p. 120).

Providing exposure to authentic language content from real-life situations is strongly recommended by SLA researchers who favour communicative language teaching (CLT). Such language teaching focuses on language use (communication) rather than usage (grammar) and is a sociocultural approach to language teaching (Canale & Swain,1980). They also made a distinction between grammatical and communicative approaches to L2 teaching. In the grammatical approach, lessons focus on linguistic or grammatical forms (for example, related to phonology, morphology, syntax or lexis) and emphasise writing grammatically correct sentences. On the other hand, adopting a communicative approach requires focusing on communicative functions (for example, inviting, apologising, and describing) and how grammar could help in expressing these functions appropriately. Therefore, using authentic input may be easier when adopting a communicative rather than a grammatical approach.

DTs offer opportunities for authentic language input more easily than ever before. It is therefore unsurprising that teachers have used DTs to facilitate exposure to L2 input. For instance, in a study with nine university lecturers of ESL in Chile, Cárdenas-Claros and Oyanedel (2016) found that all participants thought that DTs made it easier to access "updated, authentic and contextualised materials for their classes" (p. 218). This finding suggests efficiencies in teachers' lesson preparation. While some teachers used the internet as the main source of input (oral and written) for their language courses, others used internet resources to complement and enrich the activities from the textbook they used for their classes.

Rather than the amount or authenticity of language input, for Krashen (1981, 1985, 1989), language input has to be *comprehensible* to L2 learners. According to him, 'comprehensible input' denotes language input that contains structures that are slightly beyond the current level of the learner's language proficiency. The underlying argument is that if L2 learners are exposed to language structures below or above comprehensible input, the language content may be either too easy or too complex for them. Thus, Krashen argues that language input for L2 learners has to be comprehensible, for example, through modifying the input or providing contextual clues. As such, L2 teachers leverage DTs to provide comprehensible L2 input. For example, Mayer et al. (2020) recommend that when students are viewing a video in their L2, adding subtitles and making sure the pace is slow enough may help with language learning. Additionally, in a study on the effectiveness of a digital pen-based learning system to support an English listening course, Tan et al. (2020) developed a system providing "learners with different degrees of assistance [that could] make the listening input more comprehensible" (p. 792). Their system had three main functions. The first, the listening function (LF), provided the least support as it was similar to listening to a text in a real situation (normal speed). The learners could also listen to the text repeatedly if needed. Secondly, the repeat one sentence function (RSF) helped slow down the speaking rate and displayed the written text on the screen, and learners could slow it down further if needed. Finally, the learn the words function (LWF) helped learners identify and learn unknown words. This system appears to offer comprehensible input (aural or visual), which is necessary for learning L2 (Krashen, 1981).

With DTs, it may be possible for learners to choose modes of input that cater best to their individual learning styles and needs, which are then enhanced when they develop some DT competence. For instance, in a study on CALL integration into a tertiary-level ESL listening strategies course, O'Brien and Hegelheimer (2007) argued that podcasts and vodcasts give students access to language input in modes different from their typical mode (for example, textbooks). They found that podcasts helped in exposing students to a variety of spoken English by native and nonnative speakers. Using podcasts meant students were able to listen to them more than once in their own time. Additionally, ESL lecturers in Cárdenas-Claros and Oyanedel's (2016) study said that DTs have provided learners with the opportunity "to search for, select and evaluate sources and materials" on their own rather than a teacher doing it for them, thus, increasing learner "autonomy and fostering lifelong learning skills" (p. 214). Although these studies are in the tertiary context, such findings indicate that DTs could help primary teachers in providing their L2 learners with a variety of options to choose from and allow students to learn at their own pace.

Taking a step further with language input, Smith (1993) asserts that "enhancing" input by making language features salient needs to be a critical aspect of L2 instruction (p. 165). For example, with interactive whiteboards, teachers could highlight words, phrases, and language chunks to draw students' attention to vocabulary and grammatical features. At times, salience can involve "error flags" (Smith, 1993, p. 177), drawing learners' attention to language errors rather than the correct forms. While Ellis (2008) argues that teaching grammatical forms, which is also known as form-focused instruction (FFI), is essential for SLA, making input salient is an important aspect of FFI. Although FFI is often associated with grammar, a few studies (for example, Marefat & Hassanzadeh, 2016) examine its potential in vocabulary development. Long (1988, 1991) differentiated two types of FFI as 'focus on forms' (FonFs) and 'focus on form' (FonF). In lessons based on FonFs, the content centres on linguistic items such as grammatical structures, notions, and lexical (vocabulary) items. Therefore, such lessons make input salient by explicitly teaching isolated discrete grammar points and vocabulary items, such as 'relative clause', 'the past tense' or 'synonyms'. Unlike FonFs, the teacher in FonF "overtly draws students' attention to linguistic elements as they arise incidentally in lessons whose overriding focus is on meaning, or communication" (Long, 1991, p. 46). Ellis (2015) further argues that L2 learners would benefit more from FonF than from FonFs because the former can help learners develop not only language accuracy but also language fluency. However, making input salient may be easier in lessons on FonFs whether or not the teacher adopts a deductive or inductive approach.

A deductive approach to FonFs follows presentation-practice-production (PPP) sequencing consisting of "the presentation of a linguistic feature, followed by first controlled practice and subsequently free production involving contextualized grammar activities" (Ellis, 2015, pp. 1-2). On the other hand, with an inductive approach to FonFs, learners are prompted (for example, by asking questions) to discover the rules and structures in the L2 input presented to them, requiring them to formulate rules governing it. An important difference between deductive and inductive approaches is that learners are passive recipients of L2 input in the former and active participants in the learning process in the latter. However, a common denominator of both approaches is making input salient (i.e., easily noticeable), for example, using inductive or deductive consciousness-raising tasks as in Mohamed (2004). According to Schmidt (1990), it is through continually noticing grammatical forms that L2 learners become aware of those features. It was important to see if participants in my project used such strategies in their teaching.

From the claims of SLA researchers discussed here (Canale & Swain, 1980; Ellis, 2005; Krashen, 1981, 1985, 1989; Smith, 1993), it is clear that L2 learners need to be exposed to extensive amounts of target language input, whether authentic, comprehensible or enhanced. Their contentions also imply that the input needs to be deliberately selected and used to facilitate L2 learning. With such importance given to language input in SLA, I was interested in exploring the English language input Maldivian primary ESL students are exposed to and, in addition, to seek the ways in which DTs facilitate teachers to provide their students with the much-needed language exposure.

Language use

Nonetheless, an overemphasis on language input may result in teachers focusing more on receptive skills (i.e., listening and reading) rather than on productive skills (i.e., speaking and writing). After all, the ultimate goal of ESL instruction is to enable learners to acquire both productive and receptive language skills. However, the opportunities students get to use language depend on teachers' pedagogical thinking, focus and practices in DT-integrated English lessons. For instance, Ding et al.'s (2019) qualitative case study with 12 Taiwanese secondary EFL teachers reported that teachers adopted three different content-specific practices although they used the same digital resource (PPTs and videos) in their lessons. The first was skill-based practices, where DTs facilitated the repetitive drilling of native language patterns, emphasising proper pronunciation. The second was rule-based practices which involved DT use to support grammar explanations and practices. The third and final one was function-based practices in which DTs facilitated students' interaction and communication. While students’ engagement in learning varied depending on whether the focus was on skill, rule or function, the purpose of using DTs such as PPTs and videos was mainly for presentation, according to Ding and colleagues. Similarly, Andrei’s (2017) study with three ESL middle school teachers in the US highlights the importance of carefully planning lessons that use DTs. Andrei made the recommendation based on the finding that although teachers regularly used digital boards to display journal prompts, they did necessarily encourage students to interact with what was displayed on the boards. These findings indicate that rather than DT itself, it is the teachers’ pedagogical thinking, planning, and practices related to DT use that decide how meaningful the opportunities provided for students are to use the target language.

Therefore, to take full advantage of DT affordance for more meaningful language use, L2 learners need the opportunity to use DTs “to respond to genuine communicative needs in realistic second language situations” (Canale & Swain, 1980, p. 27). For example, to provide Turkish university students with the opportunity to use English for meaningful tasks based on real-life scenarios, Yukselturk et al. (2018) adopted game-based learning with *Kinect*, a motion-sensing input device. They found that the game players achieved significant developments in their listening and speaking (oral) skills, both of which they claim are given limited attention by universities with their heavily content-focused teaching. In addition to communication, collaboration in real-life-like situations is also possible with DT-enhanced lessons. For instance, in real-life, writing is no longer an individual task when people work on projects together. In such situations, DTs make it easier for learners to work collaboratively, as Cárdenas-Claros and Oyanedel (2016) found. They reported their teachers sometimes used the computer to take notes collaboratively with their students or asked students to use the Google Docs application to write collaboratively. These studies suggest that students’ language use (for speaking and writing) in meaningful contexts can be facilitated with the help of DTs.

With the help of DTs, learners can use L2 in meaningful situations and reflect on their own writing and speaking to improve language use. As such, a teacher may record individual students’ presentations and have them watch or listen to themselves to think critically about aspects they feel need urgent attention. For instance, to examine the effect of digital storytelling on EFL learners' speaking skills, Hwang et al.'s. (2016) students used a web-based multimedia system for storytelling. Since the digital storytelling system that they developed allowed students to record and share their stories as audio files, students were able to listen to their own and others' recorded spoken language afterwards. They found that students "listened to their own audio files to evaluate…the content and find out mistakes in their speech and then re-record with a more modified and improved content" (Hwang et al., 2016, p. 229). Unlike with spoken language, self-reflection is much easier with written samples, as word processors and software (that check grammar and readability) could help identify students' mistakes and make them aware of common issues in their L2 writing.

Literature stresses the importance of creating opportunities for L2 learners to use the target language in real-life situations and facilitate self-reflection to improve their language production (such as speaking and writing). However, what appear to be common teacher-centric pedagogies as practised in Maldivian schools may adversely affect opportunities for primary ESL students to use English in meaningful, authentic situations.

Learners' affective state

In addition to providing language exposure and opportunities for language use, making learners feel relaxed, comfortable, motivated, and less anxious is also paramount for successful L2 learning. In Krashen's (1981) terms, a low 'affective filter' is necessary to ensure learners are in a better mental and emotional state and have space to learn L2. Similarly, VanPatten and Williams (2015) argue that "Learners who are comfortable and have a positive attitude toward language learning have their filters set low, allowing unfettered access to comprehensible input" (p. 27). In contrast, learners experiencing high anxiety, low motivation, boredom, and negative emotions have a higher 'affective filter', which could block access to comprehensible input, thus, hindering language learning. Therefore, it was useful to notice the strategies participants in my research used to lower students' affective filter when preparing them for learning.

Therefore, 'preparing' students for the lesson may help make L2 learners feel at ease and ready to learn. Applying Aubertine's (1968) "set induction" (p. 363) concept might be one way to help L2 students to be in the right mindset to participate actively in future tasks. A 'set' is a preinstructional procedure or an initial instructional act to hook learners into learning. A set may be 'induced' (because it is a deliberate act on the teacher's part) at the beginning of the lesson or during the course of the lesson, for example, to introduce a concept, to initiate a discussion, to begin a new unit of work or to prepare for a practical session. Perrott (1982) asserts that “the activities which precede a learning task have an influence upon the outcome of that task and that some instructional sets promote learning better than others” (p. 21). Although teachers may use videos, audio, images or graphics to activate learners’ background knowledge in preparation for learning (Cárdenas-Claros & Oyanedel, 2016), learners may grasp and remember core concepts and ideas better with videos than with static media (Gedera & Zalipour, 2021). However, simply showing a video or an image (stimulus) is insufficient as it requires deliberate designing and incorporation in the instruction (Schuck, 1970). “The passage from the known to the new material” (Schuck, 1981, p. 228) is a key teacher task to connect videos or images with what students will be learning. Unless that link is established, the mere use of DTs (for example, to display an image) is unlikely to either facilitate L2 learners to be ‘ready’ for the lesson or reduce anxiety related to learning something new or difficult.

Student motivation is also an important aspect of creating a safe, productive, and nonthreatening learning environment, and DTs can help teachers with this goal. However, motivating students might mean that teachers try different ways to gain their attention or add an element of fun or rewards to lessons. For instance, Chinese secondary English teachers in Li’s study (2014) perceived DTs as motivational tools. For them, the computer was a “novel tool to deliver lectures and to retain the students’ interest and attention” (p. 14). In another study, teachers viewed the multisensory experiences that DTs afford as opportunities to grab L2 learners’ attention. A participant teacher in Li and Walsh’s (2010) study on DT use in Chinese EFL classes remarked, “I think it [DT] arouses students’ interest in learning English” (p. 111). Another teacher commented, “Students are delighted to see pictures, animations, even some of their photos being shown in class” (p. 112). Also, in both Hashim et al.’s (2019) study with Malaysian secondary ESL students and Hung’s (2017) with Taiwanese tertiary EFL students, they attributed student motivation to the fun element in gamified learning (using *Kahoot*, *Socrative* or PowerPoint Challenge Game).

On the other hand, for Tan et al. (2020), motivation is similar to dangling a carrot or waving a stick. In their study with Taiwanese secondary EFL students, they found that reward mechanisms motivated students to use lesson assistance during independent practice. As listening at normal speed was the learning goal, listening to the same sentence repeatedly and slowing down resulted in earning fewer points than listening at the normal speed. Rewarding students to motivate them is also reported by Homer et al. (2018). They found that primary ESL students enjoyed earning digital badges and points and believed that such reward mechanisms improved their motivation and participation in learning. Interestingly, while teachers awarded points for desired behaviour (such as listening to the teacher, doing reading, and responding to questions), they also deducted points for undesired behaviour. Such studies indicate that L2 learners' affective state could have an impact on their language learning experience. To lower their affective filter, teachers must ensure that L2 learners are prepared, relaxed, comfortable, and motivated to learn (Krashen, 1981). In the Maldives, teachers frequently use extrinsic rewards such as paper-based stickers, badges, and certificates are common practices to motivate students and to modify behaviour. These approaches are used to motivate students to behave appropriately and complete assigned work (Fastier & Mohamed, 2015; Ibna, 2018). Therefore, it was important for me to notice whether and how Maldivian teachers use DT affordances to motivate primary ESL students.

The literature reviewed in this section shows that language exposure, language use, and learners' affective state are recurrent themes in SLA research. While I have included various studies that used DT affordances to facilitate L2 learning, most studies do not discuss their findings in relation to any DT-integration frameworks and models or address contextual complexities surrounding DT use in pedagogical practices. The next two sections focus on this gap.

DT-Integration Frameworks and Models

DT integration in education is operationalised differently by different scholars. For Cuban et al. (2001), DT integration is understood and examined in terms of different levels of DT use in classrooms: low-level (for example, students doing internet searches) or high-level (for instance, students doing PowerPoint presentations). For Hennessy et al. (2005), DT integration is how teachers use DTs to conduct already familiar tasks more productively and how using DTs can reshape these tasks. While Hew and Brush (2007) defined DT integration as DT use for instruction purposes, Cullen and Greene (2011) defined it as using DTs in teachers' everyday practices and curricular plans. While the definitions of DT integration may vary, two elements are noteworthy; these are the role of teachers in DT integration and the levels of DT use by teachers and students. Therefore, in this section, I examine various frameworks and models for DT integration that focus on teachers' knowledge and attitudes related to DT integration and levels of DT use in classroom practices. The models and frameworks I discuss here are TPACK, TAM, and SAMR.

The TPACK Framework: Knowledge Constructs for DT Integration

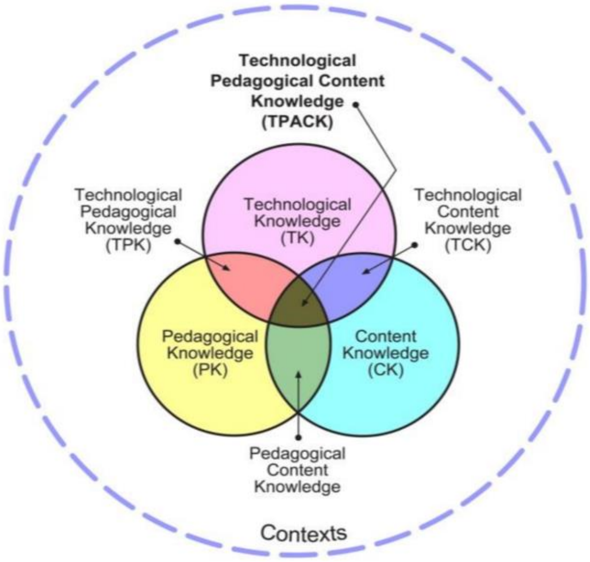
Technological pedagogical content knowledge (TPACK) is the first framework of interest because it centres attention on the value of teachers' professional learning with, about, and through digital technologies being closely linked with classroom practices. Mishra and Koehler (2006) developed this model based on Shulman's (1986) seminal work on pedagogical content knowledge (PCK). PCK is formed by integrating content knowledge (CK) and pedagogical knowledge (CK). While CK represents the knowledge of the discipline, PK deals with the knowledge of teaching, classroom management and organisation. Shuman contended subject matter knowledge and pedagogical skills independently was insufficient. Instead, blending of both (PCK) provides teachers "an understanding of how particular topics, problems, or issues, are organized, represented and adapted to the diverse interests and abilities of learners, and presented for instruction" (Shulman, 1986, p. 8). Several models and frameworks, including Mishra and Koehler's (2006) TPACK, integrate technology, pedagogy, and content in much the same way that Shulman proposed PCK.

The TPACK framework identifies the types of knowledge teachers need to skilfully use DTs for teaching and learning. As illustrated in Figure 2.2, the framework consists of three knowledge constructs, namely content knowledge (CK), which refers to subject discipline knowledge, pedagogical knowledge (PK) or knowledge related to instructional theory and practices, and technological knowledge (TK), which is knowledge about DTs. The framework illustrates how these basic knowledge constructs intersect at TCK (knowing about and how to use DTs for learning), PCK (knowing how to adapt instruction based on subject content), TPK (having the confidence to support and transform instructional strategies through using DTs), and TPACK. The final intersection of all constructs shows the 'sweet spot' of integrating DTs, pedagogy, and subject-specific content knowledge, which Mishra and Koehler (2006) argue is the optimum connection point for facilitating learning with DTs.

Although the dashed outer circle in the TPACK framework denotes 'context', the diagram does not specify what might constitute the context (see Figure 2.2). This 'openness' about the context allows researchers to explore teachers' practical application of TPACK and consider contextual factors of interest. Adam (2015), for example, explored the impact of Maldivian teacher educators' social, religious, and pedagogical backgrounds on their practices with DTs. These contextual factors were also relevant to my study, for it was also located in the Maldives. I was mindful of these factors as I undertook my data collection.

Figure 2.2

The Technological Pedagogical Content Knowledge (TPACK) Framework

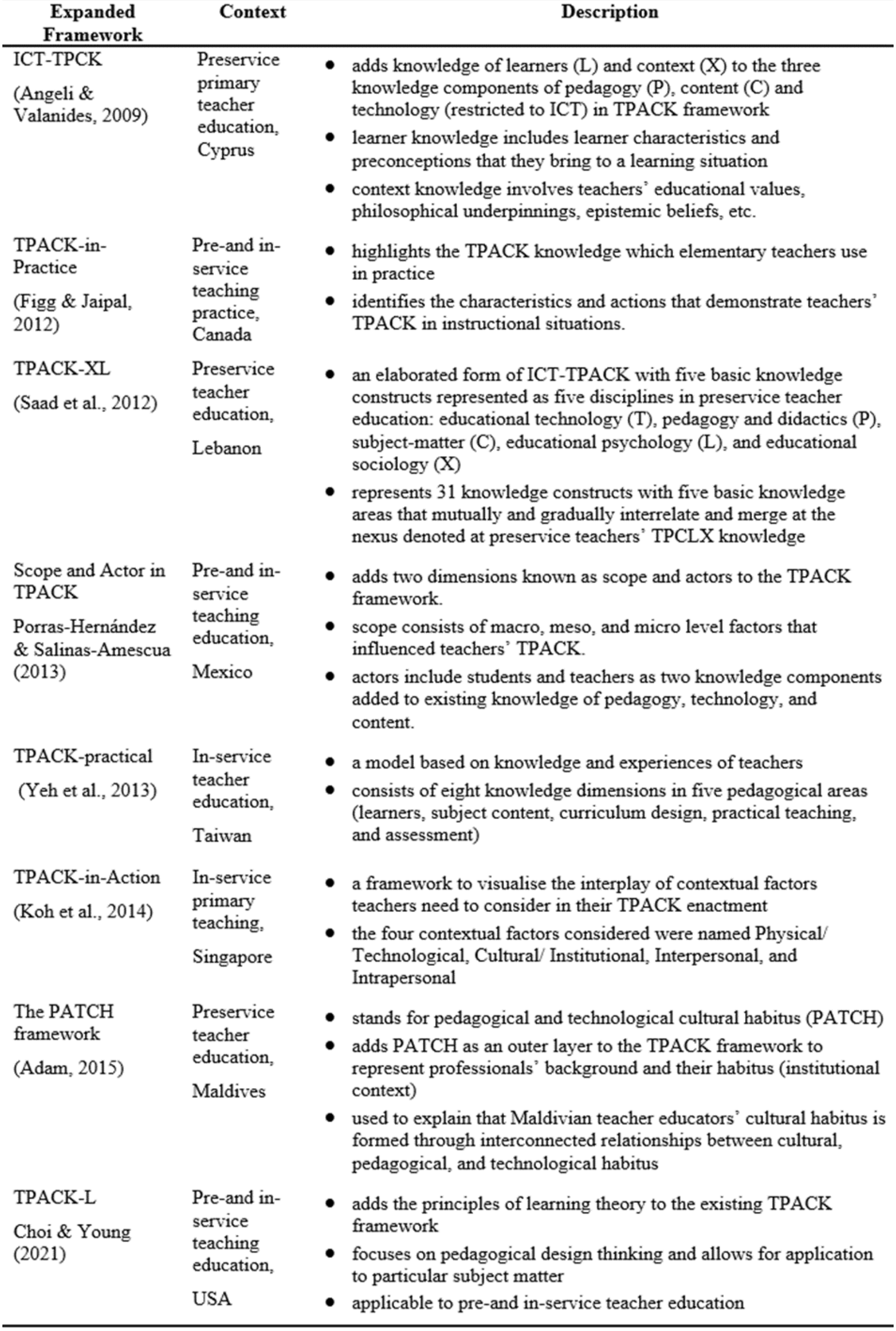

Technological Pedagogical Content Knowledge (TPACK)
Technological Pedagogical Knowledge (TPK)
Technological Knowledge (TK)
Technological Content Knowledge (TCK)
Pedagogical Knowledge (PK)
Content Knowledge (CK)
Pedagogical Content Knowledge
Contexts

Note. From *The TPACK Image* by M. J. Koehler and P. Mishra, 2012. Copyright 2012 by tpack.org.

Since 2006 when Mishra and Koehler first presented the TPACK framework, it has engendered considerable investigation by researchers interested in how teachers learn to integrate DTs into their practices. Table 2.2 outlines ways in which TPACK has been contextualised, expanded, and amended in other studies. The table clarifies the applicability of TPACK as a framework for examining teachers' DT integration across countries and contexts.

Table 2.2

Expanded Frameworks of TPACK



Expanded Framework	Context	Description
ICT-TPCK (Angeli & Valanides, 2009)	Preservice primary teacher education, Cyprus	• adds knowledge of learners (L) and context (X) to the three knowledge components of pedagogy (P), content (C) and technology (restricted to ICT) in TPACK framework • learner knowledge includes learner characteristics and preconceptions that they bring to a learning situation • context knowledge involves teachers' educational values, philosophical underpinnings, epistemic beliefs, etc.
TPACK-in-Practice (Figg & Jaipal, 2012)	Pre-and in-service teaching practice, Canada	• highlights the TPACK knowledge which elementary teachers use in practice • identifies the characteristics and actions that demonstrate teachers' TPACK in instructional situations.
TPACK-XL (Saad et al., 2012)	Preservice teacher education, Lebanon	• an elaborated form of ICT-TPACK with five basic knowledge constructs represented as five disciplines in preservice teacher education: educational technology (T), pedagogy and didactics (P), subject-matter (C), educational psychology (L), and educational sociology (X) • represents 31 knowledge constructs with five basic knowledge areas that mutually and gradually interrelate and merge at the nexus denoted at preservice teachers' TPCLX knowledge
Scope and Actor in TPACK Porras-Hernández & Salinas-Amescua (2013)	Pre-and in-service teaching education, Mexico	• adds two dimensions known as scope and actors to the TPACK framework. • scope consists of macro, meso, and micro level factors that influenced teachers' TPACK. • actors include students and teachers as two knowledge components added to existing knowledge of pedagogy, technology, and content.
TPACK-practical (Yeh et al., 2013)	In-service teacher education, Taiwan	• a model based on knowledge and experiences of teachers • consists of eight knowledge dimensions in five pedagogical areas (learners, subject content, curriculum design, practical teaching, and assessment)
TPACK-in-Action (Koh et al., 2014)	In-service primary teaching, Singapore	• a framework to visualise the interplay of contextual factors teachers need to consider in their TPACK enactment • the four contextual factors considered were named Physical/ Technological, Cultural/ Institutional, Interpersonal, and Intrapersonal
The PATCH framework (Adam, 2015)	Preservice teacher education, Maldives	• stands for pedagogical and technological cultural habitus (PATCH) • adds PATCH as an outer layer to the TPACK framework to represent professionals' background and their habitus (institutional context) • used to explain that Maldivian teacher educators' cultural habitus is formed through interconnected relationships between cultural, pedagogical, and technological habitus
TPACK-L Choi & Young (2021)	Pre-and in-service teaching education, USA	• adds the principles of learning theory to the existing TPACK framework • focuses on pedagogical design thinking and allows for application to particular subject matter • applicable to pre-and in-service teacher education

Many of these expanded models added knowledge components to the original TPACK framework. For instance, Angeli and Valanides' (2009) ICT-TPCK included learners and context as additional knowledge constructs rather than situating their framework within a broader institutional or societal context. In their model, teachers' contextual knowledge ranged from "the workings of the classroom, to the educational values and goals, as well as their philosophical underpinnings in conjunction with teachers' epistemic beliefs about teaching and learning" (Angeli & Valanides, 2009, p. 158). Although the framework considered tool affordances and constraints (opportunities and barriers), it did not consider broader national or school contextual factors. As an advanced lens of ICT-TPCK for preservice teacher educators, Saad et al. (2012) developed TPACK-XL. For them, learner knowledge (for instance, characteristics of new generations of learners who have grown up with the ubiquity of DTs) is knowledge of educational psychology, and context knowledge is knowledge of educational sociology. Similar to Angeli and Valanides' (2009) ICT-TPCK, Saad et al. (2012) also considered context as a type of teacher knowledge (of educational sociology). The same applies to Choi and Young's (2021) recently expanded TPACK-L framework. They argue that learning theory needs to be added to TPACK as an additional knowledge construct. All these models added knowledge constructs (learner, context, learning theory) rather than situating TPACK in broader sociocultural contexts of nations and educational institutions. Even the expanded frameworks that argue for their application in actual classrooms (for example, Figg and Jaipal's (2012) TPACK-in-Practice and Yeh et al.'s (2013) TPACK-Practical) do not consider the contextual factors at the institutional level which could affect teachers' DT use in their own classrooms.

Some frameworks address contextual factors that could enhance or impede teachers' classroom DT use. For example, Porras-Hernández and Salinas-Amescua (2013) added actor and scope to expand TPACK and integrated teachers' self-knowledge and knowledge of students into the TPACK framework. They proposed that TPACK can be influenced by three contextual levels: macro, meso, and micro levels. The macro level refers to sociopolitical, technological, and economic contexts (for example, educational policy changes) which may impact teachers' DT integration. The meso level corresponds to school contexts, including school culture and leadership that shape teachers' DT use. The micro level refers to classroom factors, including "the expectations, beliefs, preferences, and goals of teachers and students as they interact" (Porras-Hernández & Salinas-Amescua, 2013, p. 230). Similarly, Koh et al.'s (2014) TPACK-in-Action model addressed cultural and institutional contexts as

TPACK factors, presenting them as four dimensions: intrapersonal, interpersonal, cultural/institutional, and physical/technological dimensions. For example, the physical/technological dimension might be very important in the Maldivian context because resourcing is often an issue as its islands are geographically dispersed. However, as the availability of, for example, DT infrastructure in a school may not necessarily guarantee students' and teachers' access to DTs, differentiating school and classroom-level DT access is equally important. Such a consideration was important in my study.

Another important feature to highlight is that only a very few of these expanded frameworks consider subject-dependent TPACK enactment. For instance, Figg and Jaipal (2012) developed the TPACK-in-Practice framework to design teacher education workshops to enable teachers to use DTs in authentic learning contexts. Similarly, Yeh et al. (2013) proposed TPACK-Practical as a subject-dependent framework and emphasised considering teachers' experiences as much as their knowledge when teaching with DTs. Considering TPACK as subject-independent leads to ignoring the possibility that discipline-specific content and pedagogy could influence how teachers use DTs in specific subjects they teach. Therefore, teachers' TPACK enactment needs to be explored taking into consideration a specific subject content.

Overall, however, Adam's (2015) PATCH framework exploring interconnected relationships among teacher educators' pedagogical, technological, and cultural habitus in the Maldivian context offers a better foundation for understanding TPACK in my intended study of Maldives' primary school classrooms. The context in Adam's PATCH framework, centred on examining DTs in teacher educators' practices, includes professionals' backgrounds and habitus—otherwise known as institutional contexts. Even so, her PATCH framework offers an understanding of the impact Maldivian teachers' professional and sociocultural contexts and backgrounds may have on their pedagogical practices with DTs.

In short, this subsection on DT integration frameworks focused on the knowledge constructs required for DT integration. In doing so, I have discussed how various scholars and researchers have contextualised, expanded and modified Mishra and Koehler's (2006) TPACK framework. The next subsection focuses on the attitude towards DT integration as teachers' perceptions about DT use can also influence their pedagogical practices with DTs.

Technology Acceptance Model (TAM): Attitudes about DT Integration

Teachers' attitudes regarding DT integration tend to depend on how beneficial they perceive DTs to be for them and their students. Initially, the idea of people's acceptance of DTs as part of educational practices was introduced by Davis (1986, 1989) through the technology acceptance model (TAM). This model suggests two main determinants of DT acceptance: perceived usefulness (PU) and perceived ease of use (PEU). For example, in the teaching context, PU means teachers perceive that using a specific DT will benefit their teaching and students' learning. PEU is the degree to which teachers expect DTs to be easy to use. The model was developed initially for the business field to examine employees' acceptance of integrating DTs in their workplace. TAM has also gained popularity among educational researchers interested in teachers' DT-integration attitudes, intentions, and behaviour (actual use). For example, using a survey to examine preservice teachers' computer attitudes in Singapore, Teo et al. (2008) reported that perceived usefulness was significant in determining preservice teachers' attitudes toward computer use. More recently, in their study on in-service English teachers' perceptions of the use of augmented reality (AR) in Malaysian ESL classrooms, Salmee and Majid (2022) found that teachers' PU and attitudes directly influence their behavioural intention to use DTs in ESL classrooms. As teachers' PU seems to influence not only their intention but also the actual use of DTs, it was important for my study to explore Maldivian primary teachers' attitudes about DT integration.

In the original TAM model, design features of a specific DT were understood as external variables, indirectly affecting attitude and behaviour through PU and PEU (Davis et al., 1989). However, over time, many researchers have extended TAM with different external factors as teachers' DT acceptance may be influenced by a wide range of sociocultural and educational factors. For example, in their study examining teachers' perceptions of an augmented reality tutoring system, Ibili et al. (2019) included social norms, anxiety, and satisfaction as external factors. On the other hand, to investigate the technology acceptance of preservice teachers in Turkey, Gurer (2021) took facilitative conditions (in the organisation), subjective norms (social pressures), and technology self-efficacy as external variables. These researchers argue that adding these variables is crucial to increasing the model's predictive validity and understanding DT acceptance better. In my study, I too needed to explore various external factors that might influence teachers' pedagogical practices with DTs.

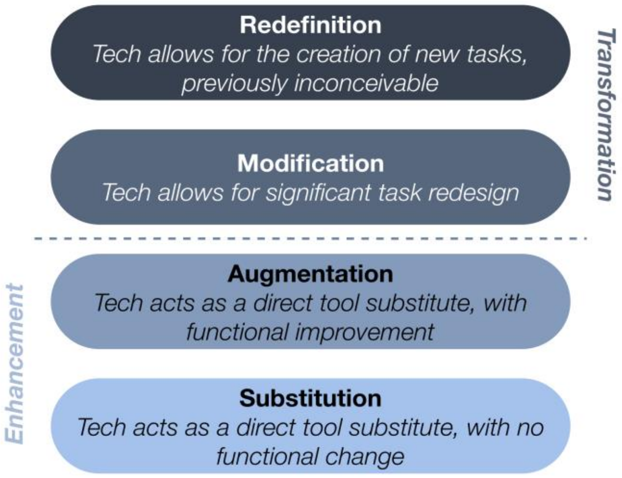
Although some TAM studies have used teachers' DT use intentions to draw conclusions about their actual DT pedagogical practices, they acknowledge gaps related to teachers' attitudes, intentions, and behaviour. For instance, in their mixed-methods study exploring the intention-behaviour link in TAM in the context of foreign-language teaching in China, Liu et al. (2019) found that there was no significant relationship between teachers' intention and their actual student-centred DT use. Their qualitative data revealed that contextual factors such as teachers' prior experience with DTs, their TPACK, and their beliefs, coupled with Chinese teaching cultural practices and assessment pressure, played a role in teachers' intention-use gap. They suggest that this intention-behaviour gap is linked with contextual factors influencing teachers' DT adoption into their practices. TAM is unlikely, therefore, to be insufficient to accommodate both external (for example, policies, DT resourcing, and support) and internal (beliefs, knowledge, practices) complexities affecting teachers. As it is timely for me to explore teachers' attitudes and actual use of DTs, taking into account the interplay of various factors that might contribute to possible mismatches in either attitudes and/or intentions regarding their pedagogical practices with DTs, I then wondered if the SAMR model had something to offer my study. This model is explored next.

The SAMR Model: Levels of Practices with DTs

Puentedura (2016) argued that it is crucial to regularly re-examine teachers' pedagogical practices with DTs to check that the best possible use of DTs is being made for teaching and learning. While TPACK focuses on teachers' knowledge and practices in relation to classroom value, TAM focuses on perceptions, attitudes, and intentions. SAMR explores how DTs are used in relation to pedagogical practices and used to facilitate student learning. The SAMR model structures DTs in relation to pedagogy via four levels of pedagogical action or change: (S) substitution, (A) augmentation, (M) modification, and (R) redefinition (see Figure 2.3).

Figure 2.3

The SAMR Model


Redefinition
Tech allows for the creation of new tasks, previously inconceivable
Modification
Tech allows for significant task redesign
Transformation
Augmentation
Tech acts as a direct tool substitute, with functional improvement
Substitution
Tech acts as a direct tool substitute, with no functional change
Enhancement

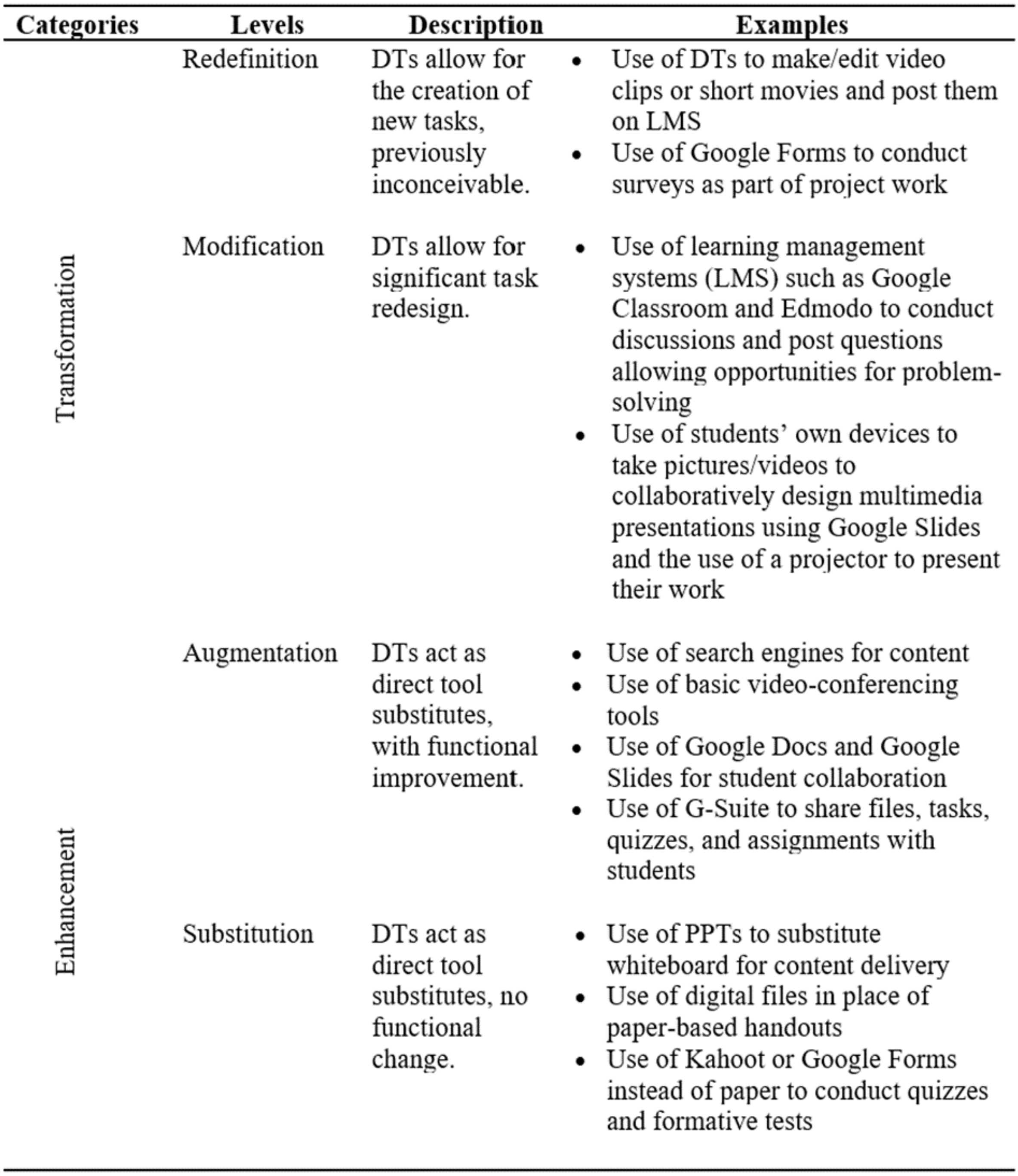
Note. From “SAMR: Moving from enhancement to transformation” by R. Puentedura, 2012. Copyright 2012 by CC BY-NC.

Puentedura (2012) argues that the four levels suggest a continuum ranging from merely swapping one tool for another, as in substitution (such as writing using a Google Doc instead of using pen and paper), to full redefinition, where the tool facilitates learning that otherwise could not have been conceived of or occurred without it (such as students’ use of Google Forms to conduct a class survey or being able to collaborate on and chat with each other about writing a single document, regardless of whether they are physically present or not). The examples I have provided in Table 2.3 clarify what DT integration may look like in practice at different levels of the SAMR ladder. The model is built on the premise that while DT integration at the substitution and augmentation level can potentially enhance learning, DT use at the modification and redefinition levels is more likely to transform the quality of learning. Using available means to transform learning is more likely to develop desirable learning skills such as higher-order thinking, analysing, evaluating, and creating.

According to Puentedura (2016), starting slowly on the DT-integration process is best. He suggests that teachers are most likely to begin with substitution practices and tools. This approach does not alter pedagogical practice, just the tool being used to achieve learning goals. The expectation is that teachers shift to higher levels when they are more comfortable with DTs and are prepared to shift their pedagogical practices. Puentedura (2012) suggests that SAMR is best understood as a ‘ladder’. This visually represents that sense of development and shift as teachers take new steps in their DT-integration journey, with the long-term aim of having a significant impact on student learning as they reach redefinition. For this reason, some researchers associate the SAMR ladder’s highest levels with student-centred pedagogical approaches with DTs. For example, based on a case study on Zoom use by a secondary ESL teacher in Hong Kong during the COVID-19 pandemic, Cheung (2021) argued that by attempting to adopt transmissive pedagogies teachers tended to remain at the enhancement levels of DT integration. According to her, transformation levels require teachers to adopt more student-centred approaches, which were culturally different from common practices. Although researchers frequently use the SAMR model to describe the levels of DT integration into teaching and learning, the model has also attracted criticism for being “blunt rather than fluid in its categories” (Adam, 2015, p. 46).

Table 2.3

Examples of DT Use at Each Level of SAMR



Categories	Levels	Description	Examples
Transformation	Redefinition	DTs allow for the creation of new tasks, previously inconceivable.	• Use of DTs to make/edit video clips or short movies and post them on LMS • Use of Google Forms to conduct surveys as part of project work
	Modification	DTs allow for significant task redesign.	• Use of learning management systems (LMS) such as Google Classroom and Edmodo to conduct discussions and post questions allowing opportunities for problem-solving • Use of students' own devices to take pictures/videos to collaboratively design multimedia presentations using Google Slides and the use of a projector to present their work
Enhancement	Augmentation	DTs act as direct tool substitutes, with functional improvement.	• Use of search engines for content • Use of basic video-conferencing tools • Use of Google Docs and Google Slides for student collaboration • Use of G-Suite to share files, tasks, quizzes, and assignments with students
	Substitution	DTs act as direct tool substitutes, no functional change.	• Use of PPTs to substitute whiteboard for content delivery • Use of digital files in place of paper-based handouts • Use of Kahoot or Google Forms instead of paper to conduct quizzes and formative tests

Studies such as Adam (2015) and Tunjera and Chigona (2020) have found that DT use in classrooms do not go much beyond SAMR's first two levels: substitution and augmentation. The replacement of chalk/board or whiteboard/marker with PowerPoint (PPT) for content delivery is an example of using DTs at the lower levels of SAMR. For example, Adam (2015) found that while the most common tool used by teacher educators in the Maldives was PPT, it was mainly used as a replacement for writing notes on the whiteboard. Similarly, in a study with 400 EFL (English as a foreign language) teachers in middle and high schools in Beijing, Li and Walsh (2010) discovered that teachers' computer use consisted mainly of PPT presentations of visual and written content. Such practices probably indicate the continued teacher-centric focus of traditional pedagogical practices. Traditional practices, often culturally embedded, appear difficult to alter.

In summary, as one model alone was not sufficient to understand the complexities around primary teachers' pedagogical practices with DTs in the Maldivian classroom, I had to take into account aspects of all three of the models I reviewed here. While TPACK helped me understand the different types of knowledge teachers require for DT integration into classroom practices, TAM was useful to explore teacher attitudes regarding DT use for teaching and learning. SAMR, on the other hand, helped me analyse DT-integration levels in primary teachers' practices in their ESL lessons. However, as SAMR is fundamentally about levels of DT integration into pedagogical practices, it tends not to address any contextual factors that may affect teachers' decisions around DT use for teaching and learning (Adam, 2015; Hamilton et al., 2016). The next section discusses contextual complexities around DT integration to address this gap.

Contextual Complexities

The dashed circle in the TPACK framework signifies that context is important (see Figure 2.2). I have also indicated that cultural practices may exert influence in classrooms even without DTs. In this section, I review literature on contextual factors that may influence teachers' pedagogical practices with DTs in a primary ESL context. Considerable research has explored contextual factors that affect DTs in education, for example, Adam (2015), Jita and Munje (2020), and Kaumba et al. (2021). These are broadly categorised as external (national/institutional), or internal (teacher/classroom-related) factors. Ertmer (1999) explored factors in terms of external or first-order barriers and internal or second-order barriers. External barriers tend to focus on aspects such as equipment, time, training, and support. Barriers such as teacher beliefs about teaching and learning constitute internal ones. Ertmer and Ottenbreit-Leftwich (2010) further added teachers' knowledge of pedagogy and technology, self-efficacy, pedagogical beliefs, and culture to the list of second-order barriers. According to Ertmer (1999), second-order barriers are "more personal and more deeply ingrained" (p. 51), and, therefore, removing the first-order barriers does not guarantee that the teachers would automatically use technology meaningfully.

Interestingly, studies often focus on contextual factors related to the institution, such as time, resources, training, and support (as in Almekhlafi et al., 2017; Hechter & Vermette, 2013; Hsu, 2016; Jack & Higgins, 2018; Sadaf et al., 2016; Walsh & Farren, 2018) rather than complexities around teacher-related factors such as teacher beliefs, self-efficacy, and resistance to change (as in Ertmer et al., 2012; Sang et al., 2011). Some studies have explored how DTs used for teaching and learning are affected by factors external and internal to teachers (for example, Hur et al., 2016; Mohamed et al., 2016; Muslem et al., 2018; Shin, 2015). For my study, it is critical that I study my participant primary teachers' technological pedagogical practices in their English lessons against the backdrop of multilevel contextual complexities in order to gain an in-depth understanding of their decisions around DTs use. Therefore, instead of considering these complexities as external or internal factors, I refer to them as national, school, and teacher contexts.

National Context

Though often underemphasised in studies on DTs in education, national-level contextual factors may have an impact on whether and how teachers use DTs for teaching and learning. These factors include educational ICT policy, teacher education, and high-stakes examinations.

National educational ICT policy

First, an educational ICT policy is necessary for a shared vision of DT integration as a nation (Kinaanath, 2013; Koh et al., 2015; Nangue, 2011; Ramorola, 2013). For instance, adopting a multiple case study approach to explore factors enabling the use of DTs by seven Turkish Cypriot subject teachers, Cubukcuoglu (2013) pointed out the importance of having a government ICT policy, especially when the education system is centralised. A national educational ICT policy would influence schools' DT integration mandate, DT investments, and integration support (Koh et al., 2015). A well-developed policy could play a significant role in the sustainability of ICT infrastructure provided to schools irrespective of their geographical location. In the Maldives, there have been two ICT in education master plans. The first was developed for 2015–2018, followed by a second master plan covering 2021–2024 (MoE, 2021). In 2018, the Maldivian government invested a substantial amount in tablets for public school teachers and students. Hence, it was likely to be important that I explore whether a national educational ICT policy was promulgated to school stakeholders and the extent of its impact on public schools' resourcing and scalability of DTs and the use of those tablets for teaching and learning in primary classes.

Teacher education

In addition to a shared vision for DT integration, teacher education has a critical role in laying the foundation for DT use by preservice teachers. Literature over time has raised concerns about teacher education programmes focusing only on technological knowledge, arguing that knowing about DTs does not automatically lead to their meaningful pedagogical use (Hanson-Smith, 2016; Mishra & Koehler, 2006; Polly et al., 2010; Tsai & Chai, 2012). For instance, in their position paper on barriers to DT integration, Tsai and Chai (2012) asserted that the pedagogical use of DTs is not often a major component in teacher education programmes. Hanson-Smith (2016) also highlighted that, more often than not, the focus of teacher education is "the physical or technological apparatus: how to open and save files or how to input content, rather than a close examination of how and why such tools might be used for pedagogical purposes in the classroom" (p. 211).

If teacher educators' own TPACK is underdeveloped, they may not be in a position to demonstrate to preservice teachers how to use DTs in a pedagogically meaningful way, just as Adnan and Tondeur (2018) and Adam (2015) found. In their study with 44 Turkish teacher educators, Adnan and Tondeur (2018) reported that teacher educators in their study could not demonstrate innovative pedagogical practices with DTs as they had limited technological pedagogical content knowledge (TPACK). Similarly, Adam (2015) found that the Maldivian teacher educators in her study used DTs mainly for content delivery. Perhaps such studies indicate that when teacher education programmes do not focus on pedagogical use of DTs, this oversight could create a gap between what preservice teachers learn in teacher education and what they practise in their classrooms as in-service teachers.

Recent literature on DT integration highlights teachers' pedagogical design thinking as a crucial skill in systematically and purposefully designing instructions for using DTs that make learning meaningful. For instance, based on their TPACK-L framework (an expansion of the existing TPACK framework by adding principles of learning theory to it), Choi and Young (2021) argued that, in addition to knowledge constructs, emphasis should also be on pedagogical design thinking. They defined this type of thinking as "a strategic, practical reasoning and situational decision-making design process that professional teachers go through in designing and implementing any level of classroom instruction" (Choi & Young, 2021, p. 232). Koh et al. (2015) also argue that teachers should enact their TPACK "using [pedagogical] design thinking as a strategy to address the complex factors surrounding ICT integrated lesson design" (p. 535). Similarly, Tsai and Chai (2012) believe that teachers' (pedagogical) design thinking could be a "third-order barrier" (making an addition to Ertmer's (1999) first- and second-order barriers) to DT integration if it is not a major component of education programmes (p. 1057). As I was studying primary teachers' pedagogical practices with DTs in their English lessons, it was important for me to examine how the knowledge and skills they gained in their preservice teacher education programme facilitate DT use in their own classrooms.

High-stakes examinations

Apart from the role of teacher education, literature also highlights the influence that high-stakes assessments may have on DT use for teaching and learning (Bindu, 2017; Hew & Brush, 2007; Mohamed et al., 2016). The influence that tests and examinations have on classroom practices, known as washback (as explained in chapter 1), could constrict students' opportunity to use DTs meaningfully for their learning. For instance, in a case study exploring how eight secondary teachers in China integrated DTs into their English lessons, Li's (2014) findings suggested the washback effect of tests exerted "a powerful influence on the teachers' decision-making in how they use technology and to what extent they integrated technology in teaching" (p. 20). Due to cultural and societal beliefs and norms, students' performance in examinations is given great value because often their performance is understood to determine their future in terms of their career or further studies. Exam-oriented teaching may consequently be a significant barrier to DT use (Lim & Chai, 2008; Salehi & Salehi, 2011). According to Tunjera and Chigona (2020), such exam-oriented approaches do not give teachers the flexibility and time to use DTs meaningfully for student learning. In the Maldives, teachers' pedagogical practices often centre on preparing students for examinations (Kinaanath, 2013; Mariya, 2012), resulting in teacher-centric, textbook-driven, exam-oriented instruction (Kinaanath, 2013; Mariya, 2012; Mohamed, 2006; Shiyama, 2020). If such practices are prevalent throughout the Maldivian school system, including primary schools, they might adversely affect primary teachers' opportunities for using DTs to create meaningful learning experiences for their students. It is this point that I needed to be mindful of as I conducted my fieldwork.

In summary, this subsection on contextual complexities explored the impact of national-level factors on teachers' decision around DT use. These factors included national educational ICT policy, teacher preparation programmes, and high-stakes examinations. Next, I discuss the school-level factors that could either facilitate or hinder DT use for teaching and learning purposes.

School Context

At the school level, DT leadership could play a crucial role in facilitating the use of DTs for student learning. While some researchers argue that principals' DT leadership cannot predict teachers' DT use (Lafont, 2011; Raman et al., 2019), others have indicated that it could facilitate schools' DT integration processes (Fisher & Waller, 2013; Tan, 2010; Thannimalai & Raman, 2018). Although "principals have traditionally been looked upon as technology leaders in schools" (Davies, 2010, p. 56), informal technology leaders may also emerge from classrooms, libraries, and computer labs to take up the responsibility of planning for DT integration (Flanagan & Jacobsen, 2003). In a broader sense, technology leaders in a school may be anyone, including the principal, IT coordinator or teachers, who takes up a leadership role in the school's DT-integration process. For instance, while school principals may initiate the DT-integration process and delivery of technology budgets, IT coordinators may be responsible for leading DT integration throughout curricula, and tech-savvy teachers may take leadership in experimenting with new DTs in their pedagogical practices. Hence, in my study, it was useful to deliberately focus on who took up or was assigned to lead the DT-integration initiative of the school and what their roles were as DT leaders.

In her qualitative study on principals' ICT leadership in schools in Canada, the United States, and New Zealand, Yee (1999), whose participants comprised principals, teachers, students, and parents, described DT leaders as those who were visionary, inspirational, innovative, change agents, risk-takers, resourceful, and supportive. It is from such studies that standards (International Society for Technology in Education [ISTE], n.d.) and indicators (Anderson & Dexter, 2005) have been developed regarding DT leadership competencies. The five most common categories used to explore DT leadership are envisioning DT integration, managing DT resources, providing equitable DT access, leading PLD, and continued monitoring and support. In the following sections, I review literature on various aspects of school context that may affect teachers' practices with DTs in their classrooms using four categories: (a) vision for DT integration, (b) DT infrastructure and accessibility, (c) technical support mechanisms, and (d) DT-related professional learning and development.

DT integration vision

Research suggests that schools successfully using DTs in teaching and learning are often guided by a DT-integration plan (Baylor & Ritchie, 2002; Hew & Brush, 2007) or a shared vision communicated via an ICT policy (Nangue, 2011; Vanderlinde et al., 2014; Yilmaz, 2011; Waseela, 2022). For instance, Culatta (2019) believes that a key difference between schools that use DTs effectively and those that do not "comes down to creating a [shared] vision for learning [with DTs] before jumping into buying devices or software" (p. 26). Although DT leaders are responsible for developing and promulgating school ICT policy and vision across all stakeholders (Tondeur et al., 2008; Tondeur, 2020), some researchers suggest that involving stakeholders in developing a DT vision and DT-integration plan is likely to be crucial if continuous commitment and support are desirable (Nangue, 2011).

In addition to national educational ICT policies, school-based ICT ones are necessary because school-level policy contextualises what DT integration means at this local level. For instance, Vanderlinde et al. (2010) found that when developing an ICT policy, one school preferred class-based instruction using ICT, while another wanted students to use DTs for independent and creative work. Clarifying the school's vision and position regarding DT integration is pivotal for community buy-in. Some schools may view instruction with DTs as a separate, parallel track in the curriculum, while others wish to integrate DTs fully into all subjects across the curriculum. DT infrastructure and/or stakeholder beliefs about the affordances of DTs may influence such decisions. I wanted to understand how DTs were used in primary English lessons, the extent to which they differed, and the impact of any school policy on their practices and perceptions.

DT infrastructure and accessibility

Another factor is the accessibility of DTs and the quality of a school's technology infrastructure. Many researchers have reported the availability of DTs as one of the most important enablers of DT use (Buabeng-Andoh, 2012; Cubukcuoglu, 2013; Ertmer et al., 2012). On the other hand, inadequate access to hardware, software, and internet bandwidth are major hindrances to using DTs for teaching and learning (Al-Awidi & Aldhafeeri, 2017; De Freitas & Spangenberg, 2019; Kaumba et al., 2021; Hew & Brush, 2007; Jita & Munje, 2020; Mikusa, 2015; Muslem et al., 2018; Tay et al., 2017). In some schools, teachers may only have access to DTs via a computer laboratory or an audio-visual room (Cubukcuoglu, 2013; Kaumba et al., 2021; Nsolly & Charlotte, 2016; Tachie, 2019). In such circumstances, it may be too difficult for teachers to continually move classes to such facilities, and so they give up trying. Similar examples have led researchers to argue for not only teachers to have access to DTs in their own classrooms (Francom, 2016; Goktas et al., 2009) but also for students to have access to DTs separately from teachers' access (Fikuree et al., 2020, 2021; Lie et al., 2020; Light & Pierson, 2012). In the Maldives, while teachers in urban schools generally have a range of DTs accessible to them in their own classrooms, not all teachers in rural and remote schools have the same level of availability. Many schools, especially on the islands, still depend on computer laboratories or audio-visual rooms to conduct lessons with DTs. Though I did not intend to focus on comparing differences, it was likely that this potential digital divide (DT infrastructure and resourcing) would surface if I recruited both urban and rural schools in the Maldives for my study.

Technical support mechanism

The availability of technical support also plays a crucial role in facilitating teachers' classroom DT use (Assan & Thomas, 2012; Li, 2014, Liu et al., 2018; Lucas, 2018; Nikolopoulou, 2020). For instance, Goktas et al. (2013) accentuated the importance of establishing ICT units and allocating personnel to provide teachers with all the necessary technical support to use technology effectively in their teaching. Earlier, Yilmaz (2011) reported that technical support in terms of repair and maintenance is crucial if teachers are to rely on digital technologies in their classrooms. For example, in her study on principals' lived experiences in ICT-enriched schools in three developed countries, Yee (1999) reported that securing technical support is necessary to maintain a robust ICT infrastructure. Technical support appears to be an enabler that had the highest positive effect on teachers' DT use, as Gürfidan and Koç (2016) discovered in their study on teachers' DT integration in high schools in Turkey. On the other hand, in an online survey with 430 in-service science educators, Hechter and Vermette (2013) found inadequate technical support was a significant barrier to teachers' DT use in K–12 Canadian schools. Similarly, in a 3-year time-series survey conducted in K–12 public schools in the United States to investigate barriers to technology integration, Francom (2020) reported that a decline in technical support over this time period was the second most cited barrier category. In the Maldives, as there are public schools funded by the government and private schools that incur student fees, the technical support mechanism established probably differs. So, exploring technical support available for primary teachers in both public and private schools was helpful in understanding their impact on teachers' DT use for teaching and learning.

DT-related professional learning and development (PLD)

Teachers' DT-based professional learning and development (PLD) opportunities could also have a significant impact on how meaningful teachers' DT use is for student learning. Researchers argue that personalised PLD has a greater impact compared with generic professional development sessions (Mishra & Koehler, 2006; Perkins, 2010; Ruggiero & Mong, 2015; Snow, 2015). Generic professional development tends to focus on transferring content knowledge, compared with sessions that aid teachers to practise different pedagogical approaches in their own classrooms. For that reason, it is the latter that is considered to be more valuable for student learning. Based on a review of 28 experimental studies that examined the effects of teachers' professional development carried out in K–12 schools in the United States, Kennedy (2016) found that developing teachers' practices was more useful than "simply presenting prescriptions or presenting bodies of knowledge" (p. 30). Noticing what teachers say about DT-related PLD opportunities in the Maldives was important. Also, I wanted to find out whether general or tailored PLD better suited my participant teachers' needs.

Literature highlights the importance of PLDs that centre on the pedagogical uses of DTs. For instance, studying the benefits and challenges of DT integration in Québec English schools, Rabah (2015) argued that PLD opportunities need to be about making teachers "buy into the pedagogical value" of various DTs so that they do not view them as "just fashionable add-ons" in curricula (p. 28). On this note, some researchers stress that (pedagogical) design thinking (Choi & Young, 2021; Koh et al., 2015; Tsai & Chai, 2012) needs to be a critical focus of PLDs. For instance, in her study on science, technology, English, and mathematics (STEM) teachers' DT integration in Kenyan secondary schools, Hooker (2017) argues that professional learning should not be merely about DT integration but about exploring "design ideas for innovative uses of available technology to support 21^{s}-century learning" (p. 138). It appears that when pedagogical design thinking is a component of PLD, teachers can design lessons with various DTs in ways meaningful for student learning. It was useful to discover if this was also true in the Maldivian primary schools I studied.

Additionally, given the rapid advancements in DTs, providing PLD opportunities for teachers is, ideally, a continuous, iterative process (Adegbenro & Olugbara, 2018; Hooker, 2017; Jita & Munje, 2020; Liu et al., 2018; Mouza & Barrett-Greenly, 2015). One-off sessions appear insufficient for teachers to gain the knowledge, design thinking skills, and confidence necessary for meaningful student learning when DTs are involved. For instance, based on the findings from focus group interviews with 23 teachers and educational consultants in seven Québec English schools, Rabah (2015) asserts that teachers need more than a couple of training sessions to bring about meaningful changes to their pedagogical practices when using DTs. It is likely that experienced teachers have preferred practices they have established over several years. Adopting new DTs which may disrupt these established beliefs and practices are not an easy task. On the other hand, experienced teachers may call on that experience to cope with any issues that ensue as they disrupt their pedagogy. Research suggests that continuous PLD help teachers reflect on and challenge existing beliefs and practices to overcome existing gaps in pedagogically positive uses of DTs. For example, based on their systematic review of 14 qualitative studies conducted in eight countries to explore the relationship between teachers' pedagogical beliefs and DT use, Tondeur et al. (2017) argued that "long-term professional development is needed to change teachers' pedagogical beliefs and practices" (p. 566). It may be that teachers who regularly use the 'Teaching as Inquiry' cycle (MoE, 2007; Timperley et al., 2014) in their practices can design their own targeted PLD and grow their expertise themselves.

Furthermore, continuous PLD also aligns with the idea of teachers as lifelong learners, a teacher trait important not only to keep teachers abreast of the exceptionally fast DT advancements but also for their professional learning and growth. If so, how can school technology leaders support teachers' ongoing learning about opportunities and possibilities of DT for meaningful student learning? For such support, coaching and mentoring are important PLD formats (Kopcha, 2012; Machado & Chung, 2015; Prestridge & Tondeur, 2015; Rosenberg & An, 2019), as they provide teachers with "just-in-time support, modelling, and apprenticeship" within the context of their classrooms (Kopcha, 2010, p. 186). Ottenbreit-Leftwich et al.'s (2018) 4-year longitudinal study reported that all four participant teachers attributed improvements in their DT use to having mentors (in addition to self-exploration and teaching environments). This finding appears to resonate with the value of apprenticeship and mentoring that Baser et al.'s (2021) later research outlined. Their study with 31 teachers who had gained individualised technology-related mentoring for a two-semester period found that mentoring helped the teachers to integrate DTs into their lessons in ways that were meaningful for student learning. Baser and colleagues attributed the positive outcome of their mentoring process to the ongoing support teachers gain based on their individual needs and pedagogical approach. However, it is important to highlight here that if mentors are simply just another name for IT technicians who resolve technical issues (as in Williams, 2017), mentoring may not result in teacher learning and growth related to their pedagogical use of DTs. So, while troubleshooting can be facilitated by IT technicians (as discussed in the previous section), mentoring for teachers' DT-based PLD needs to be about using DTs in pedagogically meaningful ways.

Some approaches to mentoring are based on a linear, hierarchical relationship where an expert (mentor) teaches a novice (mentee), as in Cotugna and Vickery (1998). Other approaches emphasise collegial collaboration (Gerard et al., 2011; Koh & Chai, 2016) or partnership in learning through comentoring (Jipson & Paley, 2000; Mullen, 2000) or reciprocal mentoring (Gabriel & Kaufield, 2008; Gonzales & Thompson, 1998). While coaching and mentoring typically involve one-to-one support, communities such as a professional learning community (PLC) entail learning from each other through collaboration (Hanson-Smith, 2016; Jones & Dexter, 2014; Wenger, 1998). PLCs are essentially based on Lave and Wenger's (1991) concept of community of practice (CoP). Members in such communities have a shared domain of interest, build a collaborative learning relationship, and develop a shared practice (Wenger, 1998). For teachers' DT-related PLD, both one-to-one and collaborative learning are better strategies than transmitting knowledge in workshop-style sessions (Baran, 2016). A combination of these strategies could provide teachers with opportunities for independent, personalised, and situated learning as well as vicarious learning through collaborations.

When teacher learning is at the heart of DT-based PLD initiatives, teachers are encouraged and supported to make progress from simply incorporating DTs into their existing practices towards using DTs in ways meaningful to students' learning. However, teachers also need regular feedback on their pedagogical practices (Timperley et al., 2007) to improve their pedagogical use of DTs. For instance, in discussing best practices in teacher professional development in the United States, Desimone and Garet (2015) argued that "establishing periodic monitoring and feedback loops is essential" to make professional development effective for teaching practice and student learning (p. 260). So, establishing mechanisms for teachers to gain feedback from technology leaders, colleagues, and students (for example, via student surveys, peer observations or schoolwide research) needs to be an important component of DT-based PLD for teachers. While teachers will be able to make improvements in their DT use based on such information, the school technology leaders can use the data to monitor the impact the use of DTs has on student learning. In the Maldives, all the teachers are mandated by the MoE to complete 15 hours of professional development annually. As literature strongly suggests DT-related PLDs need to be personalised, sustained, and focused on teacher learning and growth, it was paramount to note the extent to which my participant teachers' professional development programmes had such characteristics.

In short, at school-level, factors such as a shared DT integration vision, DT infrastructure and accessibility, technical support, and DT-related PLDs could either facilitate or hinder teachers' attempt to use DTs in their everyday practices. Apart from external factors at both national and school levels, it is possible that complexities within teacher level could also impact teachers' decisions around DT use. Therefore, the next subsection focuses on teacher-level factors affecting pedagogical use of DTs.

Teacher Context

Teachers' pedagogical practices with DTs are not only influenced by complexities in the national and school context but also by factors related to themselves. These factors include: (a) beliefs and practices, (b) embracing change, (c) perceptions related to DT use, and (d) knowledge, skills, and confidence to use DTs. In the following sections, I review literature on these teacher-related complexities.

Beliefs and practices

"A messy construct" is the label Pajares (1992, p. 307) uses for 'belief' because there is little consensus on the exact definition of it as researchers from diverse fields define the term in relation to their own purpose. However, after analysing several definitions, Pajares (1992) defined belief as an "individual's judgment of the truth or falsity of a proposition, a judgment that can only be inferred from a collective understanding of what human beings say, intend, and do" (p. 316). Although we cannot observe beliefs directly, this definition allows us to make inferences about beliefs based on an individual's verbal expressions, predispositions of action, and behaviour. For this reason, inferences about an individual's beliefs should not be made solely on what they say about their beliefs but also on their actions, making observational data a crucial source of such studies.

The term ‘teacher beliefs’ is often associated with, but not limited to, the beliefs they have regarding education in general, pedagogy, learning, and how knowledge is constructed. Pajares (1992) categorises teachers’ educational beliefs as *teacher efficacy* (teachers’ beliefs about their confidence in influencing students’ achievement), *epistemological beliefs* (nature of knowledge), *attribution, locus of control, motivation* (the causes of the performance of teachers and learners), *self-concept, self-esteem* (beliefs about self and self-worth), and *self-efficacy* (the confidence to perform specific tasks). As the behaviour of individuals is strongly affected by their beliefs (Bandura, 1986; Rokeach, 1968), recent studies have tried to establish the extent of the influence and predictability of teachers’ behaviour in classrooms. Therefore, the focus of such studies has been teachers’ pedagogical beliefs (Hsu, 2016; Kim et al., 2013; Teo & Zhou, 2017) and self-efficacy beliefs (Hsu, 2016; Ibieta et al., 2017; Sadaf et al., 2016; Saudelli & Ciampa, 2016; Teo et al., 2018). These studies highlight that both pedagogical and self-efficacy beliefs play a pivotal role in shaping teachers’ instructional practices. Exploring primary teachers’ perception of teaching and learning and their confidence to perform specific tasks in their classrooms was useful for me as these beliefs could affect their pedagogical practices.

The likely influence that beliefs have on teachers’ instructional practices is linked to how beliefs originate and develop over a lifetime. In their seminal works, many researchers have highlighted that beliefs are formed over time through personal experiences (Albion & Ertmer, 2002; Pajares, 1992), first as learners, then through teacher education programmes, and finally, through the classroom culture they build over time as a teacher (Keys, 2007; Richards & Lockhart, 1994). Core beliefs about teaching and learning formed as learners, therefore, tend to influence how teachers process the new information they gain about teaching (Kagan, 1992). Similarly, beliefs acquired over time are likely to have an impact on a teacher’s classroom behaviour (Hsu, 2016; Prestridge & de Aldama, 2016, Saudelli & Ciampa, 2016). Beliefs formed as a learner (Ertmer et al., 2014; Mohamed, 2006), through teacher education (Saudelli & Ciampa, 2016) or through teaching experiences (Prestridge, 2017) have been reported as having a significant impact on teachers’ classroom practices. For instance, in an ethnographic study in the Maldives, Adam (2015) found that deep-rooted social and cultural learning norms influenced teacher educators’ pedagogical practices. These norms included the recitation of the *Qur’an* without understanding, rote learning, authoritative acceptance of delivered knowledge, note-taking habits, and examination-oriented learning. A range of studies in the Maldivian context have also highlighted exam-oriented and syllabus/textbook-driven practices as norms among teachers (Adam, 2015; Fittell, 2014; Kinaanath, 2013; Mohamed, 2006).

Pedagogical beliefs are of interest to education researchers since they are viewed as a strong predictor of teachers' pedagogical practices. Ertmer (2005) defined pedagogical beliefs as the beliefs teachers have about the nature of teaching and learning. Such beliefs may orientate a teacher to either teacher-centric or learner-centric approaches. Teachers' beliefs about the nature of knowledge and learning (epistemological beliefs) can influence their classroom teaching styles (Kagan, 1992; Kim et al., 2013; Nespor, 1987; Pajares, 1992). Teacher-centred beliefs are often rooted in behaviourism, a learning theory which argues that learning is a change in behaviour that can be achieved through repetitions of desired actions (Skinner, 1938). On the other hand, student-centred learning has its roots in constructivism, which encourages teachers to be facilitators of the learning process by supporting students in their knowledge construction through collaborative and other activities that engage them actively in meaningful learning pitched at their zone of proximal development (ZPD) (Vygotsky, 1978).

Numerous studies have found an alignment between pedagogical beliefs and classroom practices (Farrell & Ives, 2015; Hsu, 2016; Saudelli & Ciampa, 2016; Teo et al., 2018). In their study on teacher beliefs and technology integration practices of K–12 teachers, Ertmer et al. (2012) found that 11 out of 12 teachers in their study enacted practices that closely aligned with their beliefs about DT use. However, some studies show inconsistency between stated pedagogical beliefs and teachers' actual practices in the classrooms in DT integration (Liu, 2011; Rahman et al., 2018) and language teaching (Burns, 1990; Farrell & Bennis, 2013; Kumaravadivelu, 1993; Nunan, 1987; Tang et al., 2012). Such discrepancies between stated beliefs and observed practices of the language teachers mean that even if teachers claim allegiance to a particular teaching method, they may fail to practise that in the classroom. These contradictions are often attributed to the 'apprenticeship of observation' (Lortie, 1975; Borg, 2004; Borg, 2009), which refers to the methodological preconceptions that teachers develop based on their own experiences as learners. There are, therefore, mismatches between espoused and actual practices. The argument is that teachers may find it difficult to adapt their practices if they have not had the experience of the practice themselves.

Some studies have reported that an examination-oriented culture is a culprit for inconsistencies between teachers' beliefs and their pedagogical practices (Adam, 2015; Liu, 2011; Mariya, 2012). For example, in their study on teachers' pedagogical beliefs and practices of computer-mediated lessons by six primary teachers in Singapore, Lim and Chai (2008) reported that even though five teachers had constructive beliefs, their practices were teacher-centric and that the reason teachers articulated for this discrepancy was the pressure of preparing students for examinations. Hence, even if they believe in certain practices and approaches, an examination orientation can force teachers into a preoccupation with students doing well in exams rather than focusing on learning deeply. After all, their own performance may be judged by students' exam results. These inconsistencies have also been attributed to not accurately capturing the beliefs or practices of the teachers due to the nature of the studies carried out. One of the criticisms of such studies includes data being collected only through self-reporting instruments (Ertmer et al., 2014; Jack & Higgins, 2018; Mohamed, 2006; Teo et al., 2018). Such criticisms made me realise the importance of not relying only on self-reported data in my study on teachers' pedagogical practices. So, in addition to interviews to understand teachers' pedagogical beliefs, I needed to gather data from lesson observations to capture participant teachers' pedagogical practices to explore whether there was an alignment or inconsistencies in their beliefs and practices.

Embracing change

Once established, beliefs and attitudes are difficult to alter. As explained earlier, teachers' belief systems are built over several years based on their experience as culturally located individuals, as learners, and later through teacher education and classroom practices. According to Rokeach (1968), beliefs in the 'central' dimension of the belief system, such as those related to the purpose of life and religion, are stronger and less likely to be changed, whereas more 'peripheral' ones are those more susceptible to change. Central beliefs include teachers' views about themselves, which, according to Bahcivan and Cobern (2016), are socially constructed and culturally valued by society. Central beliefs also include teachers' epistemological beliefs, such as their beliefs about the nature and source of knowledge. In some societies, teachers are considered authoritative figures and the main source of knowledge (as experts in their field). Such perspectives can have implications for teachers' relationships with students and the approaches they adopt for teaching. In societies that revere teachers as wise experts, the preference may be for teacher-centric pedagogical practices.

There may not be a willingness (by the school community, students or teachers) to adopt student-centric instructional approaches. External contextual influences thus appeared strong.

As a part of central belief systems, teachers' deep-rooted pedagogical beliefs may also be an obstacle to change. Albion and Ertmer (2002) argue that beliefs formed over many years as a learner are "resistant to change because they have been supported by strong authority [their teacher] and broad [societal] consensus" (p. 35). Thus, teachers may, either consciously or unconsciously, accept practices that align with their own beliefs and reject those that contradict them. For example, Mohamed (2008) found that reading about the best practices in the field of second language (L2) instruction did not necessarily result in changes in the ESL pedagogical practices of her participant teachers. While more experienced teachers may have more rigid beliefs about teaching and learning and be less willing to change, novice teachers appeared more open to new ideas. However, Mohamed (2014) showed that experience does not necessarily have an impact on how open teachers are to change. She highlighted that "it is still interesting that a novice teacher with very limited experience seemed to dismiss published literature by notable researchers in the field more easily than the two teachers with more experience and qualifications" (p. 57). Nevertheless, whether experienced or novice, pedagogical beliefs play a major role in adopting or rejecting new ideas in teaching.

Embracing change may be difficult for teachers if the new ways of doing things contradict or challenge their existing pedagogical practices. In such cases, teachers may prefer to continue teaching the way they have been teaching for years, even when they learn about new approaches. For example, as Thornbury (1998) observed, despite new ESL theories and teaching methods, such as task-based learning, teachers have not deviated much from the traditional approaches to teaching language. Some studies conducted in the Maldives indicate the prevalence of teacher-centric approaches among the participant teachers. For instance, in her study exploring the interplay between teachers' beliefs, instructional practices, and professional development, Mohamed (2006) reported that most classroom interactions were mediated by the teacher, who, essentially, becomes the focus. She also noted that grammar-dominated lesson content and knowledge transmission was the preferred model of instruction. These practices are consistent with teacher-centric practices. In another study with three ESL teachers in the Maldives, Mohamed (2014) reported that two teachers who taught grammar explicitly used deductive approaches such as the PPP model. In lessons using a PPP approach, teachers begin by explaining grammatical rules, followed by guided practice through oral/written questions. Students then individually complete tasks based on the specific grammatical component addressed earlier in the lesson. Teaching English based on the PPP model indicates that such instructional approaches are consistently teacher-centred. Changing their practices to align with learner-centred approaches may be challenging for teachers who are habituated to teacher-centric approaches. Therefore, I felt, teachers' pedagogical orientation needed to be a deliberate focus in my study.

In addition to existing practices, teachers' self-efficacy beliefs (associated with knowledge of pedagogical practices) may also impact their willingness to embrace change. Bahcivan and Cobern (2016) argue that teachers' self-efficacy beliefs related to learning and teaching are the weakest beliefs, placing them in the peripheral dimension of Rokeach's (1968) belief system. However, literature on DT integration indicates that teachers' low self-efficacy in terms of self-confidence may create fear of failure, impeding the adoption of new ideas and practices. For instance, Muslem et al.'s (2018) mixed-method research with 26 Indonesian teachers of English reported that, apart from other factors, teachers found it difficult to adopt DTs due to their limited knowledge and skills in using ICT tools. Lee and Tsai (2010) also found that their participant teachers' self-efficacy beliefs or confidence in DT use were crucial predictors of technology integration in their classrooms. Additionally, based on interviews with 30 nonnative English teachers in the Maldives, Mohamed (2008) found that even when teachers were open to change, underdeveloped procedural knowledge of how to alter their practices hindered their efforts. Such findings imply that teachers with high self-efficacy and self-confidence tend to be more open to changes in their practices. Therefore, teachers' underdeveloped procedural knowledge or how to adapt teaching (for instance, to use DTs) can also be an impediment to change.

Apart from teacher-related factors, school culture can play a crucial role in helping teachers embrace change. School culture is understood as visions, norms, beliefs, values, and artefacts shared by the school stakeholders (Gürfidan & Koç, 2016; Tezci, 2011). Positive school culture is where leaders establish a climate that encourages risk-taking, creativity, and collaboration. Teachers are viewed as change agents. They are given the opportunity to experiment with new tools and approaches in their classrooms. In such schools, teachers have the authority and autonomy to vary instructional strategies and content between classes in the same grade level. Although exercising such agency requires teachers to be risk-takers, teachers' agency is likely to be constrained in school cultures where "external accountability measures are very dominant" (Van der Heijden et al., 2015, p. 695). As explained in chapter 1, students' performance in high-stakes examinations is given the utmost importance in

Maldivian schools. Hence, understanding the influence such school cultures may have on teacher agency and their change process was critical for my study.

Additionally, a supportive school culture encourages and aids the change process by creating opportunities for teachers to reflect, learn, and grow as professionals. For instance, in schools without regular feedback and support mechanisms, teachers may be less aware of whether their pedagogical practices consistently support positive learner outcomes. For example, based on research on teachers' resistance to professional learning, Mohamed (2008) found that there was no systematic teacher observation and appraisal procedure in the three Maldivian schools she studied. She reported:

> None of the three schools had a systematic scheme for teacher observation and appraisal. This led to a lack of focus on the quality of teaching and continual improvement. Teachers received no feedback on their teaching and therefore were often unaware of their own inadequacies as teachers. (p. 31)

Without schoolwide mechanisms for reviewing or reflecting on one's practices, the chances are that teachers would continue teaching the same way they have always done. Such omissions can also constrict opportunities for change and development. Change can be supported by a school culture that embraces self-review and praises pedagogical risk-taking. Having opportunities for peer observations and subject coordination meetings to discuss innovative practices may help teachers adopt new ideas in their classrooms. So, exploring the norms and practices of the schools in the Maldives helped me understand how facilitative the school culture was in encouraging primary teachers to embrace changes.

Perceptions related to DT use

Apart from teachers' beliefs, their perceptions regarding how useful or easy DTs are to use for teaching and learning could significantly affect their decisions around DT use in their lessons. According to Davis' (1986, 1989) technology acceptance model (TAM), perceived usefulness (PU) and perceived ease of use (PEU) are two fundamental determinants of an individual's attitude toward DT use in their pedagogical practices. Therefore, several researchers have investigated the impact PU and PEU have on technology use in education. Many studies have also shown that both PU and PEU affected teachers' intention to use DTs for teaching and learning (Joo et al., 2018; Sadaf et al., 2012; Smarkola, 2007; Teo et al., 2008). For instance, in a study with preservice teachers, Sadaf et al. (2016) explored the PU of Web 2.0 tools for student learning, such as the potential in the understanding of concepts, engagement with content, and motivation to learn and PEU concerning how easy Web 2.0 tools were to use for teachers and students. They found that participant teachers' use of Web 2.0 tools depended on their perception of their usefulness and ease of access to such tools.

While some studies report that PEU directly influences teachers' DT use in their lessons (Teo et al., 2016; Teo, 2010), others show PEU has an indirect impact on teachers' DT-use intention through PU. The influence of PEU on PU implies that if teachers consider DT use for teaching and learning easy and effortless, they will perceive that teaching with DTs is useful. For instance, in investigating factors influencing Chinese English as a foreign language (EFL) teachers' nonvolitional online teaching intentions based on an extended TAM model, Huang et al. (2020) reported that 158 participant teachers' PEU of DTs significantly influenced their PU. Similar findings were also reported by Teo et al. (2019) in their study on preservice teachers' acceptance of Web 2.0 tools in two universities in China based on structural equation modelling analysis. They found that PEU had an indirect effect on the intention to use Web 2.0 through PU, indicating that teachers would use DTs once they perceived that DTs' use does not require much effort. PEU is often associated with facilitative conditions at the school (discussed under the school context in this chapter).

Compared to PEU, PU is also found to be a more reliable predictor of teachers' intention to use DTs for teaching and learning (Cubukcuoglu, 2013; Gurer, 2021; Liu et al., 2018; Ottenbreit-Leftwich et al., 2010; Sadaf et al., 2016; Teo et al., 2018). For instance, a study conducted by Silviyanti and Yusuf (2015) shows that Chinese EFL teachers perceived ICT to be useful because "it can increase students' motivation, make learning more enjoyable and fun, interesting, effective and diverse" (p. 40). Additionally, in a study investigating factors associated with teacher-directed student use of DTs in primary classrooms, Miranda and Russell (2012) found that teachers who perceived the importance of DTs for teaching and their benefits for meeting instructional goals directed their students to use DTs more often than did the teachers who did not have the same perception.

Literature indicates that the likelihood of teachers' using DTs in their lessons would be greater if they perceived that DTs could positively impact their teaching and students' learning and if teaching with DTs was believed to be effortless. As both PU and PEU influence teachers' pedagogical practices with DTs, exploring teachers' views regarding how useful and easy it was to use DTs was important for my study.

Knowledge, skills, and confidence to use DTs

Research points out that knowing about DTs may be insufficient to use DTs in pedagogically meaningful ways (Al-Awidi & Aldhafeeri, 2017; Franklin, 2007; Polly et al., 2010). Such findings indicate that gaining technological knowledge (TK), though essential for DT integration, may not necessarily facilitate the use of DTs in ways meaningful to students' learning. As Wright (2010) argues, DT use needs to be pedagogically purposeful to create an effective learning environment. So, to enhance a pedagogically meaningful use of DTs, teachers need to learn ways to *marry* DTs, pedagogical approaches, and subject content. So, through purposeful lesson planning, teachers need to enact their technological pedagogical content knowledge (TPACK) to make pedagogically meaningful use of DTs to facilitate learning discipline-specific content. When teachers' TPACK is underdeveloped, they tend to use new DTs as an additional extra in their existing pedagogical practices. For instance, Wright (2015) found that the use of DTs did not necessarily bring a transformation in teachers' pedagogical practices as they subsumed DTs into their existing practices. In such situations, DTs become *add-ons* in the lessons and may not necessarily be meaningful for student learning. For instance, research indicates that simply using a video in the lesson does not automatically lead to meaningful learning with DTs. Instead, teachers need to make pedagogical use of video, for example, by engaging learners through guiding questions (Brame, 2016; Lawson et al., 2006), asking them to take notes (Mayer et al., 2020) or incorporating learning moments in the video (Gedera & Zalipour, 2018) to take full advantage of such tools.

As discussed in the teacher education section of this chapter, literature on DT integration indicates that teachers need pedagogical design thinking skills in addition to TPACK (Choi & Young, 2021; Koh et al., 2014, 2015; Tsai & Chai, 2012). Choi and Young (2021) explained design thinking as a kind of pedagogical decision-making where teachers critically examine the affordances of DTs and strategically use the affordances suitable to teach specific subject content in a particular classroom context. Highlighting that teachers' [pedagogical] design thinking could be a third-order barrier to DT integration, Tsai and Chai (2012) argue that teachers need design thinking skills to adapt lessons with DTs to accommodate complexities around classrooms and students. Similarly, Koh et al. (2014, 2015) also assert that teachers' TPACK enactment is influenced by their capacity to design lessons based on various contextual factors such as ICT policies, availability of resources, student characteristics, and teacher beliefs. Therefore, in addition to TK, teachers also need TPACK and design thinking skills to ensure that classroom DT use is meaningful for student learning.

Gaining TK, TPACK, and pedagogical design thinking skills increases teachers' confidence in using DTs for teaching and learning. For example, Lawrence and Tar (2018) claim that "a teacher that has the skill or knowledge [to use DTs in their lessons] is in a better position to judge the usefulness of adopting and integrating ICT into teaching and learning activities" (p. 93). Similarly, Cubukcuoglu (2013) found that teachers' skills and confidence in DT use were a factor that may enhance teachers' use of technology in their teaching and students' learning. While studying teachers' self-confidence in using computers, Rogošić (2015) found that teachers' frequency of using common and specialised computer programs was significantly connected with their self-confidence related to computer use. In this regard, many researchers have found that some teachers' underdeveloped technological knowledge (TK) was a significant hindrance to using DTs for teaching and learning (De Freitas & Spangenberg, 2019; Hew & Brush, 2007; Kaumba et al., 2021). As teachers' knowledge, skills, and confidence to use DTs in their lessons seem to be critical in determining if and how teachers use DTs in their lessons, I needed to explore whether these aspects influence Maldivian primary teachers' practices with DTs in their English lessons.

In short, the complexities in the national, school or teacher context can either facilitate or impede DT use in teaching and learning. Within the complexities in the national context, I discussed how educational ICT policy, teacher education, and high-stakes examinations might affect DT use for teaching and learning. The school-related complexities explored are technology leadership, vision for DT integration, DT infrastructure and accessibility, technical support mechanisms, and DT-based PLD for teachers. Finally, the factors in the teacher context discussed here are teachers' beliefs and practices, attitudes toward change, perceptions related to DT use, and knowledge, skills, and confidence to use DTs.

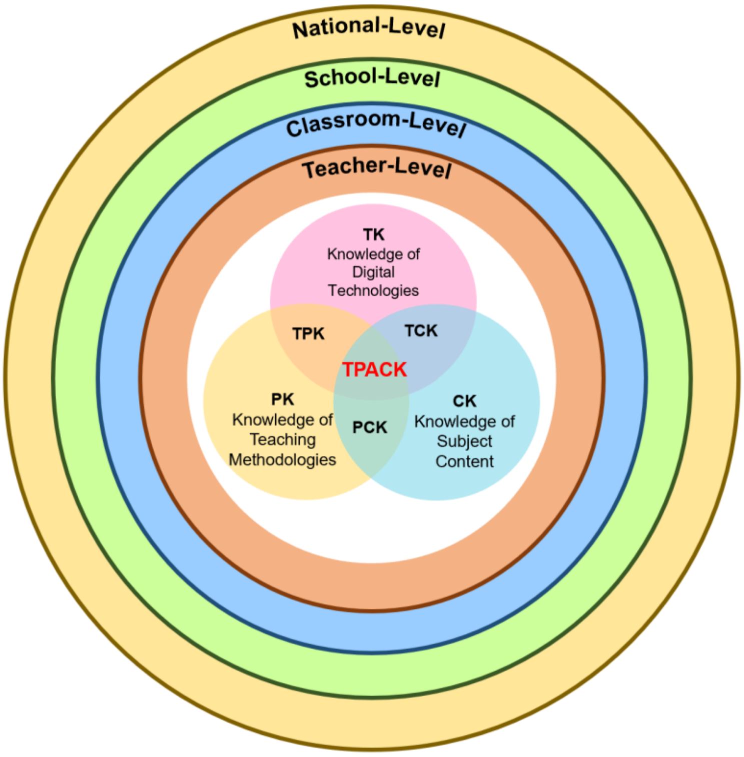
My Conceptual Framework

On the basis of the literature I have reviewed here, it is clear that various factors may affect teachers' pedagogical practices with DTs. It is not only teachers' knowledge of DTs but also their understanding of English language content and ESL pedagogical approaches that could impact how they use DTs in their lessons. This literature review has also indicated that contextual factors at various levels (national, school, teacher) have the potential to enable or impede teachers’ DT use for teaching and learning. Hence, my study required conceptualising teachers’ subject-specific (ESL) TPACK enactment by considering the broader context. Koehler et al. (2014) stated that “TPACK does not exist in a vacuum but rather is grounded and situated in specific contexts as represented by the outer dotted circle in the TPACK diagram” (p. 102). Leaving the ‘context’ undefined allowed researchers like me to explore the concept in multiple ways, for example, as country, society, institution, room, people, subject, topic or tools. Taking this undefined context as an opportunity, I developed the TPACK-in-Context framework to guide me in gaining a comprehensive understanding of multilevel contextual factors that shape teachers’ subject-specific TPACK enactment (see Figure 2.4). Inspired by the work of Bronfenbrenner (1986), I used the ideas from his ecological systems theory (EST) to create different levels of contexts to understand better how those may influence teachers’ DT use in ESL classrooms.

Bronfenbrenner contends that the entire ecological system (including personal and environmental) needs to be taken into consideration to understand human development. The four systems are depicted as a set of concentric circles nested one inside the other in Bronfenbrenner’s EST, labelled microsystem, mesosystem, exosystem, and macrosystem. While microsystems (centre circle) are the immediate environment of a teacher, such as their family, neighbourhood or classroom, the mesosystem involves the relationship between and across these microsystems. This relationship involves connections between family and work or those among coworkers teaching parallel grades. The exosystem involves connections between a teacher’s immediate context and a social setting in which the teacher does not have an active role. For example, while teachers may not have a say in the decisions made about DT integration at the policy level, such decisions potentially have an impact on teachers’ DT use in their individual classrooms. Finally, the macro system or the outer ring shows the broader social, cultural, and religious context which could, for instance, influence a teacher’s pedagogical practices with DTs. The four systems in Bronfenbrenner’s EST are useful in understanding the potential influence of factors at different contextual levels. Although teaching with DTs happens in school classrooms, teachers’ practices are most likely influenced by the decisions made within other levels and contexts, such as nationally, socioculturally, and religiously.

Figure 2.4

TPACK-in-Context


National-Level
School-Level
Classroom-Level
Teacher-Level
TK
Knowledge of Digital Technologies
TPK
TCK
TPACK
PK
Knowledge of Teaching Methodologies
PCK
CK
Knowledge of Subject Content

Note. Four contextual layers added to the TPACK framework. TPACK-in-Context was adapted from M. J. Koehler and P. Mishra's, 2012 TPACK framework.

While TPACK-in-Context acknowledges teachers' shared cultural norms in a school context, it also recognises that DT use can vary depending on individual teachers, their classroom context, and the subjects they might teach. The context surrounding TPACK enactment comprises four contextual layers. They are national-level, school-level, classroom-level, and teacher-level factors. The factors at the national level refer to the influence of national policies, curriculum, teacher education, and sociocultural norms and values. School-level or institution-level factors refer to technology leadership, school ICT vision and policies, availability of technology infrastructure, technical support mechanisms, and teacher professional learning and development. At the classroom level, teachers' and students' access to DTs, internet access, technical support, learner characteristics, and the subject taught are important factors that could affect teachers' DT use. In addition, this framework views teachers as a separate layer of the context, as teacher-related factors such as their knowledge, beliefs, attitudes, and perceptions about DTs and existing practices could influence their decisions around DT use for teaching and learning. Finally, the TPACK-in-Context framework allowed the development of content-specific TPACK as shown in its innermost circle, where TK denotes knowledge of DTs; PK is considered knowledge of teaching methodologies; and CK is knowledge of subject content. Using contextual frameworks such as this one helped me understand the influence of various contextual factors on primary teachers' DT use in their ESL lessons.

Research Questions

My research project aimed to explore Maldivian primary teachers' pedagogical practices with DTs in their English lessons and multilevel factors affecting their DT use in the Maldivian ESL context. The following research questions guided the project to achieve this aim:

1. What impacts do DT use have on ESL pedagogical practices of primary teachers in two Maldivian schools?
2. What contextual factors affect teaching and learning English with and through DTs in two Maldivian schools, and do they differ across schools?
3. What interplay of factors influence Maldivian primary teachers' DT use in their English lessons?

Chapter 3

Methodology

My project explored the technological pedagogical practices of primary ESL teachers in the Maldives and the extent to which contextual factors might affect teachers' TPACK enactment. In the previous chapter, through literature, I explored factors that may either enhance or impede the ability of teachers to use digital technologies (DTs) for teaching and learning English. This chapter explains the research methodology I used to achieve my research aim in applying my research questions to two (one rural, one urban) primary school ESL classrooms in the Maldives.

This chapter is divided into two sections. The first outlines my chosen research paradigm and explains how my ontological and epistemological assumptions guided me towards choosing the interpretive paradigm. I then justify why an interpretive phenomenological approach was deemed suitable to capture the lived experiences of primary teachers' pedagogical practices with DTs. In doing so, I discuss researcher positionality, followed by the study's data collection methods. Finally, I describe how I addressed ethical issues related to voluntary informed consent, anonymity, and confidentiality. The second section sets out my phenomenological research process and includes subsections on: sampling, participant recruitment, data collection, data analysis, and trustworthiness.

Research Paradigm

A paradigm is "a basic set of beliefs that guides action" (Guba, 1990, p. 17). The philosophical assumptions that define paradigms are based on our responses to Guba and Lincoln's (1994) three fundamental and sequential questions about ontology, epistemology, and methodology. Those questions can be expressed as:

1. ontological: what is the reality I want to know about, and what is already known about it?
2. epistemology: what will my relationship as a researcher be with what I intend to know?
3. methodology: how will I go about finding out about the reality I want to examine?

As the three questions are interrelated, the response to the ontological question shapes how the epistemological and methodological questions are answered, which is why I begin with ontology. The underlying assumptions about the nature of reality may either be objective or subjective. If our view about reality takes an objective stance, we are likely to assume the existence of a single, external reality that is independent of anyone's thoughts, opinions or feelings. It follows then that our view of the epistemological question is that 'the truth' about the world is discovered by being a "detached, objective observer" (Cohen et al., 2007, p. 19). If we are in search of universal truths, we will adopt methods that are objective, measurable, predictable, and controllable in order to arrive at law-like generalisations about a universal social reality (Saunders et al., 2019). In other words, we can take control of the phenomenon we investigate and separate it from variables that might confound a detached and objective response. In such cases, individual participants (usually referred to as subjects) may be taken out of their usual context for the research or the research may take place in laboratory conditions in order to account for and control any variables.

Denzin and Lincoln (2008) set out four major research paradigms: the (a) positivist and postpositivist, (b) constructivist-interpretive, (c) critical (Marxist, emancipatory), and (d) feminist-poststructural. Although predominantly adopted in the field of natural sciences, positivism is criticised for its "dehumanizing effects on the social sciences" (Cohen et al., 2007, p. 17) because of its propensity for quantification and generalisation regarding research on human behaviour. Such criticisms are often targeted at its underlying ontological and epistemological assumptions. Positivists view the world as a predictable, controllable, standardised, objective, and impersonal system. They argue for a single, objective reality that is external to and independent of the research and they assume human behaviour can be explained by applying scientific, empiricist methods (Saunders et al., 2019). In rejecting the positivist view of a single truth, postpositivists accept the coexistence of multiple truths that are investigated using experimental and quasi-experimental methodologies. Furthermore, in contrast to those who adopt a positivist stance, postpositivist researchers accept that "the possible imperfection and fallibility of evidence is one of the central tenets of postpositivism" (Phillips & Burbules, 2000, p. 31). However, Willis (2007) describes postpositivism as an "adaptation of positivism" (p. 97) rather than a distinctly different philosophy, as it follows the same principles as positivism. For instance, positivism and postpositivism are based on the idea that human behaviour is rule-governed and should be studied using scientific methods (Cohen et al., 2007). In my research, I was neither seeking a single, objective reality nor aiming to make generalisations from my findings. Instead, I was interested in exploring my participant primary teachers' lived experiences in their professional lives within the Maldivian school context. Thus, I believed there are multiple realities as each participant's experiences within their individual school context would be different.

Additionally, positivists believe any form of association that the researcher has with the participants may introduce bias and be a threat to the validity of the study. Therefore, with their objective epistemology, positivists argue for a "one-way mirror" type of inquiry (Guba & Lincoln, 1994, p. 110). However, I believe that the realities of my participant teachers' everyday life cannot be understood based on any 'detached' observations alone. Instead, it is more likely that not everything about their realities can be observable, and I predicted I will have to interact with my participants to find out what it meant for them to be primary teachers in their Maldivian schools. Consequently, my understanding of their lived experiences had to be based not only on my observations but also on their recollection of various moments of their experiences as primary teachers and the documentation they share with me.

I needed to adopt a research paradigm that enables me to interpret the meanings that my participants make of their lived experiences. If our assumption about reality is subjective, we are likely to expect that realities are socially and experientially based on multiple mental constructs, with their form and content dependent on the individuals who hold them (Guba & Lincoln, 1994). Through a perspective acknowledging complexity and subjectivity, as occurs in classrooms, we are more likely to believe that knowledge is created through interactions between and among the researcher and volunteer participants who volunteer to share their individual experiences of the phenomenon under investigation (Cohen et al., 2007). In such research, the participants are investigated in situ. A researcher favouring this orientation is, therefore, more likely to gather data using methods such as interviews, observations, and text analysis because our aim is to *understand* our participants' world rather than *explain* it and apply it more widely as a universal truth. The two contrasting examples I have provided here show that the research paradigm entails ontological, epistemological, and methodological assumptions and decisions that need to be made throughout the research process. These should be consistent across these assumptions.

My research aimed to explore primary teachers' lived experiences of teaching English with DTs in Maldivian schools. Hence, an interpretive paradigm better resonated with my research purpose because its focus is on understanding people's lives from their own perspectives. It was also more likely that associated methods were more sympathetic to my intended aim of gaining a richer understanding of how a group of primary teachers teach English in Maldivian primary schools through using DTs.

Ontological Assumptions

Whether we are consciously aware of it or not, our research begins with a set of philosophical assumptions related to ontology or "the study of being" (Crotty, 1998, p. 10). Ontology refers to our beliefs and assumptions about the nature of reality (Creswell, 2007; Saunders et al., 2019). Our ontological assumptions shape how we see and study our research participants. In education, our research may focus on educational institutions, individuals, documents, events or artefacts. To clarify our own ontological assumptions about such contexts and participants, we ask questions such as: What is the school environment like? What is it like being a primary teacher? Or what is it like teaching using DTs? Such questions resonate with ontological principles related to Crotty's (1998) "study of being" (p. 10). My ontological stance is, therefore, rooted in subjectivism because I want to understand how others experience their professional world of being primary teachers in Maldivian schools. I do not see reality as singular, objective or external to social actors (Bryman, 2016) but as subjective, relative, and contextually contingent. Subjectivism means I can better capture multiple realities instead of seeking to discover a single reality, which may imply that everyone has the same experience. Having a more subjective orientation acknowledges that each person not only experiences and perceives reality differently but also teaches in a different kind of school where class compositions also differ. I, therefore, expect to encounter multiple, subjective realities.

For me, reality is also time- and context-bound because I believe it is possible for an individual's reality to vary over time and that it connects with their circumstances. I am, therefore, assuming that primary teachers, whether from the same or different schools, are likely to differ in their views and experiences of teaching English with DTs. I need to be aware that their realities could vary not only based on their own beliefs, perceptions, and understandings but also in terms of contextual factors influencing their everyday experiences. Rather than studying my participant teachers' experiences in a vacuum or external to their own schools, I explored their realities by taking into consideration multilevel contextual factors within which they are situated. Doing so included the assumption that teachers' pedagogical practices varied depending on factors that enable or hinder their use of DTs for teaching and learning. For example, I predict that such factors might include the accessibility to DTs in the classrooms, the availability of technical support in school or opportunities for professional development related to DT classroom use. Exploring whether my predictions about such factors relate to my participants' experiences was part of my research. I wanted to capture the realities of my participant teachers but also to gain an in-depth understanding of the phenomenon of teaching English with DTs in two Maldivian primary schools.

Epistemological Assumptions

When conducting research, we also make assumptions about epistemology or "how we know what we know" (Crotty, 2003, p. 3). Epistemology focuses on the nature of knowledge and knowledge production. Our epistemological assumptions centre around what is acceptable as knowledge, what constitutes quality data, and what we can contribute to knowledge (Saunders et al., 2019). The epistemological stance I took for this research was social constructionism. Crotty (1998) defined constructionism as the stance in which all meaningful reality is constructed in and out of human interaction which is developed and transmitted within a social context. This definition of social constructionism implies that meaning is not discovered but constructed. In an epistemology that aligns with subjectivism, the researcher and the researched are "assumed to be interactively linked so that the 'findings' are *literally created* as the investigation proceeds" [authors' italics] (Guba & Lincoln, 1994, p. 111). Because I think that making meaning of DT use in primary teachers' ESL lessons was too complex a process to apply objective methods to, I intended to take such an epistemological stance. In social constructionism, knowledge is created when social actors negotiate the meaning of actions and situations together (Crotty, 1998) and which are constantly revised through social interaction (Bryman, 2016). My familiarity with the sociocultural norms of the practice of Maldivian teachers as a local insider-researcher further argues for taking social constructionism as the epistemological stance of my study, although my insiderness might affect how I interact with participants and understand their experiences.

Interpretive Paradigm

My ontological and epistemological assumptions guide me to an interpretivist paradigm. As a paradigm, interpretivism strives "to understand and interpret the world in terms of its actors" (Cohen et al., 2007, p. 26) rather than to generalise and predict causes and effects. In interpretivism, truth does not represent objective reality as in positivism. Instead, it views reality as multiple, subjective, and socially constructed (Pessu, 2019). Researchers using interpretivism aim to gain deep insights into the experiences of the participants by collecting and analysing rich qualitative data. This was my intention.

In contrast to positivism, interpretivism emphasises understanding human behaviour rather than explaining it. Weber (1947) used the word "*Verstehen",* which has most commonly been used to mean "understanding" (p. 88). In this sense, knowledge is arrived at by capturing the subjective meaning of social action in research based on interpretivism (Bryman, 2016). The goal of interpretivism is to understand "the complex world of lived experience from the point of view of those who live it" (Schwandt, 1994, p. 221). Therefore, both participants' and researchers' understanding is necessary to make meaning of the phenomena studied. Knowledge, I argue, is created through my interactions as a researcher with participants in the social and professional settings of their school. Therefore, instead of looking for absolute truth, my aim was to capture the subjective meaning each teacher brings into the social action of teaching English using DTs in their primary classroom context.

Interpretivism argues that the social world of human beings cannot be studied in the same way as the physical world. Therefore, according to interpretivists, approaches applied to studying natural sciences cannot be applied in social sciences contexts like classrooms. For instance, although some postpositivists use qualitative data, they do not analyse it in the same way interpretivists do (Willis, 2007). This approach might mean that by applying hypothesis testing to interview data, they seek to quantify qualitative data. Interpretivists believe that the experiences of individuals vary depending on their contexts and circumstances and that reducing the complexity of the context through generalisations will result in the loss of rich insights into humanity (Saunders et al., 2019). Because I wished to explore and understand participants' experiences, attitudes, and behaviour, an interpretive paradigm was most fitting. Consequently, I, like other interpretivist researchers, conducted an in-depth study based on a range of qualitative data from a small sample. I also adopted qualitative methods of analysis to understand the everyday life of the study participants, as do other interpretivist researchers.

In the next section, I explain how my ontological, epistemological, and interpretive philosophical worldviews guided me towards a phenomenological methodology for my research. I also justify why I chose a hermeneutic/interpretive phenomenological approach over a transcendental/descriptive phenomenological approach.

Phenomenology

“Men are disturbed not by things, but by the views which they take of things.”

-Epictetus (1948/2014)

Phenomenology reminds me of this saying from the 1st century A.D. Greek Stoic philosopher, Epictetus. Epictetus argues that the meaning human beings associate with things (for example, objects, events, decisions or other people) could vary based on their individual perspectives. The quote implies that understanding a specific thing requires accessing it “as it is to us” rather than “as it is” (Schmidt, 2005, p. 122). This distinction is critical because phenomenologists are not interested in studying things in a vacuum but rather as they are perceived through the eyes of those within the experience. Phenomenologists, thus, make meaning from an individual’s experiences in relation to others and other things (Vagle, 2018). It appears that studying anything phenomenologically requires understanding intentionality or our inseparable connection with the world around us (van Manen, 1997).

At a deeper level, Epictetus’ statement suggests that the same things do not affect everyone in the same way, although we may all be connected meaningfully with them. Our understanding and ‘reading’ of an event or a thing are determined by our beliefs, perceptions, and experiences as individuals. This idea also illustrates why subjectivism in an interpretivist, phenomenological frame was my choice. Subjectivism offers me a way of exploring the realities of individual teachers’ practices with DTs and uncovering what various contextual factors have shaped their practices. Therefore, by reflecting on the *what* and the *how*, a phenomenological approach was apt for my study, as it allows the capturing of these multiple realities or differences in individuals’ perceptions, understandings, and experiences when exploring a specific phenomenon. However, I had to be mindful that the focus in phenomenology is not, ultimately, the individual but the phenomenon (Creswell, 2007; Vagle, 2018). Therefore, my focus ultimately was on the phenomenon of teaching English with DTs in primary classes and through teachers’ experiences and the factors affecting those experiences. This emphasis on phenomenon meant that the lived experiences of the participant teachers provided a rich data source to inform my interpretation and understanding of the phenomenon I have researched.

My phenomenological study was based not on the premise that there is one truth to be found but that 'reality' is subjective and based on how individuals experience, understand, perceive, and conceptualise various aspects of a phenomenon. Unlike an objectivist epistemology that assumes knowledge exists within reality and beyond the human mind (Husserl, 1900–1901/1970), a phenomenological epistemology stipulates that knowledge is intentionally constituted through individuals' conception of their reality (Sandbergh, 1997). For my project, this is likely to mean that views of 'truth' was based on individual teachers' experiences, understanding, and perceptions related to their teaching and learning English with DTs. The main epistemological basis for phenomenological studies is lived experience, which is "experience as we live through it and recognize it as a particular type of experience" (van Manen, 1997, p. 177). This focus on lived experiences suggests that a phenomenologist intends to explore "life as we live it" as opposed to what we think it is (van Manen, 2014, p. 39). Since my study explored teachers' technological pedagogical practices, a phenomenological approach suited my focus on teachers' conscious, lived, individual experiences. These experiences were my primary sources of information (Moustakas, 1994). Taking such an epistemological stance also meant that I had to be constantly reflective and attentive to my participants' experiences and consciousness of the phenomenon of teaching primary school students English with and through DTs.

Vagle's (2018) analogy of an onion clarifies the emphasis of the two branches of phenomenology, namely transcendental and hermeneutic phenomenology. Vagle compares *transcendental* phenomenology with an onion, the layers of which are peeled away to find the essential core of a phenomenon as constituted in individuals' consciousness and views *hermeneutic* phenomenology as an ongoing act of interpretation of meaning. My study adopts an interpretive phenomenological approach as I want to make meaning through the interpretation of the experiences of individual teachers in their everyday life. My aim was not to capture the essential components of their lived experiences that transcendental phenomenologists would aim to achieve. This approach involved Habermas' (1984) "double hermeneutic" concept (p. 110) as it was a combination of my participants' views of their lived experiences and my attempt at understanding how they make sense of their professional life, filtered through my own understanding and experiences of being a primary school English teacher and then a teacher educator in the Maldives.

Researcher Positionality

As an interpretive phenomenological researcher, my intention was to explore the lived experiences of my participants both through interviews and by being amidst them and observing their practices (van Manen, 1997). Being a Maldivian, I share the same sociocultural background as my participant teachers, and I also share knowledge of and experience in teaching in similar schools. Enjoying this insider-researcher status was likely to give me not only access to my participants' everyday professional life but also the ability to communicate more easily with them and possibly for us to be more comfortable with each other because we share the same first language. Additionally, spending 4 months at each school gave me the opportunity to participate in my participant teachers' professional experiences as they lived them. However, while a phenomenological approach allowed me to engage myself in the research process, I had to be aware of my positionality as an insider researcher. I needed to be aware of, reflect on, and be cautious about my prejudices and biases because of this insiderness as I conducted my research. Because researcher positionality can have an impact on the decisions made throughout a research process, it has received increasing attention across branches of social sciences such as anthropology (Ohnuki-Tierney, 1984), psychology (Breen, 2007), geography (DeLyser, 2001; Mullings, 1999), social work (Chammas; 2020; Kahuna, 2000), sociology (Griffith, 1998; Merton, 1972), nursing (Bonner & Tolhurst, 2002), and education (Mercer, 2007; Nakata, 2015; Unluer, 2012). Early discussions on researcher positioning assumed a dualist position where the researcher was either an insider or an outsider. Griffith (1998) distinguishes the insider from the outsider, with the former being the researcher whose biography gives them "a lived familiarity with the group being researched" and the latter as "a researcher who does not have an intimate knowledge of the group being researched prior to their entry into the group" (p. 362).

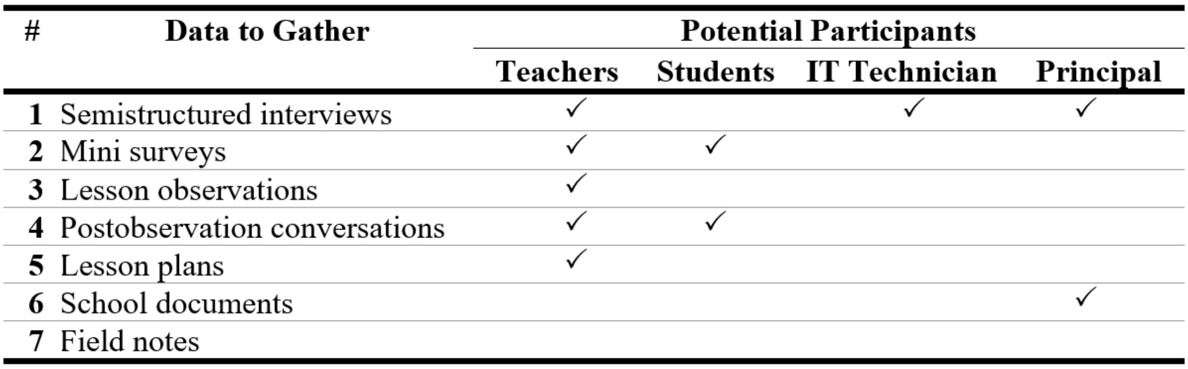
As an insider researcher, it might not have been possible to "set aside–or bracket off" (Neubauer et al., 2019, p. 93) my preunderstandings completely, as van Manen (1997) contends. Instead of neutralising their prejudices, expert knowledge or biases, such awareness and reflection are expected of those undertaking hermeneutic or interpretive phenomenology. This approach aligned with the purpose of my study because I was a critical part of the participants' world. I cannot expect to separate myself from their world completely. A phenomenological attitude allowed me to be fully involved, interested, and open to what might emerge. Being objectivist, distanced or detached was not possible (Finlay, 2008). In this way, rather than taking a back seat, I was able to play an active role throughout the research process, connecting with and sharing experiences with participants. It was fitting, then, that the interpretive phenomenological approach was my focus in conducting my research on teachers' practices.

Data Collection Methods

In this section, I explain the procedures I used to gather data on primary teachers' beliefs and attitudes about DT use and their pedagogical practices with DTs in Maldivian primary school contexts. To gain an in-depth understanding of this phenomenon, I intended to use the methods listed in Table 3.1 to gather data from teachers, students, IT technicians, and principals. I then address each method in turn.

Table 3.1

Data to Gather from Potential Participants



#	Data to Gather	Potential Participants			
		Teachers	**Students**	**IT Technician**	**Principal**
1	Semistructured interviews	✓		✓	✓
2	Mini surveys	✓	✓		
3	Lesson observations	✓			
4	Postobservation conversations	✓	✓		
5	Lesson plans	✓			
6	School documents				✓
7	Field notes				

Semistructured interviews

Phenomenological studies typically involve conducting interviews (Giorgi, 2009; Moustakas, 1994). These interviews are usually unstructured (Mapp, 2008) or semistructured (Lauterbach, 2018; Sandall et al., 2018; Shafiei Sarvestani et al., 2019). van Manen (1997) warns novice researchers against unstructured or open-ended interview methods as there will be a greater chance of going "everywhere and nowhere" with the interviews (p. 67). This advice was sound, and I did not want to get carried away or be overwhelmed by unmanageable interview material due to a lack of focus. I, therefore, thought that semistructured interviews were deemed to be a better option for my study. As phenomenological research is "not experimental, comparative, or correlational" (Vagle, 2018, p. 87), I did not need to worry if I interviewed participants in exactly the same way, as long as I covered all categories of questions. Instead, I could treat the interviews as a valuable opportunity to explore their views, experiences, beliefs, and motivation. Doing so helped me gain a deeper understanding of their professional classroom actions and thoughts about the phenomenon of teaching ESL to primary school students (Gill et al., 2008). As such, the duration of phenomenological interviews varied as it was based on data saturation. This is the point at which responses become repetitive, and participants no longer generate new data (Mapp, 2008). For instance, while interviews conducted by Berg and Dahlberg (1998) took between 30 and 120 minutes, those by Lundqvist et al. (2002) took 60 and 90 minutes to reach data saturation. This openness about what is asked of participants meant that I could be responsive to the conditions my participants teach in and could also modify the length of interviews. I anticipated the interviews to last between 45 and 60 minutes.

I expected that my role as an interviewer would aid my participants to revisit their experiences through the questions I asked related to the context, teaching experiences, and the meaning they associate with teaching English to primary school students as they use DTs (Bevan, 2014). I was likely to take an active role in the meaning-making process by listening attentively, asking probing questions, and reflecting on nonverbal cues as I wanted to work towards interpreting the data as a whole (Frechette et al., 2020). I was able to let my prior knowledge and past experiences add to what was rich interview data (McGrath et al., 2019). Indeed, Lopez and Willis (2004) argue that with this approach, the researcher’s presuppositions or expert knowledge are valuable guides and make the inquiry a meaningful undertaking. My insiderness was, therefore, found to be advantageous.

The semistructured nature of the interview method helped me to encourage the participants to describe their experiences with DTs, their opportunities, the difficulties they faced, and any fears or reluctance they had. With this information, it was more likely that I could place their lived experiences in the context of their daily social and professional contexts. By using semistructured interviews, I was able to ask probing questions such as ‘How so?’, ‘Can you give me an example?’ or ‘Can you tell me what the term means to you?’ These questions encouraged participants to provide a more detailed description of their previous responses. Interviewing, however, was not my only data-gathering method. I also used mini surveys and observed lessons, collected specific documents, and made field notes. These are addressed in turn.

Mini surveys

As in Nkongolo and Westman (2019), mini surveys are often used when gathering quantitative data. Mini surveys are not as frequently used in qualitative research in general and phenomenological studies in particular. However, mini surveys can be a simple way to gather insight into specific situations or events. Mini surveys consist of a few open-ended questions and can be administered online or in print. Unlike interviews, the participants' responses to mini surveys are written and specific. As a mini survey was relatively short, I anticipated that participants would be more willing to respond to one than to an interview. Additionally, I predicted mini surveys could be completed quickly. I intended to use these in situations where I needed to explore further participants' views and experiences related to interesting things I noticed during my data collection.

Lesson observations

Observations can be a powerful data source to see how a phenomenon is experienced in participants' everyday life (Vagle, 2018). van Manen (1997) recommends "close observation" (p. 69) as a method for collecting experiential data and reminds us that in this method a researcher acts as a participant and observer at the same time. In other words, the key is finding a balance between getting as close as possible to what we as researchers are observing and retaining a position that allows us to reflect constantly on the meaning of the situation. Close observation was a suitable method to carry out lesson observations for my study.

Lesson observations were important because what theory says *should* happen in the classrooms and what *actually* happens in everyday pedagogical practices can be quite different. Hence, observing classroom teaching was crucial to understanding how teachers actually use DTs in teaching English lessons at the primary level. The observations I made notes on allowed me to see how teachers implemented lesson plans and how their beliefs about DTs shared during interviews corresponded to the practices I observed in their classrooms.

Observational data was also crucial for my study because the majority of the studies on DT integration in education rely on teacher self-reported data such as that provided in interviews (Francom, 2016; Ifinedo & Kankaanranta, 2021) or surveys (Ifinedo et al., 2020; Koh & Chai, 2014; Lai & Lin, 2018). Jaipal and Figg (2010) argue that self-reported data "is incomplete as it does not provide concrete examples of what TPACK *looks like in practice* [author's italics]" (p. 417). Their argument suggests that such data may not, by itself, provide a rich enough understanding of teachers' DT use in their everyday lessons. Therefore, teachers' pedagogical practices with DTs also had to be experienced first-hand through classroom observations as a third method for examining data and identifying trends in findings.

Postobservation conversations

The emphasis in phenomenological research is always on the meaning of lived experiences. To that end, it was important for me to follow up observations with opportunities to ask participant teachers and students questions about what was happening and why. Informal conversations can help in obtaining experiential data because people, especially young children, "will talk with much more ease and eloquence and with much less reserve" than when writing down their thoughts on paper (van Manen, 1997, p. 64). Short, deliberate conversations with teachers and students can be exciting opportunities to learn something critical about the deeper meaning of an aspect of their lived experiences. To help participants recollect detailed accounts of their experiences of a particular phenomenon, I needed to ask specific questions about what was happening and with whom. What was essential in carrying out conversations was to be attentive. So, instead of taking detailed notes during these conversations, it was wise to take notes immediately afterwards and rely on recall. Although audio recording might have been a good option, I anticipated that the participants were more likely to be at ease if there was no recording involved in these short conversations.

In a teaching context, carrying out conversations postobservation is crucial because such interactions would help me and my participants (teachers and students) to refer to specific moments from the observation in the meaning-making process. Also, participants would have an opportunity to express their perceptions related to the teaching and learning moments. Another reason why postobservation conversations were crucial for my study was that there was a possibility that it might not have been viable to conduct multiple interviews with each participant teacher during the 14 weeks of data collection planned at each school. Additionally, I was aware that an abundance of interview data could prove unmanageable or overwhelming. In my quest for meaning, I had to look for opportunities for short conversations with participants throughout my data collection process. Coupled with other data sources, conversation notes were invaluable in helping me to understand what was going on.

Documents

Document data is important in phenomenological research because examining and analysing this data can give researchers access to key information that will add insights into participants' experiences (Ramsook, 2018). Documents include public records (newspapers, meeting minutes, official reports) and private documents (personal journals, diaries, letters) that I might gather during my data collection phase (Creswell, 2014). Although any type of document can be used in phenomenological studies, I intended to collect two types of documents:

1) lesson plans which included the plans my participant teachers prepared for their English lessons during my data collection period at each school and

2) school documents such as policies, guidelines, inventories, brochures, flyers, class timetables, and activity schedules.

While participant teachers’ lesson plans helped me to understand their planning around using DTs for teaching and learning English, school documents shed light on various aspects of their school context that either enabled or hindered the use of DTs for teaching and learning. While documents function within shared systems such as families, organisations, and cultures (Gorichanaz & Latham, 2016), they are situated both spatially and temporally (Frohmann, 2004). For example, our interpretation of a specific document can differ depending on the sociocultural context in which we discuss it, and its value may increase or decrease over time. So, understanding a document requires exploring its intrinsic and extrinsic information (Gorichanaz & Latham, 2016). While the former refers to the information conveyed by the document itself (its text, colouration, shape, material, and age), the latter refers to the social and contextual information associated with it (for example, how it was created, its function, how it is used). When analysing the documents, I not only had to explore their textual contents but also consider what purpose they served in a particular context i.e., when applied to my study. For instance, I needed to ask whether a document’s existence or nonexistence made any difference to my participants’ everyday professional life.

Field notes

Van Maanen (1988) defines field notes as “gnomic, shorthand reconstructions of events, observations, and conversations that took place in the field” (p. 223). In phenomenological studies, field notes serve several purposes. Field notes facilitate gathering rich descriptions of participants’ everyday experiences in their sociocultural context by zooming in on what they hear, see, feel, and think throughout the data-gathering process (Koopman, 2017). Field notes can become thick descriptions of the research context, what participants express during interviews and conversations, and researchers’ observations of events. While preunderstandings can be a source of insight for researchers, it is also pivotal for them to be reflexively self-aware of their positionality as researchers. This awareness was definitely important to my role as a researcher.

Reflexivity, when applied to research, aims to capture a more immediate, dynamic self-awareness of the researcher’s background, assumptions, positioning, and behaviour (Finlay, 2008). Reflexive field notes can record the influence that my presuppositions might have on how I filter what I observe. These notes can also be used to critically examine the intersubjective dynamics between me and my participants. As Burgess (1982) argues, field notes also enable the beginnings of data analysis alongside data collection. So, as an additional critical layer of data, field notes also aided the interpretation of participants’ experiences while the data gathering took place and prior to a full focus on the analysis process. Taking field notes gave me a head start in the postdata-collection processes.

In the presence of participants, to ensure minimising interruptions to the flow of action or discourse, I needed to take abbreviated notes. These have been given labels such as “field jottings” (Bernard, 2006, p. 389) or “scratch notes” (Sanjek, 1990, p. 96). So, while “it may not always be appropriate to pull out a pen and paper (or even a mobile or iPad)” amidst the flow of events or conversations (Mills & Morton, 2013, p. 80), these quick scribbles helped jog my memory later. These mostly handwritten notes triggered my recall of the details I could not write down while listening to a participant or observing an event. However, I had to be mindful of how important it was for me to write or type these notes as comprehensively as possible and “no later than the morning after” (Fielding, 2001, p. 152). These comprehensive notes were best created while my memory was fresh (Phillippi & Lauderdale, 2018).

In addition, as an interpretive phenomenological researcher, I recorded and labelled my notes as *descriptive notes, reflexive notes, and analytical notes* for ease of access and retrieval. These are explained as follows:

1) *Descriptive notes* (DN) are descriptions of the research context, participants, documents, events, observations, conversations, and interviews. Where applicable, to ensure taking notes on various aspects of a participant's everyday life, researchers can use a specific template or format to take descriptive notes. For instance, a phenomenological researcher can choose to follow a strict protocol or a flexible guide when taking notes based on lesson observations.

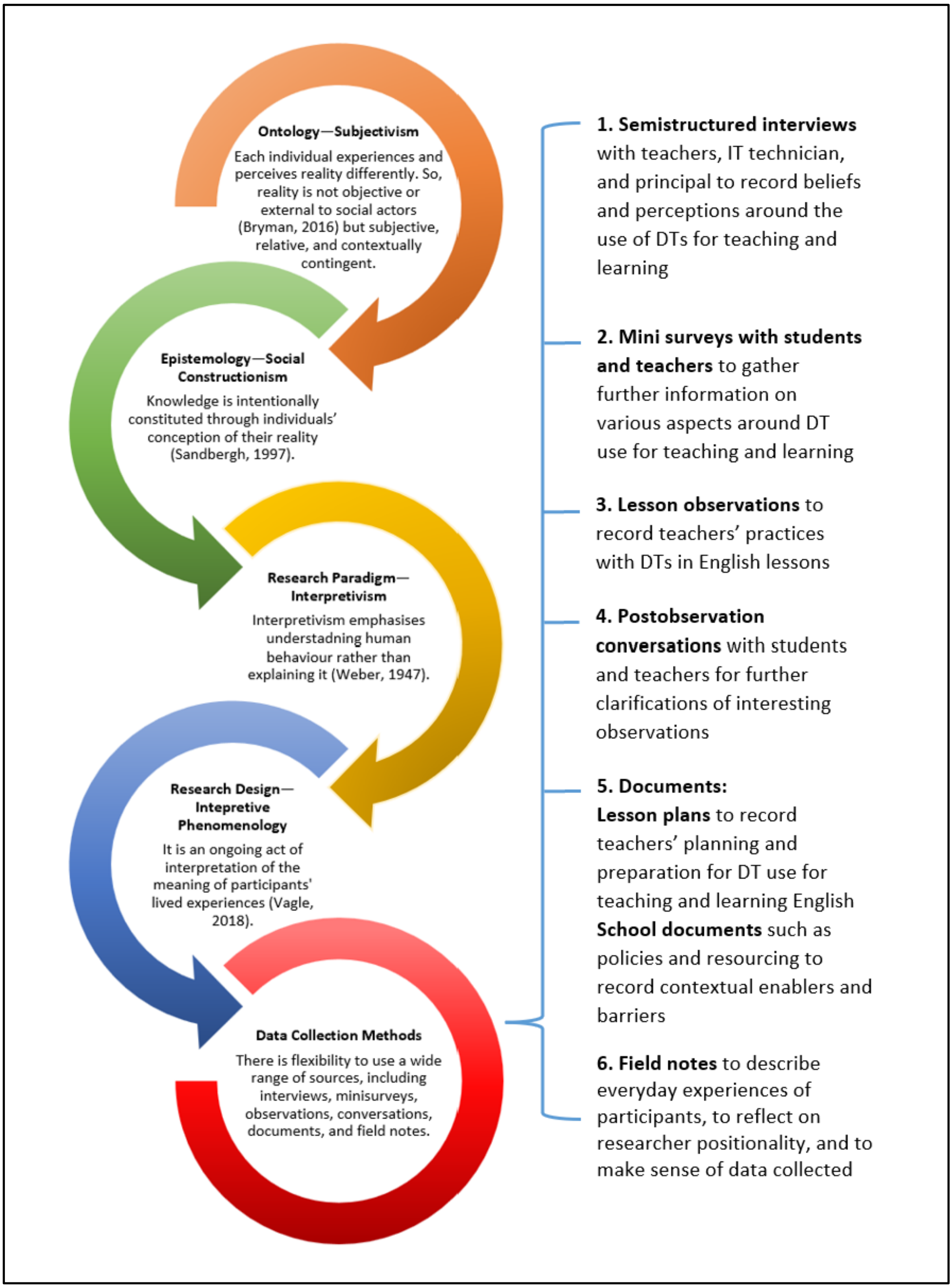
2) *Reflexive note*s (RN) are reflections on the research experience through self-expression, self-awareness, and self-analysis based on the researcher's physical, mental, and social conditions in the field. Here, the researcher reflects on their positionality as a researcher, their relationship with the participants, and the challenges they encounter in the field.

3) *Analytic notes* (AN) are questions, queries, and wonderings that form the preliminary analysis. As field research involves the simultaneous collection and analysis of data, analytic notes include interpretations of data already gathered and indications of aspects of lived experiences that the researcher can explore further. These three types of notes aided me in my research in the field in different ways. First, taking descriptive notes, for example, during lesson observations, helped me capture details of teaching moments. Second, being an insider researcher, taking reflexive notes was crucial to keep my potential prejudice and presuppositions in check. Third, analytic notes helped me ask participants further questions for clarification, as both researcher and my participants were involved in the meaning-making process.

In summary, our beliefs, assumptions or philosophical stance about generating knowledge have a role to play in determining our research direction. Throughout the research processes, we make assumptions about the nature of reality (ontological assumptions) and the nature of knowledge (epistemological assumptions) that shape our research paradigm. As these assumptions significantly influence how we understand our research questions, collect data, and interpret our findings (Crotty, 1998), it is critical to explore, understand, and delineate where we stand in terms of our research orientations. Figure 3.1 outlines the connection between the choices I made about the kind of research I wished to undertake. The five interconnected areas identify what informed my paradigm choice, research stance, and study design. Finally, the numbers 1–6 on the right-hand side of the diagram summarise what constituted my data sources.

Figure 3.1

Methodological Framework



Ontology—Subjectivism

Each individual experiences and perceives reality differently. So, reality is not objective or external to social actors (Bryman, 2016) but subjective, relative, and contextually contingent.

Epistemology—Social Constructionism

Knowledge is intentionally constituted through individuals' conception of their reality (Sandbergh, 1997).

Research Paradigm—Interpretivism

Interpretivism emphasises understadning human behaviour rather than explaining it (Weber, 1947).

Research Design—Intepretive Phenomenology

It is an ongoing act of interpretation of the meaning of participants' lived experiences (Vagle, 2018).

Data Collection Methods

There is flexibility to use a wide range of sources, including interviews, minisurveys, observations, conversations, documents, and field notes.

1. Semistructured interviews with teachers, IT technician, and principal to record beliefs and perceptions around the use of DTs for teaching and learning

2. Mini surveys with students and teachers to gather further information on various aspects around DT use for teaching and learning

3. Lesson observations to record teachers' practices with DTs in English lessons

4. Postobservation conversations with students and teachers for further clarifications of interesting observations

5. Documents:
Lesson plans to record teachers' planning and preparation for DT use for teaching and learning English
School documents such as policies and resourcing to record contextual enablers and barriers

6. Field notes to describe everyday experiences of participants, to reflect on researcher positionality, and to make sense of data collected

Ethical Considerations

It is crucial to consider potential ethical dilemmas that may arise in conducting any research. Ethical considerations are necessary not only for the welfare of participants and the researcher but also for the integrity of the research. Here, I explain how I addressed issues related to gaining voluntary informed consent and maintaining the anonymity of my participants and confidentiality of the data I gathered from them.

Voluntary informed consent

Diener and Crandall (1978) defined informed consent as “the procedure in which individuals choose whether to participate in an investigation after being informed of facts that would likely influence their decision” (p. 34). Gaining consent involves preparing information letters and consent forms for principals, IT technicians, teachers, students, and their parents. Once I gained approval from the urban school, for example, I met everyone except the parents to gain their consent. For parents, an information letter and consent form were sent home with students.

The purpose of the information letter was to ensure all potential participants were fully informed about the research and were aware of the voluntary nature of participation. I prepared all the documents in English and Dhivehi. I wrote information letters and consent forms for children pitched at a level they understand. It was expected that not all students and parents would respond to my invitation to participate in the research. However, this nonparticipation was not a significant issue as the focus of my research was teachers’ practices. I made sure that I did not collect any data from students whose parents did not give consent for me to do so. For instance, I kept a record of students and parents who gave consent and distributed the mini surveys only to the students from whose parents I had gained consent.

Anonymity and confidentiality

According to Cohen et al. (2007), “the essence of anonymity is that information provided by participants should in no way reveal their identity” (p. 64). Therefore, during data collection, I made sure that I took photos of student works in ways that the identity of the teachers and students were not revealed.

When reporting the findings, I used pseudonyms for both participants and the school to protect their original identity. When writing participant responses, I avoided describing too much contextual information to also protect identity. Nonetheless, I acknowledge that due to the Maldivian community’s nature, other school stakeholders were probably aware of my participants’ participation in my research. As Moosa (2013) acknowledges, the tight-knit nature of the island communities and the small size of the context will continue to pose challenges in researching the Maldives. It was important to work hard to make it difficult for anyone to trace individual responses.

Finally, my data storage and security procedures acted as an additional strategy to ensure the anonymity of the participants and the confidentiality of their information. I entered observation notes, student mini surveys, and field notes into a designated password-protected NVivo research project. I also imported the lesson plans, mini surveys for teachers, audios of the observed lessons, interviews, and school documents into the software. Hard copies of student-survey responses and consent forms are kept in a secure, locked location. All digital files and the NVivo project are password protected. A backup of all these files are kept in my Google Drive. I will destroy all these documents after 5 years.

My Research Process

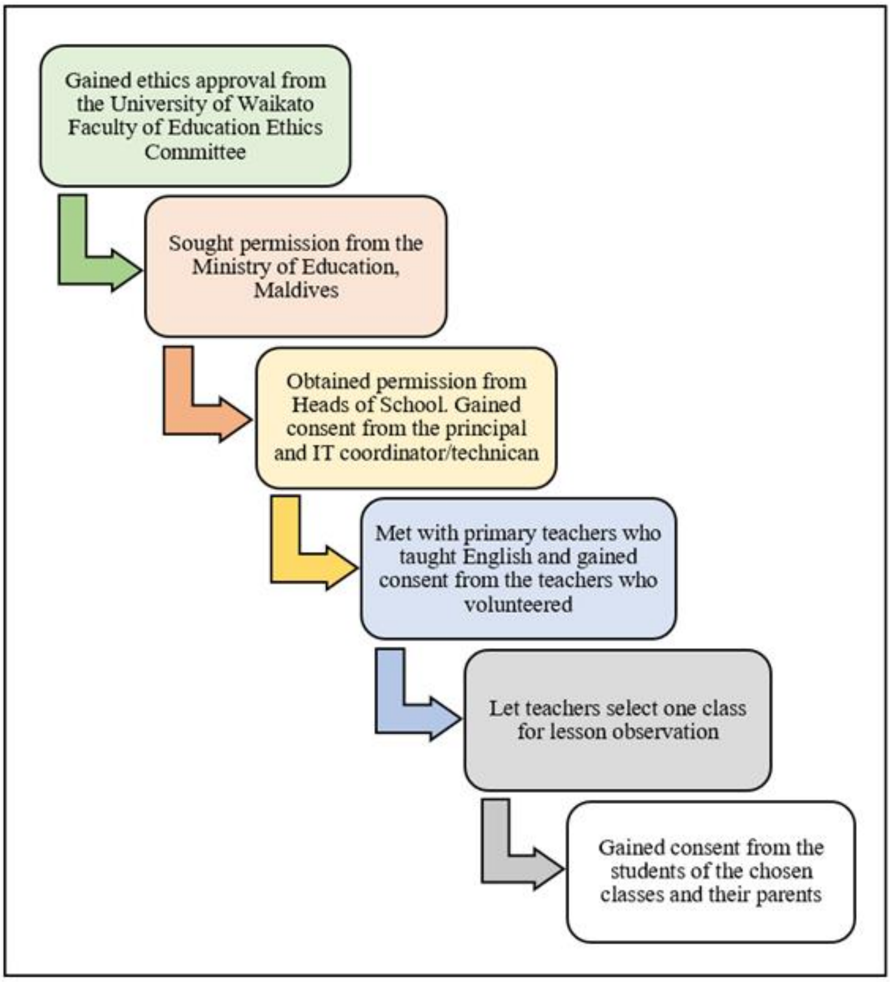
In this section’s five parts, I describe my research process. First, I describe my participant recruitment process. Next, I provide details of how I selected schools and participants for my study. In the two sections that follow, I describe my data collection and analysis processes. Finally, I explain how reflexivity, transparency, and triangulation helped in maintaining the trustworthiness of my study.

Participant Recruitment

As shown in Figure 3.2, the first step in participant recruitment was gaining ethics approval from the University of Waikato Faculty of Education Ethics Committee (see Appendix A). Next, I sought permission from the MoE, Maldives to access schools. Following this approval (see Appendix B), I emailed the urban and rural schools, explaining my research and the participation I was seeking from them. Once I had gained a positive reply from each school, I visited the school and met the senior management team (SMT) to provide them with further information about my research and to invite the principal to participate in it (see Appendix C for the schools' and principals' consent). During the first week at each school, I invited the IT coordinator/technician to participate in a one-on-one interview. I did this by first emailing the person an information letter and consent form before initiating a meeting.

Figure 3.2

Participant Recruitment Process


Gained ethics approval from the University of Waikato Faculty of Education Ethics Committee
Sought permission from the Ministry of Education, Maldives
Obtained permission from Heads of School. Gained consent from the principal and IT coordinator/technican
Met with primary teachers who taught English and gained consent from the teachers who volunteered
Let teachers select one class for lesson observation
Gained consent from the students of the chosen classes and their parents

Following each principal's consent, I met with potential participant teachers who taught English at the primary level. The meeting helped me establish contact and explain the kind of participation I was seeking from them. I also provided them with the information letters and consent forms (see Appendix D). Consequently, four primary teachers from the urban school and five from the rural school volunteered to participate in the research, although I had initially planned for four primary teachers (two from each Key Stage) from each school. As this change involved adding only one additional teacher, I continued my data collection with the nine teachers who had volunteered (see Table 3.2).

Once teachers consented to participate, I asked them to choose one class so that I could carry out lesson observations and conduct mini surveys with the students (ages 6–12). I met with urban students during their English period and rural students along with their parents at the end of the session. I took about 10 minutes to explain why and how I was planning to do the research. I gave each student information letters and consent forms for themselves and their parents. I also provided Dhivehi language copies of the documents for parents (see Appendix E) and students who preferred to have them in Dhivehi.

Hiccups are an inevitable reality during data collection for any research. The same was true for my research. The first hindrance to my data gathering was the rejection from the urban school that I had approached first. Having had to request another school led to a delay of 2 weeks of data collection as I had to get new approval from the MoE, Maldives and contact another urban school. This delay resulted in having to extend data collection to the first 2 weeks of the month of Ramadan, during which schools have shorter session times. Also, having to recruit a replacement for the urban teacher who left her school halfway through my data collection caused additional delays. My data collection was also affected because I could not interview the principal who joined the rural school during my data collection phase. This rural principal was taking an acting/interim role. It is common in the Maldives for principals to change, particularly in rural settings. However, this change of personnel did not help me gather perspectives from the rural principal. In addition, while there was no IT technician at the rural school, I interviewed the librarian who was acting in that role.

Sampling Procedures

The two broad categories of sampling are probability sampling and nonprobability sampling. Probability sampling is used to ensure that every member of the target population has an equal chance of being included in the sample (Fink, 2003). Its aim is to choose a representative sample so that the findings can be generalised to the population in question. This was not my intention. I wanted to select my participants using nonprobability sampling techniques based on the “type, nature and purpose” of my study (Etikan et al., 2016, p.1). In the following sections, I explain how I sampled schools, teachers, and students for my study.

Sampling schools

As I was aware of the differences in ESL resources and ICT infrastructure availability between urban and rural schools based on my past experience as an educator in the Maldives, I wanted one school from the capital city, Male’ and another from one of the atolls that make up the archipelago of the Maldives. I used convenience sampling to choose the two schools as this technique helped to identify sites that were easily accessible (Cohen et al., 2011). Accessibility is important, given the difficulty and cost of travelling to many of the dispersed islands of the Maldives. An urban and a rural school thus represent the two types of schools in the Maldives in terms of their geographical location. The urban school I approached first was a public school. I chose the school because it was the closest to my home. However, as the school did not accept my invitation to participate in the research, saying they had limited ICT infrastructure, I approached another urban school through a personal contact. On the other hand, I chose the rural school I did because it was convenient in terms of traveling and accommodation.

The urban school was a private international school which relies on tuition fees paid by students’ parents for its operation. The school caters to primary and secondary students (grades 1–10, ages 6–16) and has an audiovisual (AV room) and a computer laboratory. In addition, each classroom has access to Wi-Fi and is equipped with a smart board, a computer system, a projector, and a sound system. The school runs a bring your own device (BYOD) programme, in which grade 5 (age 10–11) and above students bring a device (laptop or tablet) to school 1 day a week.

The rural school selected was publicly funded by the government and caters for students from grades 1–10 (ages 6–16). The school no longer has a computer laboratory due to a lack of repair and maintenance issues and because the computer systems have been damaged beyond repair. Rural school teachers and students received tablets in 2018 under the MoE digitisation programme for public schools. All the students and teachers, with the exception of those who joined the school after 2018, had tablets. However, because classrooms did not have internet access, they did not use tablets for teaching and learning. While rural school classrooms for Key Stage 1 (ages 6–9) have a wall-mounted 65-inch TV screen, Key Stage 2 and above (ages 9–16) classrooms have a ceiling-mounted projector without a screen. As classrooms are not equipped with any computer systems or necessary peripherals, rural teachers carry laptops, portable speakers, and cables to every class. Teachers have access to Staff Wi-Fi in the staffroom but none in classrooms. They had not received the necessary password from the MoE during my data collection phase. Unfortunately, no one took the initiative to contact the MoE to get this password during the 4 months I was at the school. Without access to Wi-Fi in the classrooms, rural teachers download and save all the online resources on their laptops before going to class.

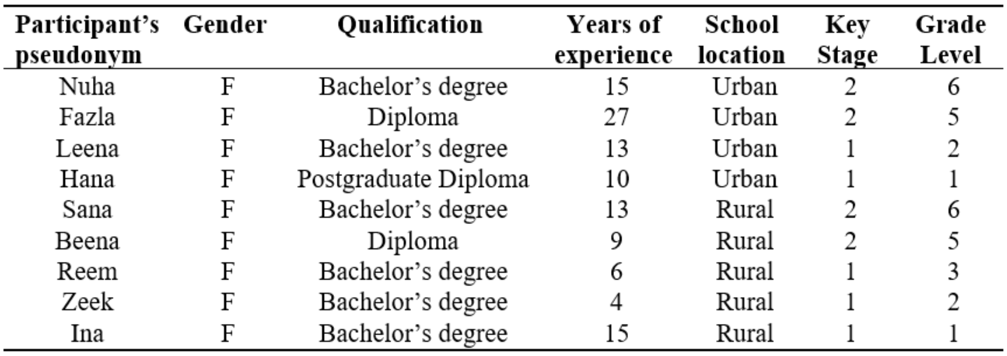
Sampling teachers

Sample sizes in phenomenological studies typically range from 3 to 10 (Creswell, 2014). I ended up with nine participants, and, therefore, this sample size fits within this range. These participants taught English at the primary level in either the urban or rural school. A small sample size was appropriate for my research because the aim was not to generalise the findings but to understand what it means to experience a phenomenon (Converse, 2012). I used two criteria to recruit participants: 1) they were employed full-time at either the rural or urban school, and 2) they taught English with DTs at the primary level. They were not required to have a minimum qualification or experience to participate in my study.

Table 3.2 presents the demographics of my participant teachers at the time of my data collection. The table includes participants' pseudonyms, gender, qualification, years of experience, school location, and also the Key Stage and grade level at which they taught. All nine teachers were women. Teaching is a female-dominant field in the Maldives. Also, all of them spoke English as a second language. The five teachers who taught at Key Stage 1 (grades 1–3, ages 6–9) were generalist primary teachers because, in addition to English, they also taught other core subjects such as mathematics, social studies, and science to their allocated class. On the other hand, the four Key Stage 2 (grades 4–6, ages 9–12) teachers taught only English to parallel classes. Except for Nuha and Beena, who had qualifications in teaching English to speakers of other languages (TESOL), the rest of the teachers had qualifications in teaching primary students. My intention in presenting my participants' demographics was to provide readers with an understanding of the diversity of my participants and not to claim that there was any correlation between my participants' variables and the findings of this research.

Table 3.2

Demographics of Participant Teachers



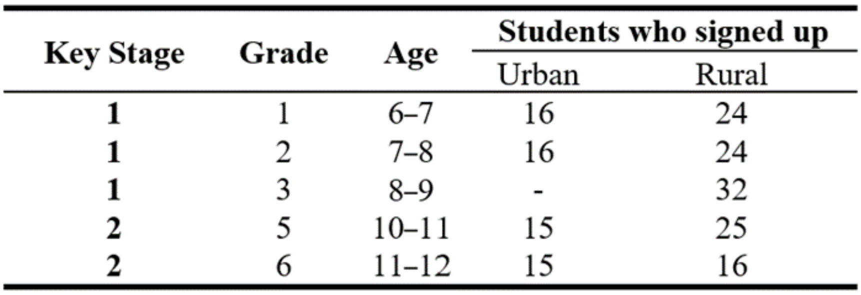
Participant's pseudonym	Gender	Qualification	Years of experience	School location	Key Stage	Grade Level
Nuha	F	Bachelor's degree	15	Urban	2	6
Fazla	F	Diploma	27	Urban	2	5
Leena	F	Bachelor's degree	13	Urban	1	2
Hana	F	Postgraduate Diploma	10	Urban	1	1
Sana	F	Bachelor's degree	13	Rural	2	6
Beena	F	Diploma	9	Rural	2	5
Reem	F	Bachelor's degree	6	Rural	1	3
Zeek	F	Bachelor's degree	4	Rural	1	2
Ina	F	Bachelor's degree	15	Rural	1	1

Selecting students

As it would not have been practical to invite all the students of the nine teachers to participate in my study, I asked each teacher to select one class she taught so that I could focus my observations and attention on their chosen sample. Although I invited all the students of the nine selected classes, as could be expected, not all the students and their parents responded to my invitation. Table 3.3 shows the number of students who, along with their parents, gave consent to participate in mini surveys and postobservation conversations. While all these students were invited to participate in the three mini surveys conducted for them, a few students from among them were purposefully selected to participate in postobservation conversations.

Table 3.3

Student Participation in Urban and Rural Schools



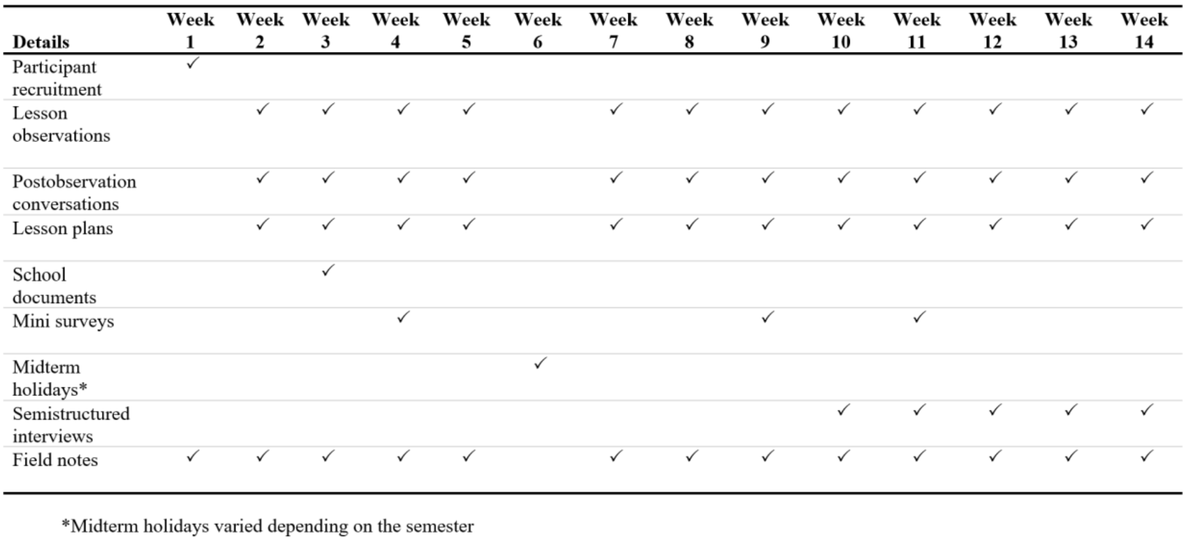
Key Stage	Grade	Age	Students who signed up	
			Urban	Rural
1	1	6–7	16	24
1	2	7–8	16	24
1	3	8–9	-	32
2	5	10–11	15	25
2	6	11–12	15	16

Data Collection

Capturing the everyday life of my participant teachers required me to collect data over a prolonged period. According to Fetterman (2010), even though immersion in culture usually requires 6 months to 2 years, such a long duration may not be necessary for a study within one’s own culture. As I am from the same culture as my participants, I did not need to learn the native language, Dhivehi or learn about the participants’ historical, political, and cultural contexts. Instead, I had to be cautious about overlooking important aspects due to our shared background. As such, I undertook my data collection within an 8-month period. As the academic year in the Maldives is divided into two terms, I gathered data at the urban school during the first term—from February to May 2019—and at the rural school in the second term—from June to September 2019. Table 3.4 shows the schedule I followed in gathering data at each school.

Table 3.4

Data Collection Schedule



Details	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Participant recruitment	✓													
Lesson observations		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Postobservation conversations		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Lesson plans		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
School documents			✓											
Mini surveys				✓					✓		✓			
Midterm holidays*						✓								
Semistructured interviews										✓	✓	✓	✓	✓
Field notes	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

*Midterm holidays varied depending on the semester

Lesson observations

Starting from the second week at each school, I began observing the English lessons of my participant teachers. Although I had planned to observe one lesson for each teacher every week (12 lessons for each teacher), I was not able to reach my target due to unavoidable circumstances such as public holidays and school activities. Despite the hiccups, I observed 98 lessons (38 for urban and 60 for rural teachers). The vast difference in the number of lessons observed in urban and rural schools was due to the number of teachers who participated in the research (see Table 3.2) and because I had to recruit a new teacher halfway through data collection at the urban school.

Each observation lasted about 35–40 minutes (35 minutes in the rural school and 40 minutes in the urban school, as per the timetable). To minimise data loss, I audio-recorded the lessons and took photographs of student works. Sitting at the back of the class, I observed the lesson and took descriptive notes using my observation guidelines that broadly focused on teacher activities, student responses, and DT use in the lesson (see Appendix F). Although the guidelines helped draw my attention to the phenomenon of teaching and learning with DTs, their open-ended nature did not limit the amount or type of observational notes I took. Hence, I also took notes of my own thoughts, reflections, and wonderings separately during the observations. During these lesson observations, I was "a sensitive observer of the subtleties of everyday life" (van Manen, 1997, p. 29) to gather data on taken-for-granted aspects of teachers' pedagogical practices. To achieve this aim, I also listened to the audio tape while revisiting my observation notes. This process helped me notice any interesting aspects of teachers' practices that I might have missed earlier.

Postobservation conversations

Conversations with students and teachers after my lesson observations were also a critical data source as they helped to clarify various aspects of the everyday pedagogical practices of my participant teachers. Thus, I had 21 postobservation conversations (14 with students and 7 with teachers). Each conversation took less than 5 minutes, and I made detailed notes of students' and teachers' responses immediately after the conversations. The aim was to learn more about specific activities carried out in the class or the participant's opinion about something I had observed that required clarification. In this way, the thoughts, reflections, and wonderings that I wrote in the observation notes gave focus and purpose to my conversations. For instance, after a few weeks of observing the English lessons of a grade 5 class at the urban school, I noticed that students used their own devices, such as laptops and iPads, in some of the lessons. I wondered why they did not use their devices in all the English lessons. So, I spoke about this issue with one of the students from that class who, along with their parents, had given consent to have a postobservation conversation. From the chat with the student, I learned that the school ran a BYOD programme that requires students of grade 5 and above to bring their own devices to school 1 day of the week and that their device could be used across all subjects timetabled that day. This new information also helped me further clarify this programme in my interviews with the principal, IT technician, and teachers of the urban school.

Lesson plans

Examining the extent to which my participant teachers planned to use DTs in their English lessons was important for my study. I, therefore, collected the English lesson plans of the teachers to explore their planning around DTs use and to document the types of DTs they used for specific activities. I gathered 317 lesson plans (125 from four urban teachers and 192 from five rural teachers) over the course of 8 months. Teachers emailed me a copy of their lesson plans at the end of each week. Understandably, the timetable varied for each class. So, while English lessons were not timetabled for every day of the week for some classes, on some days, a class might have two English periods back-to-back. Hence, the number of English lesson plans prepared weekly varied depending on the timetable of the class my participant teachers taught. The teachers at both schools used a template provided by the school to write the lesson plans. However, I noticed that while all the teachers of the urban school used the same lesson plan template, Key Stage 1 and Key Stage 2 teachers of the rural school had two different templates, which differed in terms of the section labels, details, and content covered. For instance, in the template urban teachers followed, the lesson was divided into sections called review, introduction, presentation, model, guided practice, independent practice, and closure. On the other hand, in the rural teachers' lesson template, the lesson was divided into hooking, introduction, main activities, and closure.

School documents

As understanding teachers' lived experiences of teaching with DTs required me to explore the social and professional context of their schools, I also gathered 13 school documents (10 from the urban school and 3 from the rural school). They included ICT and PD policies and guidelines, ICT infrastructure inventory, activity schedules, class timetables, and lesson plan templates. These documents provided information about the resources and support available for the teachers, giving insight into the enablers and constraints of using DTs in the teaching and learning process at each school. Both schools kept a record of the ICT inventory and PD schedules. However, only the urban school had their own ICT policy and guidelines regarding DT use.

Mini surveys

Each mini survey (see Appendix G for a mini survey sample) consisted of two open-ended questions, which took participants about 10 to 15 minutes to respond to. I conducted these surveys to understand further various aspects of using DTs in teaching and learning in the ESL context. The responses also served as an additional source for data triangulation.

1. Mini surveys for teachers

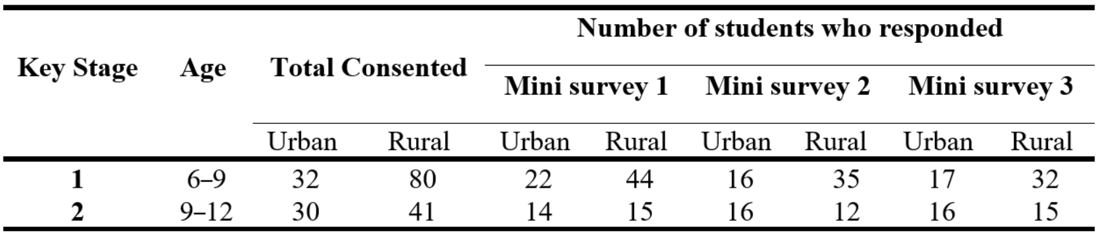
I conducted mini surveys with nine participant teachers via Google Forms. Online surveys via Google Forms made data collection quite convenient for the participants and for me as a researcher. As nine participant teachers had smartphones with internet access via 3G or Wi-Fi, they were able to answer survey questions on their mobile phones without having to use a laptop or a desktop computer. As a researcher, the use of Google Forms was convenient for me because teachers' responses were automatically saved in my Google Docs, and I could readily import them to my NVivo project for analysis. Although I initially planned to conduct six surveys for teachers, I conducted only three surveys for urban teachers and two surveys for rural teachers due to time constraints.

2. Mini surveys for students

While 112 students from Key Stage 1 and 71 students from Key Stage 2, along with their parents, gave consent to participate in my study, not all the students participated in all three mini surveys I conducted. Understandably, some students were absent on the days I conducted the surveys, and some simply did not feel like participating on that particular day. Hence, the number of survey responses does not correspond to the number of students and parents who agreed to participate in the survey. Table 3.5 provides details of the number of students who participated in the three mini surveys from Key Stages 1 and 2 at the urban school and the rural school.

Table 3.5

Student Responses to the Mini Surveys (Key Stages 1–2, Both Schools)



Key Stage	Age	Total Consented		Number of students who responded					
				Mini survey 1		Mini survey 2		Mini survey 3	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1	6–9	32	80	22	44	16	35	17	32
2	9–12	30	41	14	15	16	12	16	15

For students, I used paper-based mini surveys because I had anticipated it would be difficult for them to complete these online. The questions in the survey explored students' perspectives and feelings about using DTs in their English lessons. I framed the questions differently for Key Stage 1 (ages 6–9) and 2 (ages 9–12) students for ease of understanding. The main difference was that I gave Key Stage 1 students the opportunity to either write or draw their responses while I asked Key Stage 2 students to write. In addition, although these questions were in English, I explained them to students in Dhivehi when I distributed the surveys. Students filled out the surveys during substitute periods when their regular teacher was absent. As the period was about 40 minutes in the urban school and 35 minutes in the rural school, students had plenty of time to think and write or draw their responses to the two questions in the survey. I noticed that students from grade 1 (ages 6–7) in particular preferred responding to the questions with a drawing along with some captions. For instance, for the question on why students liked the smart board, one of the students drew a black and green chessboard and wrote 'because we can play online games like chess' above the drawing. If I was not sure about what the student had drawn, I asked them what it depicted, and they explained what it was. Such clarifications helped me during my data analysis process.

Semistructured interviews

During the last 5 weeks of my data collection at each school, I conducted one semistructured interview with each of the teachers, IT technicians, and the principal. Unfortunately, I could interview only the urban school principal. As an interim principal had joined the rural school during my data collection at that school, I felt it was not appropriate to interview the new principal. The reason I conducted the interviews towards the end of my data collection was that I wanted to wait till I had built a good rapport with the participants. I conducted the interviews at a mutually agreed time and in the participants' preferred languages. Except for the interview with the urban school principal, which took about 90 minutes, all the remaining interviews lasted for about 30–45 minutes. All the interviews were audio-recorded with the permission of the participants. Eight out of 12 interviews were conducted in English. The remaining four interviews (three teachers and the acting IT technician) at the rural school were conducted in Dhivehi as the interviewees were more comfortable speaking in their mother tongue. I had prepared a question guide ahead of the interviews (see Appendix H for the guide for teacher interviews). However, the interview process did not completely follow the question sequence in the guide as participants sometimes covered many areas at once, even before I asked about them.

Although I had not initially planned to do so, I conducted a second virtual interview with three of my participant teachers in November and December of 2020 during the COVID-19 pandemic. As I saw an opportunity to understand their pedagogical practices with DTs during online teaching in lockdown conditions, I sought further approval from the Education Ethics Committee before conducting these interviews. I used Viber, a secure Voice over Internet Protocol (VoIP) software application, to conduct the additional interview with three available teachers: two from the urban school and one from the rural school.

Field notes

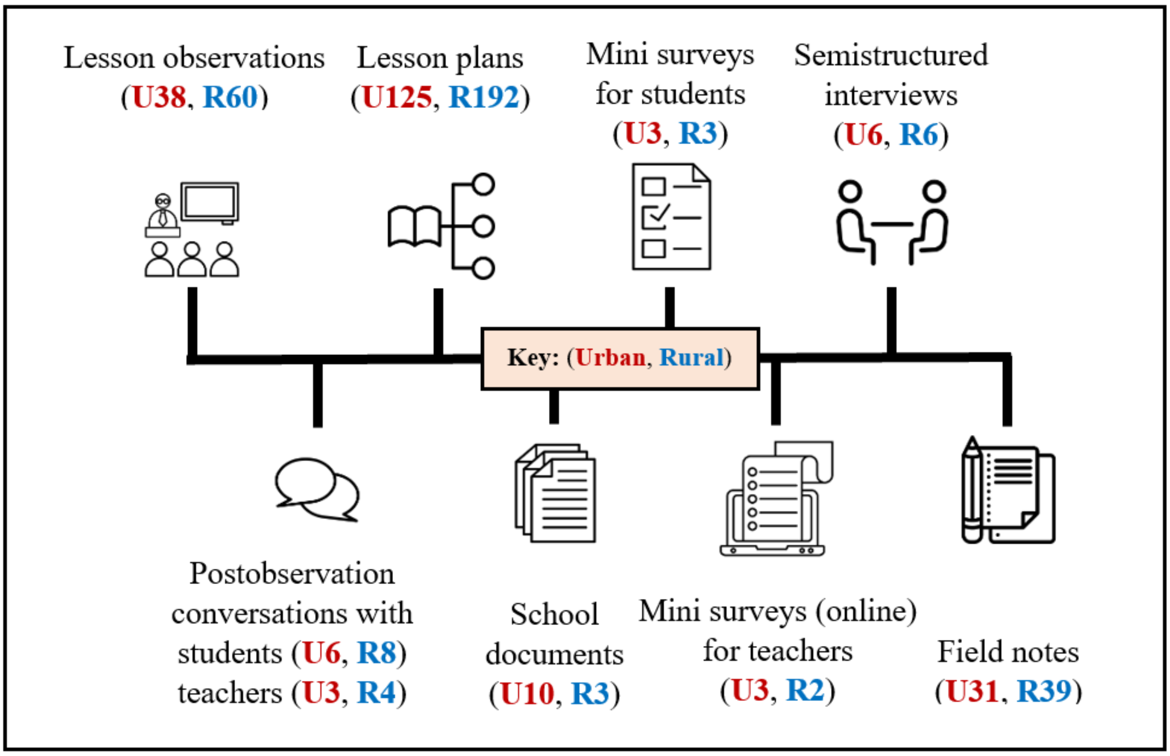
I started writing field notes from the first week of my data collection at each school. While I took 'scratch' notes in the presence of my participants when my attention and eye contact were important, I made sure I expanded them into comprehensive notes by the end of the day. For instance, as I wanted to participate and maintain eye contact with my participants during postobservation conversations, I would scribble keywords or phrases on a small notebook. Later, I would type up comprehensive notes of my conversations, including my interpretations as they occurred to me at that time. As I wrote the field notes immediately after the conversations, I was able to capture the subtleties of cues and responses in addition to the factual information. I also found that it was important to make 'scratch' notes of thoughts and questions that 'popped up' during interviews, although the interviews were recorded and transcribed later. Some thoughts and insights about my research came at odd times when I did not have my notebook with me. So, having a smartphone with the Notes application was a lifesaver. The application made it convenient for me to take 'scratch' notes wherever I was. These abbreviated notes helped in typing comprehensive field notes in my Google Docs afterwards. I saved 70 entries of comprehensive field notes in my Google Docs during my data collection as I found Google Docs a secure space to store them. Having comprehensive typed notes was also essential when importing them into my project in NVivo, a qualitative data analysis software, for analysis.

For clarity, I labelled my notes as descriptive, reflexive or analytic. My descriptive field notes were general observations about the school, participants, and documents. These notes focused on describing what the school was like in terms of DT use for teaching and learning for my participant teachers. The reflexive field notes I took helped me reflect on my positionality as a researcher and interrogate my preconceptions about teaching and learning in Maldivian schools. I wrote analytic field notes to record my thoughts, questions, and wonderings about what I noticed on occasions, such as lesson observations, subject coordination meetings, and school events. These notes helped me in making sense of my participant teachers' lived experiences while gathering as well as analysing data.

To conclude this section on my data collection experience, in Figure 3.3, I have presented a summary of data I gathered from the urban school (written in red) and rural school (written in blue). In the next section, I explain my data analysis experience and how the themes that emerged helped me understand various aspects of DT use for teaching and learning English in Maldivian primary schools.

Figure 3.3

Data Collected from the Urban and Rural Schools


Lesson observations (U38, R60)
Lesson plans (U125, R192)
Mini surveys for students (U3, R3)
Semistructured interviews (U6, R6)
Key: (Urban, Rural)
Postobservation conversations with students (U6, R8) teachers (U3, R4)
School documents (U10, R3)
Mini surveys (online) for teachers (U3, R2)
Field notes (U31, R39)

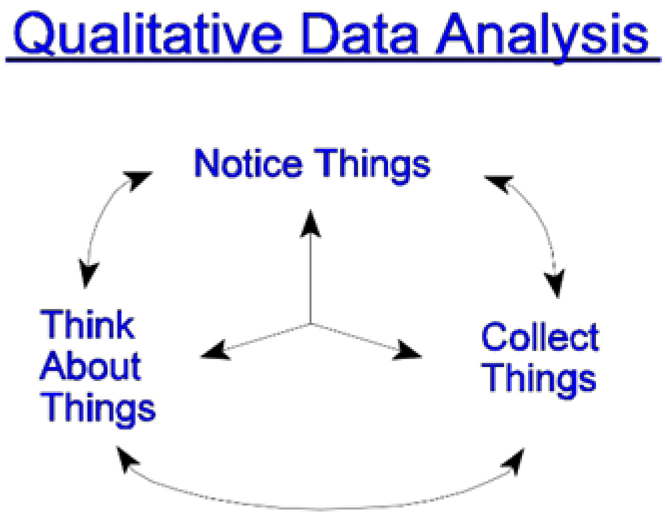
Note. Data collected from the urban and the rural school in red and blue, respectively

Data Analysis

Qualitative data analysis (QDA) can be quite 'messy' as there are many ways of linking themes, and data does not necessarily fall into neat categories. For any novice researcher like myself, the endeavour could become quite difficult when there is a mismatch between what is written in the textbooks about QDA and what actually happens in practice. I found that although QDA is claimed to be a nonlinear, iterative, and recursive process, it is often explained or illustrated in some frameworks as a linear process moving through phases in a single direction. Adopting an interpretive phenomenological approach for my study allowed me to discover or invent a data analysis process that aligned with my experiences in response to my research questions (van Manen, 1997). So, from my readings, I realised that Seidel's (1998) QDA model closely aligned with the complex nature of qualitative data analysis I experienced. Also, it provided me with a process to connect with and reflect on the data. Seidel's (1998) QDA procedure consists of three processes: *noticing things*, *collecting things*, and *thinking about interesting things* (Figure 3.4). First, this process is iterative and progressive because it is a cycle that keeps repeating. Second, it is recursive because it allows going back to the last part. Third, it is holographic in that each step in the process consists of the entire process.

Figure 3.4

Seidel's (1998) Qualitative Data Analysis

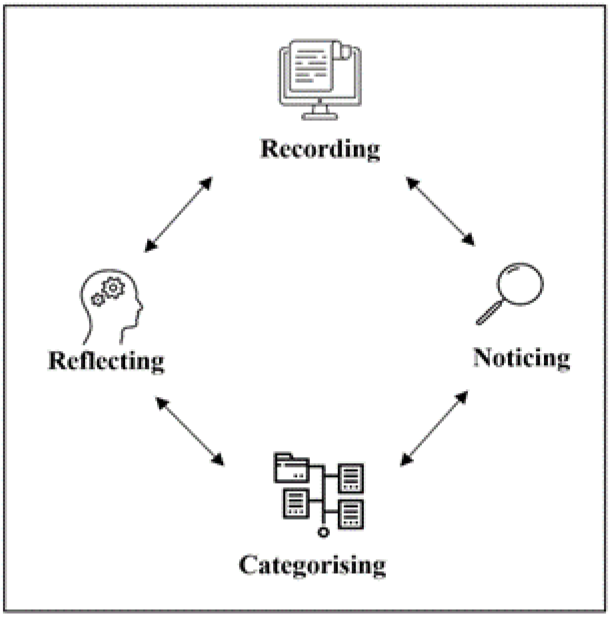


Note. The basic processes in qualitative data analysis (QDA). From *Qualitative Data Analysis*, by J. V. Seidel, 1998, p. 2. Copyright 1998 by John V. Seidel.

As I read more about what *noticing*, *collecting*, and *thinking* were in Seidel's (1998) QDA process, I realised expanding it to four processes and assigning new labels to each process would give each process more clarity for my purposes. So, I extended the three processes proposed originally to four processes: *recording*, *noticing*, *categorising*, and *reflecting* (see Figure 3.5). In Seidel's QDA, *noticing things* included data collecting (recording what had been noticed) and coding (noticing interesting things in the record). So, I separated the two parts within *noticing things* and labelled them as *recording* and *noticing*. As *collecting things* in Seidel's QDA meant sorting and categorising data, I labelled this process *categorising*. Finally, I replaced *thinking about things* in Seidel's QDA with *reflecting*, as I am of the view that QDA requires a conscious effort and deeper engagement with data. Reflecting better connects with the theory of 'thinking about things' as in Schön's (1987) reflection-in-action, reflection-on-action, and reflection-for-action.

Figure 3.5

Qualitative Data Analysis Process



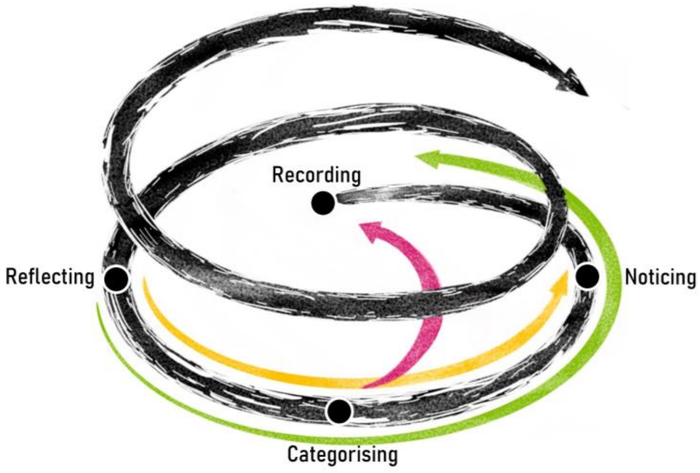
Note. The four processes followed in my initial qualitative data analysis process. The QDA process I adapted from *Qualitative Data Analysis*, by J. V. Seidel, 1998.

The Spiral-QDA process

As I began my data analysis, I felt that visualising QDA as a spiral process gave me a better understanding of the iterative nature of my data analysis process. Therefore, drawing on Seidel's (1998) QDA, I developed the Spiral-QDA process (Figure 3.6), partly to reflect that an important feature of data analysis in qualitative studies is its iterative nature (Fetterman, 2010). The black arrow winding upwards in a continuous curve depicts the iterative and progressive nature of the QDA process. The ability to repeat the process makes it also suitable for research where data is collected and analysed in phases. For instance, during the COVID-19 pandemic, I recorded additional data through semistructured interviews, and I went through the data analysis process all over again. The green arrow illustrates the recursive nature of the process that allows moving back to a previous phase or phases. For example, while *categorising* data, I sometimes had to go back and start *noticing* new things to add to the themes that emerged. It was through such revisits that I learned that my participant teachers frequently used DTs to gain students' attention. Both the yellow and pink arrows show that a phase can be skipped when moving back. For instance, while trying to make sense of the themes in the *reflecting* phase, I sometimes had to look back at the coding I did in the *noticing* phase. The pink and green arrows also indicate that, if need be, going back to *recording* is possible from any phase, be it from *categorising* or *noticing*. With the Spiral-QDA process, I was able to conduct both data-driven and theory-driven analysis. For example, the answer to how and why teachers use DTs in their ESL pedagogical practices was driven by what was in the data. However, the exploration of contextual complexities surrounding teachers' DT use was not only data-driven but also, to a great extent, informed by my conceptual framework.

Figure 3.6

The Spiral-QDA Process



Note. The iterative, recursive, nonlinear nature of the QDA process. The Spiral-QDA process I adapted from *Qualitative Data Analysis,* by J. V. Seidel, 1998.

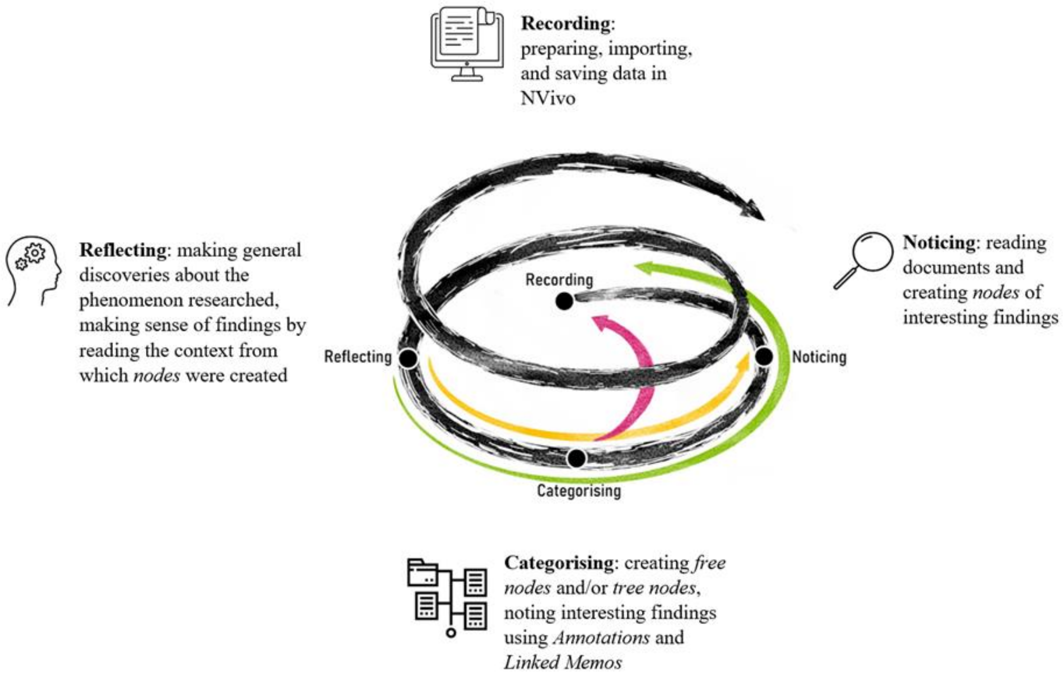
The NVivo-enhanced Spiral-QDA process

I could have used the Spiral-QDA process to analyse qualitative data manually. To do so manually, I would have needed "a little bit of data, and a lot of right brain" (Agar, 1991, p.

194). However, having generated such large amounts of rich qualitative data for this research (see Figure 3.3.), managing and analysing data manually was next to impossible, even with a lot of right-brain effort. So, I decided to use NVivo, a CAQDAS tool (computer-assisted qualitative data analysis software), to enhance my data analysis process. Figure 3.7 provides a brief description of how NVivo enhanced data analysis at each of the four phases of the Spiral-QDA process.

Figure 3.7

The NVivo-Enhanced Spiral-QDA Process



Recording: preparing, importing, and saving data in NVivo

Reflecting: making general discoveries about the phenomenon researched, making sense of findings by reading the context from which *nodes* were created

Noticing: reading documents and creating *nodes* of interesting findings

Categorising: creating *free nodes* and/or *tree nodes*, noting interesting findings using *Annotations* and *Linked Memos*

Note. How NVivo, a CAQDAS (computer-assisted qualitative data analysis software), enhanced the Spiral-QDA process, which I adapted from *Qualitative Data Analysis*, by J. V. Seidel, 1998.

In recent years, NVivo has become a commonly used analysis tool for content analysis (Kaefer et al., 2015; Leech & Onwuegbuzie, 2011), grounded theory analysis (Adam, 2015; Zamawe, 2015), and framework analysis (Bonello & Meehan, 2019; Parkinson et al., 2016). However, unlike quantitative data analysis software such as SPSS, which deals with numbers, NVivo does not analyse qualitative data for a researcher. So, in addition to NVivo, QDA requires a lot of analytical thinking from the researcher. Nonetheless, I must acknowledge that NVivo simplified the complex nature of the process. As Bryman (2016) argued, NVivo also enabled me “to be more explicit and reflective about the process of analysis” (p. 603). Table 3.6 shows how I developed NVivo-enhanced Spiral-QDA by adapting Seidel’s (1998) QDA.

Table 3.6

Development of NVivo-Enhanced Spiral-QDA Process

QDA (Seidel, 1998)	**Spiral-QDA**	**NVivo-enhanced Spiral-QDA**
Noticing	***Recording***	
Level 1 ● making observations ● writing field notes ● tape recording interviews ● gathering documents	● making observations ● tape recording interviews and conversation ● conducting mini surveys ● gathering documents ● writing field notes	● preparing and importing data to NVivo software ● saving various data sources in separate folders with appropriate labels, such as lesson observations, field notes, interview audios, transcripts, lesson plans, mini survey responses.
Level 2 ● noticing interesting facts in the data collected by reading the record many times ● coding as you notice them	***Noticing***	
	● reading documents several times to get the gist of them and to notice interesting findings that stand out ● coding important findings as they are noticed	● running *Word Frequency* for each individual source and also all the sources of the same type to get a general idea of the main findings ● Using *Word Cloud* or *Word Tree* to enhance noticing ● Coding by applying nodes to segments of text e.g., highlighting and placing the segments of texts from various sources that identify the barriers in the node labelled ‘Barriers’ ● using *Coding Stripes* to keep track of *Coding Density*
Collecting	***Categorising***	
● sorting ● sifting ● collecting (classifying/ categorising)	● reading the nodes ● categorising them based on their relationship with each other ● triangulating participants and sources of data	● creating *Free Nodes (nonhierarchical nodes)* and *Tree Nodes (hierarchical nodes)* to show the connection between and amongst the nodes, enabling triangulation of participants and data sources ● intensive reading of data in each node and noting interesting findings using

		Annotations and *Linked Memos*
Thinking	***Reflecting***	
● making sense of each collection ● looking for patterns and relationships within and across collections ● making general discoveries about the phenomenon researched	● reflecting on each category to make general discoveries about the phenomena studied ● looking for patterns and relationships within and across categories ● exploring ways to illustrate data in a meaningful way	● visualising categories using *Charts, Maps, Diagrams* to make general discoveries in relation to the research questions. ● using *Matrix Coding Queries* to look for the patterns and relations within and across categories ● rereading the context from which the nodes were created to make sense of the findings

My NVivo-enhanced Spiral-QDA process

In this section, I provide specific details of how I used various features and functions of NVivo to analyse the data of my phenomenological study. My data analysis process began as soon as I started collecting data.

Recording

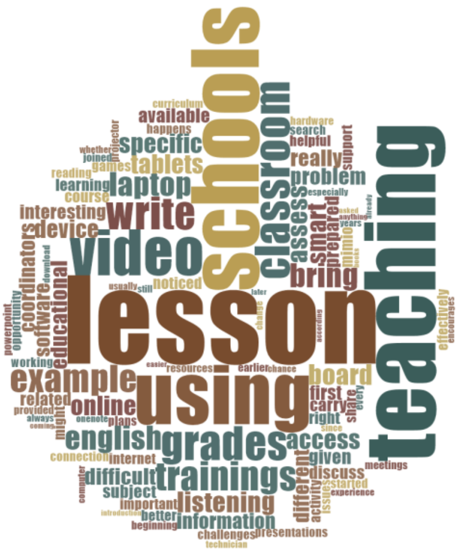
The recording phase of the spiral included collecting, preparing, importing, and saving all my data sources into NVivo-12. I collected various data sources, including audio recordings of lessons and semistructured interviews, mini survey responses from teachers and students, lesson observation notes and field notes, teachers' lesson plans, and school documents. One of the advantages of NVivo was the ability to store and manage all my data sources in one place. Data preparation meant labelling the files carefully to make it easy to trace my way back to the original source in the later phases of data analysis. After importing all the data sources, I created a data folder within which I saved files in specific folders allocated for each data type. Transcribing the interviews was also a crucial part of the recording phase. This process involved carefully and repeatedly listening to the audio-recorded interviews to document the content in light of the expressions and intonations in participants' conversations. Using NVivo enhanced the time-consuming task of transcribing interviews. For instance, it enabled me to listen to the audio at a slower pace and sync media with the transcript, allowing me to locate specific utterances using the timespan feature. As some interviews were conducted in the local language, Dhivehi, it took additional time to translate and transcribe them into English. Then, I exported the translated transcripts to a Word document and emailed them to one of my supervisors to verify the accuracy of my translation of the transcripts from Dhivehi to the English language. I also emailed the transcripts to my participants for verification of content. Finally, I imported the verified transcripts back into NVivo to continue with the data analysis process.

Noticing

The noticing phase in the Spiral-QDA aimed to allow the data to ‘speak for itself’. So, before beginning the conscious process of noticing interesting findings in the data, I used the *Explore* option in NVivo to run *Word Frequency* to get the gist of the most significant ideas in individual data files (e.g., a single transcript) and all the files of the same data type (for example, all the transcripts). In addition, the use of both *Word Cloud* and *Word Tree* helped me to notice the trends in what teachers told me. For example, the Word Cloud (Figure 3.8) indicates participant teachers’ frequent mention of the word ‘teaching’ in their interviews.

Figure 3.8

Word Cloud from the Interview Data

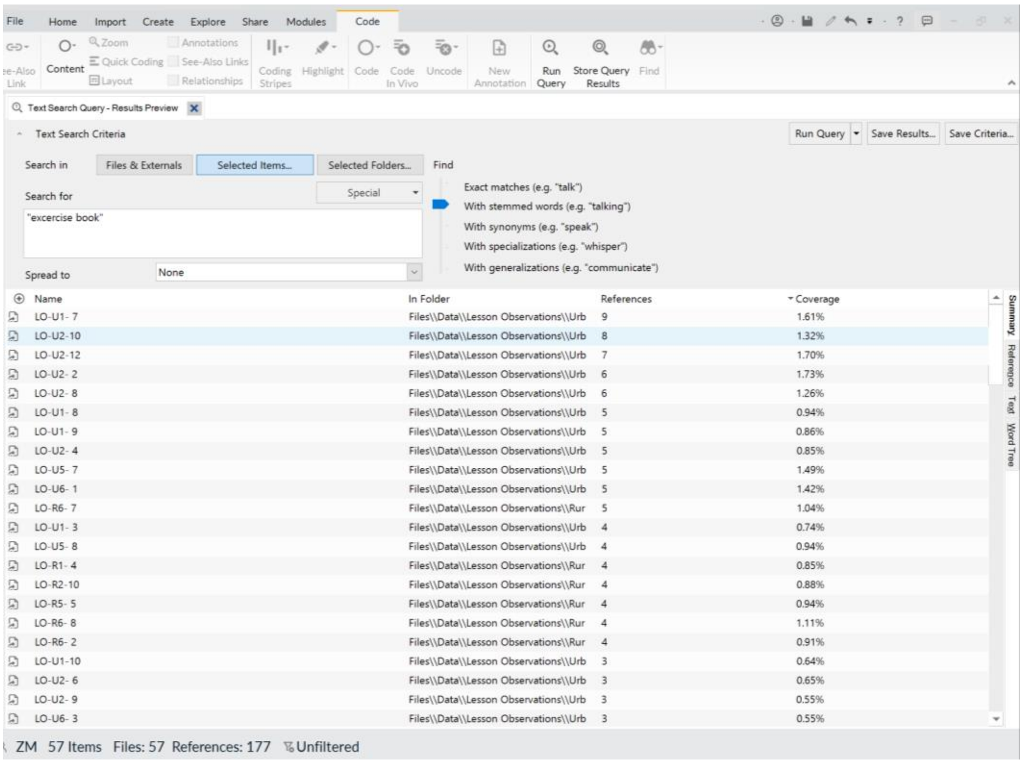


Note. The *Word Cloud* I generated from the interview data of all the participant teachers (N=9).

In addition, as I noticed ‘exercise books’ was a critical idea in the lesson observation data, I ran a *Text Search Query* for this term (Figure 3.9). As a result, I found out that students used their English exercise books for writing in 57 out of 98 lessons.

Figure 3.9

Screen Capture of Text Search Query


File
Home
Import
Create
Explore
Share
Modules
Code
See-Also Link
Content
Zoom
Quick Coding
Layout
Annotations
See-Also Links
Relationships
Coding Stripes
Highlight
Code
Code In Vivo
Uncode
New Annotation
Run Query
Store Query Results
Find
Text Search Query - Results Preview
Run Query
Save Results...
Save Criteria...
Files & Externals
Selected Items...
Selected Folders...
Summary
Reference
Text
Word Tree

Text Search Criteria

Search in: Selected Items...

Search for: "excercise book"

Special

Spread to: None

Find:
Exact matches (e.g. "talk")
With stemmed words (e.g. "talking")
With synonyms (e.g. "speak")
With specializations (e.g. "whisper")
With generalizations (e.g. "communicate")

Name	In Folder	References	Coverage
LO-U1- 7	Files\\Data\\Lesson Observations\\Urb	9	1.61%
LO-U2-10	Files\\Data\\Lesson Observations\\Urb	8	1.32%
LO-U2-12	Files\\Data\\Lesson Observations\\Urb	7	1.70%
LO-U2- 2	Files\\Data\\Lesson Observations\\Urb	6	1.73%
LO-U2- 8	Files\\Data\\Lesson Observations\\Urb	6	1.26%
LO-U1- 8	Files\\Data\\Lesson Observations\\Urb	5	0.94%
LO-U1- 9	Files\\Data\\Lesson Observations\\Urb	5	0.86%
LO-U2- 4	Files\\Data\\Lesson Observations\\Urb	5	0.85%
LO-U5- 7	Files\\Data\\Lesson Observations\\Urb	5	1.49%
LO-U6- 1	Files\\Data\\Lesson Observations\\Urb	5	1.42%
LO-R6- 7	Files\\Data\\Lesson Observations\\Rur	5	1.04%
LO-U1- 3	Files\\Data\\Lesson Observations\\Urb	4	0.74%
LO-U5- 8	Files\\Data\\Lesson Observations\\Urb	4	0.94%
LO-R1- 4	Files\\Data\\Lesson Observations\\Rur	4	0.85%
LO-R2-10	Files\\Data\\Lesson Observations\\Rur	4	0.88%
LO-R5- 5	Files\\Data\\Lesson Observations\\Rur	4	0.94%
LO-R6- 8	Files\\Data\\Lesson Observations\\Rur	4	1.11%
LO-R6- 2	Files\\Data\\Lesson Observations\\Rur	4	0.91%
LO-U1-10	Files\\Data\\Lesson Observations\\Urb	3	0.64%
LO-U2- 6	Files\\Data\\Lesson Observations\\Urb	3	0.65%
LO-U2- 9	Files\\Data\\Lesson Observations\\Urb	3	0.55%
LO-U6- 3	Files\\Data\\Lesson Observations\\Urb	3	0.55%

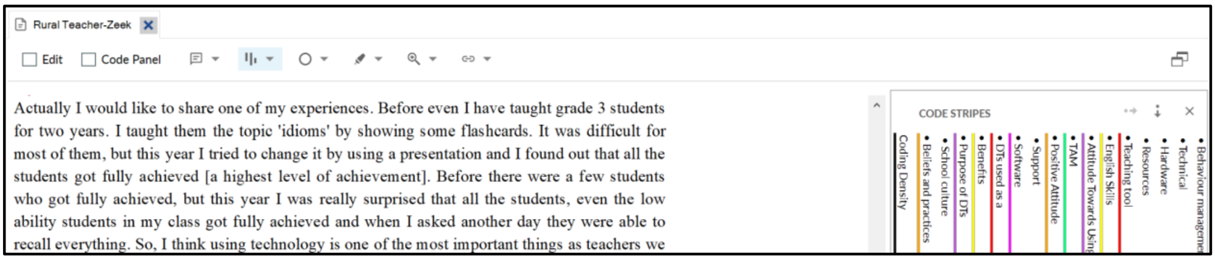
ZM 57 Items Files: 57 References: 177 Unfiltered

Note. Screen capture of *Text Search Query* showing the use of English ‘exercise book’ in 57 out of 98 lessons observed

Although NVivo facilitates qualitative analysis, it does not analyse our data for us. Consequently, as a researcher, I had to take an active role in the process. So, I read each data file several times to ensure I did not miss any crucial findings when coding them. For instance, if I came across something unique and interesting in one of the transcripts, I reread the other transcripts to ensure I had not missed the same thing in those transcripts. Although reading and thinking took time, the actual coding process was relatively easy in NVivo as I could select text segments from various data sources and drag them to new or existing *nodes*. *Nodes* are best understood as containers that hold text segments that refer to specific themes. For instance, all the text segments in different data sources identified as impediments to DT use were coded in the node labelled ‘Barriers’. As I created multiple nodes from the same text segments, I used *Coding Stripes* to track the *Coding Density* (Figure 3.10).

Figure 3.10

Screen Capture of Coding Density


Rural Teacher-Zeek
☐ Edit
☐ Code Panel
CODE STRIPES
Coding Density
• Beliefs and practices
• School culture
• Purpose of DTs
• Benefits
• DTs used as a
• Software
• Support
• Positive Attitude
• TAM
• Attitude Towards Using
• English Skills
• Teaching tool
• Resources
• Hardware
• Technical
• Behaviour managemen

Actually I would like to share one of my experiences. Before even I have taught grade 3 students for two years. I taught them the topic 'idioms' by showing some flashcards. It was difficult for most of them, but this year I tried to change it by using a presentation and I found out that all the students got fully achieved [a highest level of achievement]. Before there were a few students who got fully achieved, but this year I was really surprised that all the students, even the low ability students in my class got fully achieved and when I asked another day they were able to recall everything. So, I think using technology is one of the most important things as teachers we

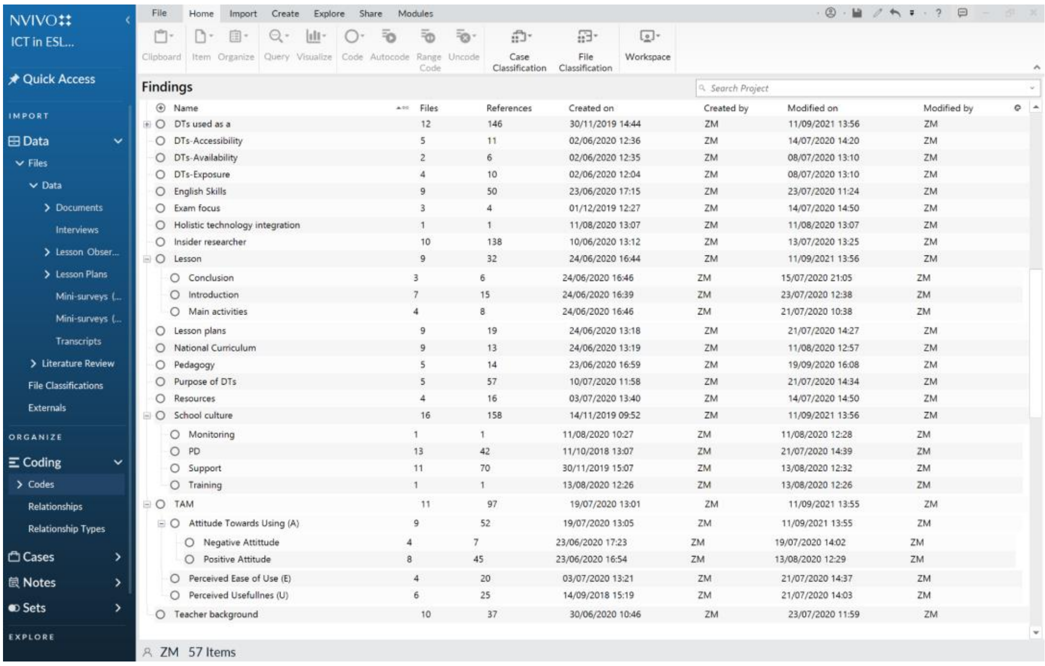
Note. Screen capture showing the *Coding Density* of a text segment from a transcript

Categorising

In the spiral, the categorising phase involved sorting and sifting data to categorise it in a meaningful way. The purpose was to make it easier for me to closely examine, compare, and contrast what I noticed in my data. The process included creating *Free Nodes* (nonhierarchical nodes) and *Tree Nodes* (hierarchical nodes) from various sources to show the connection between and amongst the nodes, enabling triangulation of data sources and participants. In addition to *Free Nodes* or nodes without ‘children’, I created *Parent Nodes* and *Child Nodes* whenever I noticed a hierarchical relationship between the nodes. For example, a parent node (TAM) can have multiple child nodes, which in turn can contain additional child nodes of its own (Figure 3.11).

Figure 3.11

Screen Capture of Parent and Child Nodes


NVIVO
ICT in ESL...
Quick Access
IMPORT
Data
Files
Data
Documents
Interviews
Lesson Obser...
Lesson Plans
Mini-surveys (...
Mini-surveys (...
Transcripts
Literature Review
File Classifications
Externals
ORGANIZE
Coding
Codes
Relationships
Relationship Types
Cases
Notes
Sets
EXPLORE
File
Home
Import
Create
Explore
Share
Modules
Clipboard
Item
Organize
Query
Visualize
Code
Autocode
Range Code
Uncode
Case Classification
File Classification
Workspace
Search Project

Findings

Name	Files	References	Created on	Created by	Modified on	Modified by
DTs used as a	12	146	30/11/2019 14:44	ZM	11/09/2021 13:56	ZM
DTs-Accessibility	5	11	02/06/2020 12:36	ZM	14/07/2020 14:20	ZM
DTs-Availability	2	6	02/06/2020 12:35	ZM	08/07/2020 13:10	ZM
DTs-Exposure	4	10	02/06/2020 12:04	ZM	08/07/2020 13:10	ZM
English Skills	9	50	23/06/2020 17:15	ZM	23/07/2020 11:24	ZM
Exam focus	3	4	01/12/2019 12:27	ZM	14/07/2020 14:50	ZM
Holistic technology integration	1	1	11/08/2020 13:07	ZM	11/08/2020 13:07	ZM
Insider researcher	10	138	10/06/2020 13:12	ZM	13/07/2020 13:25	ZM
Lesson	9	32	24/06/2020 16:44	ZM	11/09/2021 13:56	ZM
Conclusion	3	6	24/06/2020 16:46	ZM	15/07/2020 21:05	ZM
Introduction	7	15	24/06/2020 16:39	ZM	23/07/2020 12:38	ZM
Main activities	4	8	24/06/2020 16:46	ZM	21/07/2020 10:38	ZM
Lesson plans	9	19	24/06/2020 13:18	ZM	21/07/2020 14:27	ZM
National Curriculum	9	13	24/06/2020 13:19	ZM	11/08/2020 12:57	ZM
Pedagogy	5	14	23/06/2020 16:59	ZM	19/09/2020 16:08	ZM
Purpose of DTs	5	57	10/07/2020 11:58	ZM	21/07/2020 14:34	ZM
Resources	4	16	03/07/2020 13:40	ZM	14/07/2020 14:50	ZM
School culture	16	158	14/11/2019 09:52	ZM	11/09/2021 13:56	ZM
Monitoring	1	1	11/08/2020 10:27	ZM	11/08/2020 12:28	ZM
PD	13	42	11/10/2018 13:07	ZM	21/07/2020 14:39	ZM
Support	11	70	30/11/2019 15:07	ZM	13/08/2020 12:32	ZM
Training	1	1	13/08/2020 12:26	ZM	13/08/2020 12:26	ZM
TAM	11	97	19/07/2020 13:01	ZM	11/09/2021 13:55	ZM
Attitude Towards Using (A)	9	52	19/07/2020 13:05	ZM	11/09/2021 13:55	ZM
Negative Attittude	4	7	23/06/2020 17:23	ZM	19/07/2020 14:02	ZM
Positive Attitude	8	45	23/06/2020 16:54	ZM	13/08/2020 12:29	ZM
Perceived Ease of Use (E)	4	20	03/07/2020 13:21	ZM	21/07/2020 14:37	ZM
Perceived Usefullnes (U)	6	25	14/09/2018 15:19	ZM	21/07/2020 14:03	ZM
Teacher background	10	37	30/06/2020 10:46	ZM	23/07/2020 11:59	ZM

ZM 57 Items

Note. Screen capture of *Parent Nodes and Child Nodes* created initially

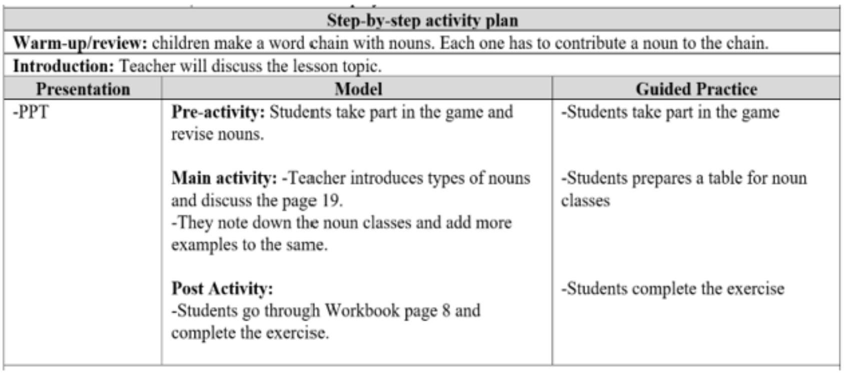
At this phase, I generated data in individual nodes and made notes of interesting findings, insightful connections, and thought-provoking questions using *Annotations*. I also created *Linked Memos* for each data source. Both served the purpose of analytical memos where I wrote the main findings along with “the emergent patterns, categories and subcategories, themes, and concepts” in my data (Saldaña, 2013, p. 41). At times, I went back to the noticing phase to do additional coding based on emerging themes. It was through working iteratively back and forth that I realised the importance of creating a parent node for internal barriers rather than having barriers in general, as shown in Table 3.7.

Table 3.7

Coding and Categorising Using Parent and Child Nodes

<table>
<tr><th>Parent node</th><th>Child node</th><th>Data and sources</th></tr>
<tr><td>Barriers (internal)</td><td>Textbook-driven practices</td><td>
The meeting started at 3 pm in a classroom where teachers of the same grade sat in a group. They all looked exhausted after a busy day. The academic coordinator for the grade sat with them and participated in the discussion. **They discussed subject by subject. They decided on the pages from the prescribed books they needed to complete for each subject** and the homework they would give their students. (Field Notes, 28 April 2019, Urban School)

Reem played a video that explained how simple past tense is formed by adding the suffix -d or -ed to the regular verbs. She also did a PPT presentation to explain the rules further and provide examples. Next, she asked her students to **do page 53 of their English textbook**, which required students to underline the correct verb form to complete the sentences in the simple past tense. (Lesson Observation, 15 July 2019, Rural School)


<table>
<tr><th colspan="3">Step-by-step activity plan</th></tr>
<tr><td colspan="3">Warm-up/review: children make a word chain with nouns. Each one has to contribute a noun to the chain.</td></tr>
<tr><td colspan="3">Introduction: Teacher will discuss the lesson topic.</td></tr>
<tr><th>Presentation</th><th>Model</th><th>Guided Practice</th></tr>
<tr><td>-PPT</td><td>Pre-activity: Students take part in the game and revise nouns.

Main activity: -Teacher introduces types of nouns and discuss the page 19.
-They note down the noun classes and add more examples to the same.

Post Activity:
-Students go through Workbook page 8 and complete the exercise.</td><td>-Students take part in the game

-Students prepares a table for noun classes

-Students complete the exercise</td></tr>
</table>
Nuha's Lesson Plan, 17 February 2019, Urban School

At the end of the first term, we collected feedback from parents about online classes [held during COVID-19]. **Almost all the parents wanted us to use textbooks and activity books. They said that it would be a waste not to use the books. So, in the second term, we started using textbooks more often. We assign tasks from the book, even in online classes**. (Hana Viber Interview, 15 December 2020, Urban School)
</td></tr>
</table>

Reflecting

This phase of the spiral process aimed to make general discoveries about data regarding my research question. This was the stage where code weaving happened. Saldaña (2013) defines code weaving as "the actual integration of key code words and phrases into narrative form to see how the puzzle pieces fit together" (p. 248). Reflecting involved thinking and rethinking the themes that emerged, looking for the 'bigger picture'. Based on the emerging patterns, I went back to the categorising phase. I refined the coding structure by combining two or more *Free Nodes* or creating, re-organising, and restructuring the *Tree Node* hierarchy. Discoveries also made me notice new things in my data by going back to the noticing phase. In the meaning-making process, I also undertook *Text Search Queries* to understand better the context in which I used a keyword or phrase in the original sources. If not for NVivo, I might not have had the chance to read and hear participants' excerpts in context with just a click. Finally, reflection also meant thinking of ways to present the findings in ways that the reader could make sense of them.

Trustworthiness in My Research Process

While there are numerous strategies to establish trustworthiness in qualitative research, as discussed in Guba (1981) and Krefting (1991), the same strategies may not be applicable to all qualitative studies. With many approaches, methods, and purposes for qualitative studies, different ways are used to determine whether they are trustworthy. In my phenomenological study, the goal is to describe the lived experiences of participants, rather than to develop theoretical constructs. So, while Lincoln and Guba (1985) have proposed four criteria for assessing the trustworthiness of qualitative research (credibility, dependability, conformability, and transferability), not all are relevant to my phenomenological study. For instance, dependability, which refers to the stability of data over time and conditions, is unlikely to be relevant since my project is underpinned by subjective ontological assumptions. Similarly, as conformability relates to the objectivity of data, this is also not applicable, as it requires the researcher to take an objective position. Since transferability implies that findings can be generalised to a larger population, this also has little relevance to my focus and methodological intent. The most relevant criterion is credibility. According to

Krefting (1991), some of the ways credibility can be ensured are prolonged and varied field experience, reflexivity, triangulation, member checking, and peer examination. In the following sections, I explain how I established both credibility and trustworthiness through reflexivity, transparency, and triangulation within my research process.

Reflexivity and insiderness

I practised reflexivity not only because it is about establishing and sustaining rigour in the research process but also because, as an interpretive phenomenologist, I must reflect on my positionality, which, in my case, meant applying Guillemin and Gillam's (2004) views of reflexivity. These involve reflecting on interpersonal relationships, ethical aspects of the research practice, and epistemological rigour. Berger (2013) argued that it is important to address three key aspects of reflexivity. They include continual internal dialogue, critical self-evaluation, and explicit recognition of possible effects of researcher positionality on the research process and outcome. To address these aspects, I adopted two main reflexive strategies to ensure rigour in my research process and findings. One strategy was reflexive writing. In my field notes, I constantly reflected on my role as a researcher to avoid imposing my experiences on participants. I used reflexive notes to continuously compare my own knowledge and experiences with those of my participants. The second strategy was reflexive conversations. Throughout my research process, I engaged in reflexive conversations with my supervisors, friends, colleagues, and other academics through conference presentations. These conversations helped me identify and minimise possible biases related to my familiarity with the research context.

Like other novice researchers, I faced the dilemma of my positionality as I was studying people from my community as a Maldivian and from the same profession that qualified me as an insider. Also, I was familiar with my participants as some of them were either former colleagues or students I had taught in preservice. Some researchers and even participants believe that "you have to be one in order to understand one" (Merton, 1972, p. 15). So, prior relationships with the participants probably gave me privileged access to knowledge that an outsider may not be in a position to gain. For instance, Mariya's (2016) reflection argued that she could access some resources she otherwise might not have been given access to because of prior relationships she had with her participants. Not having to immerse myself in an unfamiliar professional context was reassuring.

Nevertheless, I realised that even with shared commonalities, I did not entirely have insider status when I started my fieldwork. Instead, my reputation as a teacher educator and my participants' perceptions of me as an 'expert' made me aware of some of the complexities around my positionality as an insider. As Shiyama (2020) reported, my participants also referred to me as '*Miss*', a formal expression in Dhivehi that indicates the authority and power they ascribed to me. I tried to minimise the perceived power imbalance by explaining that, as a researcher, I was there to understand their perceptions about and practices with DT and not to judge or evaluate their teaching. Having the blurred boundaries of the insider-outsider status, I was more attuned to noticing the chances of "slippage and fluidity" between the two states during my data collection (Merriam et al., 2001, p. 405). On the other hand, as Fetterman (2010) warns, overfamiliarity, due perhaps to my preconceived notions of teaching and learning in the Maldives, might mean I might take things for granted or leave critical data unnoticed or unrecorded. I was also conscious not to be overinvolved in the professional lives of my participants, given the extended research immersion period. It was through reflexivity that I realised my positionality was within the blurred boundaries of the "insider-outsider hyphen" (Humphrey, 2007, p. 12).

Transparency

My first act of transparency occurred during the participant recruitment phase. For instance, to recruit participants, I designed information letters and consent forms that directly linked to what the research would entail for each potential group of participants. This process entailed preparing separate information sheets and consent forms for principals, IT technicians, teachers, students, and parents. These information sheets included details such as what participation in my research would involve, how long data collection would last, and what their rights as participants were in the process. For parents and students, I prepared information letters and consent forms in English and Dhivehi so that they could choose to read these documents in their preferred language. The purpose of offering dual-language versions was to ensure the clarity of information I provided my participants with and to make it easy for them to choose whether or not to volunteer.

Secondly, as the research progressed, member checking allowed my participants to verify their responses, thereby establishing transparency. Member checking is a form of respondent validation that involves returning data to participants to check for the accuracy of the content or its resonance with their experiences (Birt et al., 2016). Lincoln and Guba (1985) also recommend member checking as a technique to establish whether the researcher's interpretation of the participants' individual interview data honours what they intended. Member-checking is important for interpretivists as it helps "*verstehen"* (Weber, 1947, p. 88) or in other words 'to understand' participants' meanings. In my case, after carefully transcribing the interviews in NVivo and having a supervisor verify the accuracy of the translation of the transcripts, I sent individuals their transcripts via email for member checking. I gave them 3 weeks to check for data accuracy, suggest changes or ask for clarification about the transcript. In addition, I contacted my participants through Viber, a secure VoIP, if I needed to ask them to clarify any points.

Finally, using NVivo not only made my data analysis robust and efficient but also enabled transparency. The software provided me with an audit trail in the form of visual evidence of my data analysis process. The coding, annotations, memoing, and mapping concepts and themes generated during analysis meant I could address transparency and consistency between my analytical strategy and philosophical underpinnings (Bonella & Meehan, 2019).

Triangulation

Creswell (2007) argues that triangulation involves "corroborating evidence from different sources to shed light on the theme or perspective" (p. 208). To increase the credibility of my phenomenological study, I achieved triangulation through data, method, and prolonged immersion. First, by reviewing interviews, mini surveys, and observational data, I cross-checked teachers' beliefs about and intentions to use DTs with their actual classroom practices with DTs. In addition, I reviewed data across all nine participants. As a result, I was able to identify common technological pedagogical practices among all the teachers in this study. Second, as I gathered data through other methods, such as mini surveys, conversations, documents, and field notes, I achieved methodological triangulation. Using these multiple methods also meant I could examine the connection between lesson planning and the pedagogical practices of individual participants. For example, I was able to compare a teacher's actual practices with DTs (from my lesson observations) with their intention to use DTs (expressed in the interview) and their plan to use DTs (written in the lesson plans). Third, the duration of my data collection allowed for achieving triangulation through prolonged immersion. As I collected data for 8 months, I could explore the consistency of teachers' planning for DT use and practices with DTs over a prolonged period.

Chapter 4

Findings

This chapter presents my research findings on primary school teachers' use of digital technologies (DTs) in teaching English in two schools in the Maldives. In my phenomenological study, I wanted to explore the impact of the use of DTs on the pedagogical practices of primary English as a second language (ESL) teachers in the Maldives. This impact exploration also examined the perceived benefits of DTs and the extent to which they are used to maximise ESL learning. The study also aimed to scrutinise enablers and barriers to using DTs for teaching and learning.

The findings presented in this chapter are based on data generated from multiple data sources, as illustrated in Figure 3.3 (chapter 3). When reporting the findings, I have provided excerpts from lesson observations, semistructured interviews with teachers, the principal and the IT technicians, conversations with teachers and students, lesson plans, school documents, mini surveys for students and teachers, and field notes. The voices of nine primary teachers, their students, IT technicians, and the principal are provided using noms de plume.

This chapter outlines four main themes that present the findings of the two schools (urban and rural). Each section deals with a theme, and, in order, they are technological pedagogical practices in English lessons, perceived benefits of digital technologies (DTs), DT enablers, and barriers to meaningful DT use.

Theme 1: Technological Pedagogical Practices in ESL Lessons

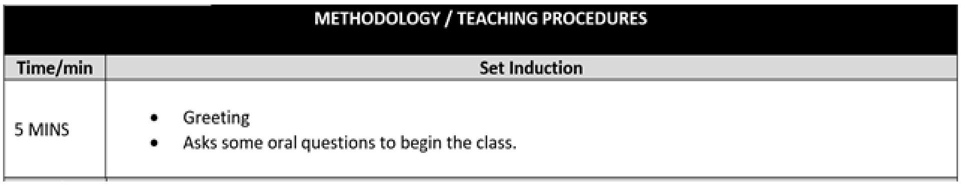
I view my findings presented here through a TPACK lens (explained under the TPACK framework in chapter 2). The key themes arising from primary teachers' ESL technological pedagogical practices (or teaching ESL with DTs as defined in chapter 1) are: technology-enhanced 'set inductions'; explanation videos; form-focused instruction (FFI) using DTs; DTs used for exam-format listening; paper-based reading and writing; and underutilised areas of DT use. Each of these areas is addressed in turn.

Technology-Enhanced “Set Inductions”

A “set” or “instructional set” is the name for activities preceding a learning task likely to improve the outcome of that particular task. In such activities, an environmental stimulus or stimuli (such as real objects, digital pictures, and videos) might be used to prepare learners for the tasks that follow. Teachers can deliberately induce an instructional set (therefore, set induction) in any part of the lesson whenever there is a change in content or learning outcome. Although my observations of both rural and urban English lessons show that primary teachers used DTs to facilitate set induction, they did not express a specific understanding of the term ‘set induction’, nor mention the phrase explicitly. However, there is evidence of ‘set induction’ in the lesson plan template used by Key Stage 2 teachers in the rural school. The following excerpt from such a lesson plan (Figure 4.1) shows that ‘set induction’ was used interchangeably with ‘lesson introduction’. This interchangeability may be because the activities under that heading were generic, used to begin lessons, and tended not to focus on any specific learning task that followed those activities.

Figure 4.1

Sana’s Lesson Plan, 21 July 2019, Rural School

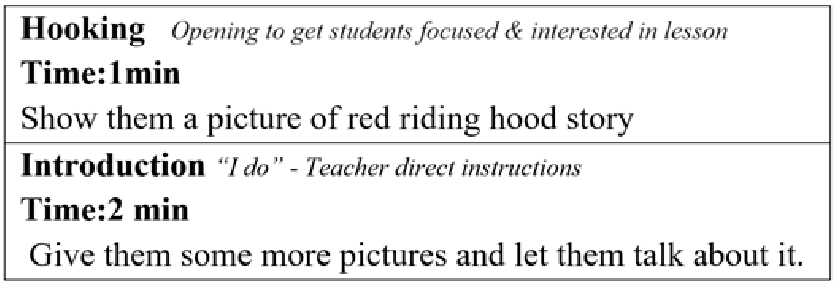


METHODOLOGY / TEACHING PROCEDURES	
Time/min	Set Induction
5 MINS	• Greeting • Asks some oral questions to begin the class.

Interestingly, the term ‘hooking’ was written in the lesson plan template used in Key Stage 1 of the rural school. Hooking represented a phase before the lesson introduction. The definition of hooking given in italics in the following lesson plan excerpt (Figure 4.2) shows that hooking was limited to lesson beginnings. I observed that in the example below, Ina used a picture of the story ‘Red Riding Hood’ on the TV to gain students’ attention. Teachers mainly used a hook to gain students’ attention at the start of a lesson before introducing concepts or a key focus for a lesson.

Figure 4.2

Ina's Lesson Plan, 29 July 2019, Rural School



Hooking *Opening to get students focused & interested in lesson*
Time:1min
Show them a picture of red riding hood story

Introduction *"I do" - Teacher direct instructions*
Time:2 min
Give them some more pictures and let them talk about it.

When asked what set induction meant and its purpose, Sana indicates she equated set induction with lesson hook:

> We use it [set induction] just as an introduction to the day's lesson to get the students ready, inducing them into the right mindset for the class. It's at the beginning of the period to gain students' attention.
>
> (Conversation with Sana, 10 September 2019, Rural School)

Although participant teachers may not have a specific understanding of the term 'set induction,' the findings show set inductions were an important part of their pedagogical practices in their English lessons. As the purpose of set inductions in their lessons varied, I have categorised and labelled them as *attention sets, transition sets*, and *graphic sets.*

Attention sets

The most commonly observed set inductions that participants used included visual content that served as 'lesson hooks' to draw students' attention to what they will be learning. The following observation notes (OBN) describe how two teachers used DTs to incorporate instructional sets to gain attention in their English classes. Fazla used a smart notebook (a software tool used to complement the smart board) to show a picture to gain her grade 5 (age 10–11) students' attention in a writing lesson in the urban school:

> Fazla showed a picture of a haunted house on the smart notebook. She asked students to call out adjectives that they could use to describe the picture. Students from different corners of the classroom called out adjectives that they thought could be associated with the picture of the haunted house. Students were later required to do descriptive writing on a different picture.
>
> (Lesson Observation, 24 April 2019, Urban School)

Reem, a teacher in the rural school, began her lesson in a similar fashion, displaying a riddle on a PowerPoint (PPT) slide. This was, she said, to build the curiosity of her grade 2 (age 7–8) students about the text they were going to read:

> When Reem came to the class, her students were already sitting in front of the 65-inch TV screen, wall-mounted on the right side of the whiteboard. After greeting the students, she connected her laptop to the TV. She displayed a riddle about penguins on a PPT and asked students to solve the riddle. Later in the lesson, Reem gave her students a text on penguins for reading comprehension.
>
> (Lesson Observation, 31 July 2019, Rural School)

Fazla's and Reem's examples of set induction indicate a similarity in pedagogical purpose. Both teachers displayed a digital learning resource to initiate students' awareness and later used resources that drew on the initial lesson stimulus.

All nine teachers used DTs at the beginning of lessons to gain students' attention. Zeek and Leena encapsulate the collective views:

> In the beginning, because we need to hook them, we need to gain their attention.
> (Zeek Interview, 18 September 2019, Rural School)

> I prefer [using DTs] mainly in the introduction [of a lesson]...and to wind up. To start, it's because it helps to get the attention of the kids.
>
> (Leena Interview, 20 May 2019, Urban School)

Transition sets

Although used in very few lessons, DTs also facilitated transitioning from already covered content (known information) to new content (unknown information). As such, transition sets gave teachers opportunities to engage students in instructional conversations to understand their prior knowledge. The following OBNs track such uses. Zeek used a PPT to show some pictures to her third graders (age 8–9) to generate a discussion about a cause-and-effect relationship before assigning them a related pair work task:

> After explaining cause and effect using example sentences, Zeek asked her students to watch the pictures on the PPT. She asked them how pictures in each set of pairs were related to each other. For instance, one set included a picture of a girl holding an umbrella, and the other was that of a rainy day. At times she provided prompts in the

> form of sentence beginnings to elicit examples of the cause-and -effect relationship between the pictures. After this whole class activity, she distributed a worksheet to be done in pairs. (Lesson Observation, 23 June 2019, Rural School)

Leena used DTs to check students' background knowledge before beginning a lesson, saying that using DTs "gives me a chance to find out their prior knowledge". (Leena Interview, 20 May 2019, Urban School)

While Zeek broke the norm of using a set induction at the beginning of the lesson by using it in the main activity of a lesson I observed, the purpose of both teachers' mediated set induction was a transition (for example, from familiar to unfamiliar or known to unknown).

Graphic sets

A few set inductions also took the form of graphic organisers, such as Venn diagrams and mind maps. Both provided necessary background information related to the intended new content. The following OBNs show how Nuha and Fazla used DTs as graphic representations in their set induction. Nuha used a Venn diagram to give background information on autobiographies to her sixth graders (age 11–12):

> Nuha's writing lesson was on 'autobiographies'. After recalling the lesson on biographies, she displayed a Venn diagram on the smart board to show her students the similarities and differences between biographies and autobiographies. She later asked students to write an autobiography.
>
> (Lesson Observation, 28 April 2019, Urban School)

The graphic organiser used in Fazla's set induction was a mind map on biography to guide students in planning their writing:

> After greeting her fifth graders (age 10–11), Fazla checked whether students brought, from home, printed information and pictures related to the biography they were going to write. Then she opened a PPT and showed students a slide with a mind map about biographies. She asked students to use the mind map to guide their biography writing.
>
> (Lesson Observation, 27 February 2019, Urban School)

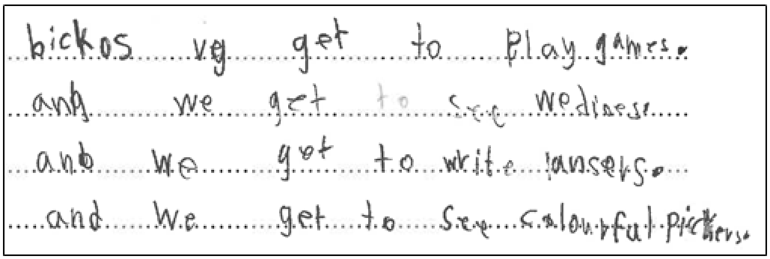
In both of these two different teaching moments, teachers used graphic representations as their set induction. DTs may have been helping students visualise relationships between various concepts and ideas. Hana's response (in a teachers' mini survey question) to the benefits of DTs suggests that she finds visual illustrations help students grasp complex concepts. Smart boards help her achieve this end, saying that they:

> …help the teachers to teach some topics which require a visual illustration for the students to understand the concept.
>
> (Hana, Mini Survey 2 for Teachers, Urban School)

Students expressed their interest in pictures in a mini survey on why they wanted their teacher to use the smart board. One grade 1 (age 6–7) student wrote (see Figure 4.3):

Figure 4.3

Student Response, Mini Survey 1 for Key Stage 1, Urban School

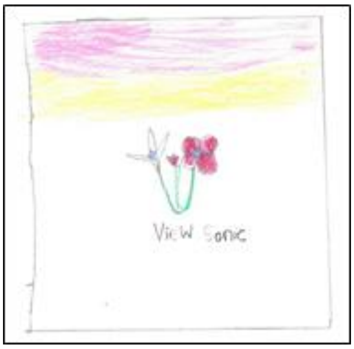


bickos vg get to play games.
and we get to see wediesr
anb we got to write !ansers.
and we get to see colourful pickers.

Replying to the same question, another grade 1 (age 6–7) student drew a picture of the smart board (Figure 4.4) and wrote, “Because it has colourful pictures”.

Figure 4.4

Student Response, Mini Survey 1 for Key Stage 1, Urban School



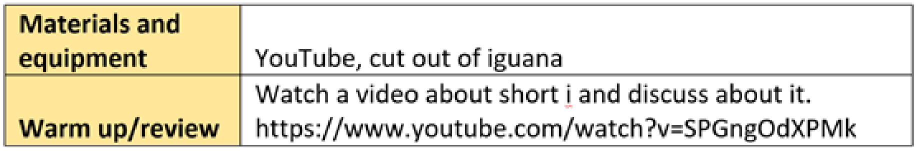
Data from various sources indicates teachers use DTs to gain students’ attention, to transition from one activity to another, and to provide graphic organisers. Although set induction seems to be an important aspect of Maldivian primary teachers’ pedagogical practices in their English lessons, it appears that these are interchangeable with lesson hooks as a way to gain students’ attention at the beginning of a lesson.

Use of Explanation Videos

The second emerging theme from the evidence centres on teachers' use of 'explanation videos' about various aspects of the English language. Four out of the nine participant teachers included links to short YouTube video clips in their lesson plans, as evident from the following excerpt. YouTube is mentioned in the materials and equipment section of the lesson plan accompanied by the URL (Figure 4.5):

Figure 4.5

Hana's Lesson Plan, 17 February 2019, Urban School

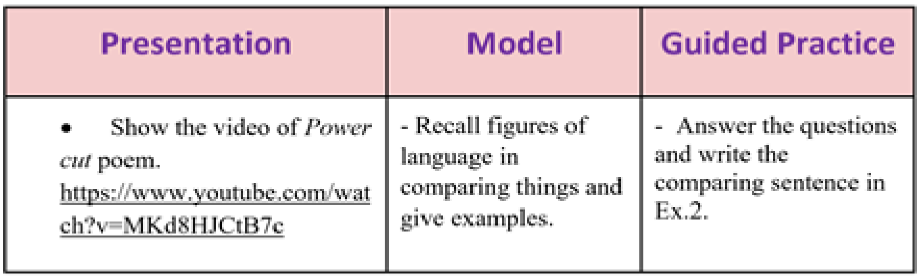


Materials and equipment	YouTube, cut out of iguana
Warm up/review	Watch a video about short i and discuss about it. https://www.youtube.com/watch?v=SPGngOdXPMk

All participant teachers used explanation videos as sources of declarative knowledge such as concepts, vocabulary, grammatical rules, and procedural knowledge on speaking, reading, and writing. Fazla planned to use a Peppa Pig cartoon from YouTube to explain the concept of 'power cut' to her fifth graders (ages 10–11) in a lesson on a poem about power cuts (see Figure 4.6).

Figure 4.6

Fazla's Lesson Plan, 28 February 2019, Urban School



Presentation	Model	Guided Practice
• Show the video of *Power cut* poem. https://www.youtube.com/watch?v=MKd8HJCtB7c	- Recall figures of language in comparing things and give examples.	- Answer the questions and write the comparing sentence in Ex.2.

Participant teachers used videos to explain different concepts to their ESL students. Sana used a video to explain concepts such as 'volcano':

> Before [having digital] technology, we were simply lecturing and explaining every single word, but nowadays, for example, if you want to teach 'volcano', we can just show the video of what it is...So, it is very helpful for us teachers, and it helps our students to understand the concepts. Rather than explaining ourselves, they like to watch videos and presentations with us.

(Sana Interview, 18 September 2019, Rural School)

Reem also believed that videos helped explain various concepts to her grade 2 (age 7-8) students:

> Most of the time, for most of the students, it is very easy to understand what we are trying to explain if we can get the required tools, whether it is a video or even a song.
>
> (Translated Reem Interview, 25 September 2019, Rural School)

The pedagogical reasoning behind teachers' choices seems to be that DTs such as YouTube videos mean students can see what something looks like while they are learning about it and learning English at the same time.

My OBNs also indicate that all nine participant teachers used explanation videos to teach various aspects of the English language in their primary classes. Leena used an explanation video to teach simple past tense to her grade 2 (age 7–8) students, as indicated in the following OBN:

> After greeting her students, Leena told them that they were going to learn simple past tense. Then, she played a short English YouTube video explaining how simple past tense is formed when regular verbs are used. It also explained the spelling rules involved when changing the base form of the verb to the past tense. When the video finished, she displayed a list of verbs on the smart notebook and asked individual students to explain to the class how the given verb could be changed to past tense, especially focusing on the spelling rules. This activity was followed by an individual task on the students' English activity book, page 47, which included questions about what students did the previous day. (Lesson Observation, 29 April 2019, Urban School)

For Hana, an explanation video in her grade 1 (age 6–7) class provided procedural knowledge of how to carry out a telephone conversation:

> After a role-play of a telephone conversation between Hana and another teacher in the class, Hana played a YouTube video of a telephone conversation via the smart board. Once the video was over, Hana asked two students to carry out a role-play of a telephone conversation. After asking a few questions about the role-plays, she assigned students some work from the activity book.
>
> (Lesson Observation, 29 April 2019, Urban School)

In another lesson, Hana used explanation videos to teach phonics and raise phonemic awareness among her students:

> After greeting the students, Hana began her lesson by playing a video on ‘i’, the English short vowel sound, on YouTube. It explained how to pronounce ‘i’, as in British English. It also showed the letter and sound correspondence and examples of words with the ‘i’ sound, such as bin, ink, and pig. Hana asked individual students to read the phrases shown in the video and for the rest of the class to repeat these after the student. (Lesson Observation, 21 February 2019, Urban School)

Reem’s explanation video on the structure of the paragraph provided procedural knowledge on how to write paragraphs to her second graders (ages 7–8):

> Reem began her class by asking students whether they liked burgers and knew the ingredients. Then, she showed the class a YouTube video on the structure of hamburger paragraphs. She paused the video in between to elaborate and provide further examples. (Lesson Observation, 17 September 2019, Rural School)

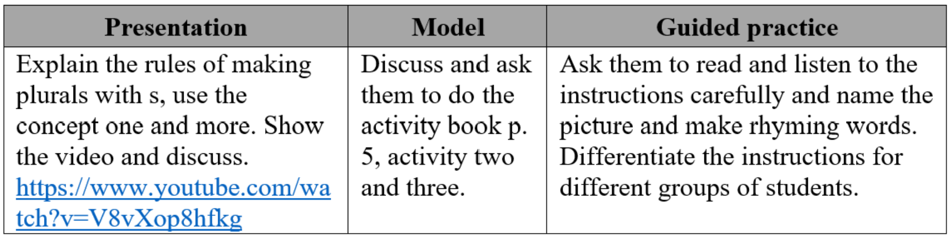
The findings show that all the participant primary teachers frequently used short explanation videos from YouTube as a teaching tool in their English lessons. It also appears that explanation videos replaced teacher explanations when teaching different skills and aspects of the English language. Although teachers used these videos as instructional tools, my lesson observations consistently showed that no teacher who used such videos deliberately expected students to notice specific concepts or processes in these videos. Also, teachers did not make explicit links between these videos and the tasks that would follow.

Form-Focused Instruction (FFI) Using DTs

The third theme relates to DTs in form-focused instruction (FFI). As explained in the literature review, teaching grammar, phonics, and vocabulary *explicitly* is known as ‘focus on forms’ (FonFs) as opposed to teaching *implicitly,* which is known as ‘focus on form’ (FonF). My findings show although phonics was taught only in grades one and two (ages 6–8), it was taught explicitly. Also, entire lessons dedicated to vocabulary were limited. Generally, all the teachers integrated vocabulary items in lessons teaching other language skills. However, all nine participant teachers frequently taught grammar explicitly (FonFs) using various DTs, as shown in the lesson plan sample and the OBN below. Hana’s lesson plan (Figure 4.7) shows her intention to teach grammar explicitly by showing an explanation video from YouTube to her grade 1 (age 6-7) urban class:

Figure 4.7

Hana's Lesson Plan, 24 March 2019, Urban School



Presentation	Model	Guided practice
Explain the rules of making plurals with s, use the concept one and more. Show the video and discuss. https://www.youtube.com/watch?v=V8vXop8hfkg	Discuss and ask them to do the activity book p. 5, activity two and three.	Ask them to read and listen to the instructions carefully and name the picture and make rhyming words. Differentiate the instructions for different groups of students.

Observation of Ina's lesson in her first grade (age 6–7) rural class shows her using a similar YouTube video to teach explicitly how plural nouns are formed:

> The main activities of Ina's lesson began after asking her students to raise their hands if they were ready for the lesson. When students indicated they were ready, Ina played a previously downloaded video using Windows Media Player. The students sat silently, watching a bunny explaining the use of -s to form plural nouns. After that, she assigned a worksheet to be completed individually. The exercise required students to circle either the singular or plural noun to indicate what the picture depicted.
>
> (Lesson Observation, 25 June 2019, Rural School)

In her second interview conducted during the COVID-19 pandemic, Leena's explanation of her lessons for the second (ages 7–8) graders during the online classes also indicates explicit teaching of grammar and phonics:

> I share my screen with students and play a video or use a PPT to explain the lesson. In the lesson on prepositions, I used a PPT. But for verbs, I used both video and PPT. I also used videos to explain sounds in lessons on phonics. Then, we assign a task on *Quizziz*, *Wizer.me* or *Padlet* to practise what was taught. (Leena Viber Interview, 23 November 2020, Urban School)

One point to note is that the grammar lessons I observed often focused on the grammatical form or how grammatical structures are formed rather than showing how they are used. The following OBN from Leena's grade 2 (age 7–8) class shows how a continuous tense is formed rather than when continuous tense is used in real-life situations:

> After checking students' background knowledge of action verbs, Leena played a YouTube video that explained the spelling rules when adding the suffix -ing to the base form of the verb. For example, to remove 'e' before adding -ing to verbs ending in 'e' or the rules of when to double the final consonant before adding -ing. Students seemed interested in the video as everyone's eyes were glued to the smart board. However, some students could not choose the correct answer when later Leena played an online multiple-choice quiz on the smart board.
>
> (Lesson Observation, 5 March 2019, Urban School)

Similarly, Reem also used a YouTube video to explain the past tense to her second graders (age 7–8):

> Reem asked her students to bring their chairs and sit in front of the TV connected to her laptop. Students became quiet as they knew they were going to watch something on the TV. Reem played a video that explained how simple past tense is formed by adding the suffix -d or -ed to the regular verbs. She also did a PPT presentation to explain the rules further and provide examples. Students did not ask any questions on their own but answered questions that Reem asked about the video and the presentation. Next, Reem assigned students a task on page 53 of their textbook, which required them to underline the correct word to complete the sentences in the simple past tense. (Lesson Observation, 15 July 2019, Rural School)

As a more student-centred approach, the inductive approach to FFI could have given students the opportunity to notice, understand, and discover the rule by themselves. However, I did not observe any lessons where an inductive approach was adopted. On the other hand, while the deductive approach is more teacher-centred, my data shows that the participant teachers adopted a deductive approach to their FFI. Deductive grammar teaching involves the teacher explaining a grammatical rule before asking students for examples and getting them to do practice exercises, and this approach is what I found from lesson plans and lesson observations as shown below:

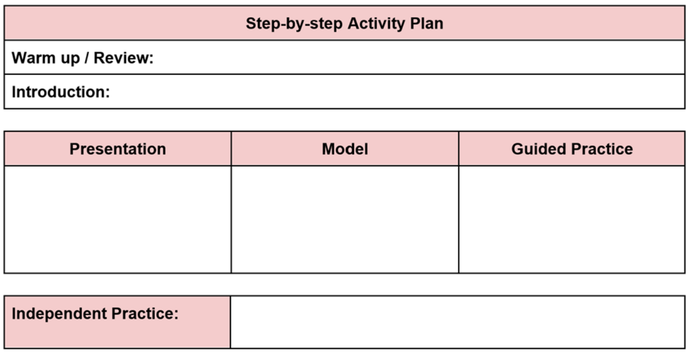
> In Nuha's lesson plan (17th February 2019) on nouns for her sixth grade (age 11–12) English class in the urban school, she wrote, "Teacher introduces types of nouns and discusses page 19. They [students] note down the noun classes and add more examples to the same. Students go through Workbook page 8 and complete the exercise."

> In the rural school, Zeek’s grammar lesson began with identifying success criteria with her third graders (age 8–9) before showing a PPT presentation to explain prepositions, followed by a PPT quiz to check students’ knowledge of prepositions:
>
> > She asked questions about her presentation and encouraged students to make sentences using different prepositions. Then she played a PPT quiz she had prepared for the lesson. She called random students to come to her laptop, which was connected to the TV, to respond to the question by clicking one of the given options. Due to limited time, not many students got the opportunity to do the quiz.
> >
> > (Lesson Observation, 30 June 2019, Rural School)
>
> To begin her lesson, Beena used a PPT to explain different types of connectives to her fifth graders (ages 10–11). She then gave them a pair-work task to write a sentence for each connective given in the work card. Finally, she asked her students to take out their English exercise book to write a sentence individually for each connective she called out. (Lesson Observation, 9 July 2019, Rural School)

Common to all these classes is the fact that the teacher begins by explaining grammar rules using DTs, followed by pair or group guided practice. Then, the teacher ends the lesson with an independent practice task to check how much individual students were able to grasp the grammatical rules they were taught. As such, the three teachers’ steps in these three lessons align with deductive teaching approaches, which follow a presentation-practice-production (PPP) model, as explained in chapter 3. Interestingly, the lesson plan template (see the excerpts in Figure 4.8) used by the four urban school teachers shows the section titles such as presentation, model, and guided practice, similar to the PPP model.

Figure 4.8

An Excerpt from Urban School’s Lesson Plan Template



Step-by-step Activity Plan
Warm up / Review:
Introduction:

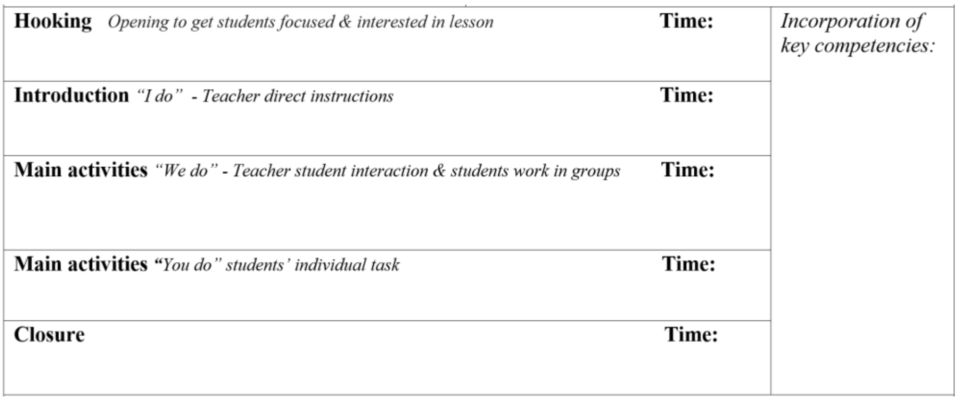
Presentation	Model	Guided Practice

Independent Practice:	

Though the wording is different, a similar pattern is seen in the lesson plan template used in Key Stage 1 of the rural school (see Figure 4.9). The descriptions given in the introduction and main activities sections include teacher-directed presentation, teacher and students working together (guided practice), and students working alone (independent practice). Perhaps, using templates that followed the PPP model is the reason why the lessons observed followed a similar pattern.

Figure 4.9

An Excerpt from Rural School's Lesson Plan Template



Hooking *Opening to get students focused & interested in lesson*	**Time:**	*Incorporation of key competencies:*
Introduction *"I do" - Teacher direct instructions*	**Time:**	
Main activities *"We do" - Teacher student interaction & students work in groups*	**Time:**	
Main activities *"You do" students' individual task*	**Time:**	
Closure	**Time:**	

Another common practice among my participant teachers was using resources simplified in terms of language and context in FFI. That being the case, I noticed that the resources tended to focus on decontextualised grammatical features presented at the sentence level rather than common usage. For instance, Fazla's lesson plan on past and present tense for 15th April had "Use the correct form of verbs in the brackets and complete the sentences" listed as the main activity. Additionally, teachers checked students' grammatical knowledge through gap-filling exercises and multiple-choice quizzes using printed worksheets or online games on the smart board. For example, Leena had her second graders (ages 7–8) try an online game in her grammar lesson on past tense:

> Leena explained the rules of changing regular verbs to past tense on the smart notebook. Some students gave examples for each of the four spelling rules she discussed. Next, she opened a URL (related to an educational site containing English tasks pitched at different levels) and asked randomly selected students to do some online tasks. While one task required choosing the correct past tense verb from the given options, the other task was to type the past tense of the given infinitive form. As time was short, the teacher could not allow many students to play the game on the

> smart board. Finally, she asked students to take out their English exercise book and write at least five sentences in the simple past tense. (Lesson Observation, 30 April 2019, Urban School)

Irrespective of the differences in the DTs available in the urban and rural schools, teachers in both schools used DTs to teach grammar deductively rather than inductively, implying that the lessons were teacher-centred. In addition, some of the activities seemed very decontextualised. Such practices may indicate a gap in my participant teachers' awareness of ESL pedagogical practices and how DTs could facilitate learning a language.

DTs to Facilitate Exam-Format Listening Tasks

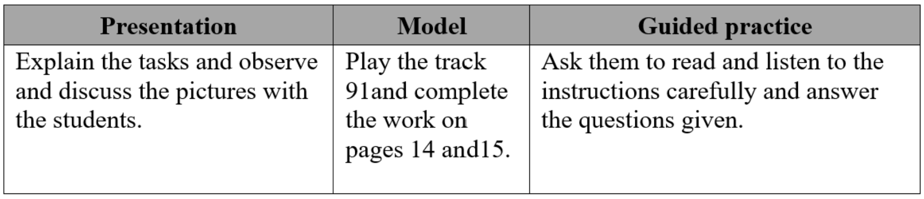
Facilitating exam-format listening tasks using DTs emerged as the fourth theme. Listening tracks were usually available on CDs with textbooks. In cases where the CDs were not available or were missing, teachers downloaded audio tracks or videos from the internet and prepared their worksheets based on those resources.

> Beena used her smartphone to play a downloaded audio track for her listening class using a Bluetooth speaker on her table after she had distributed the worksheet with gapped text for listening comprehension and after students had read the text. (Lesson observation, 19 September 2019, Rural School)

Hana's lesson plan (Figure 4.10) shows she intended to use an audio track from the CD provided with the textbook:

Figure 4.10

Hana's Lesson Plan, 22 April 2019, Urban School



Presentation	Model	Guided practice
Explain the tasks and observe and discuss the pictures with the students.	Play the track 91and complete the work on pages 14 and15.	Ask them to read and listen to the instructions carefully and answer the questions given.

Listening lessons were usually structured similarly to the structure of a listening examination format. Such classes began with the teacher drawing students' attention to the questions they were to answer, followed by playing the listening track. Lastly, students had to answer the listening comprehension questions. These exam-structured listening lessons were evident from a range of lessons I observed, such as in one of Leena's classes. Here, she discussed the questions given in the activity book before playing the audio track for students to answer the questions:

> Leena asked her grade 2 (age 7–8) students to open pages 50 and 51 of their activity book and write the date. She discussed each question with the students focusing on the question words. Leena played an audio track on the Windows Media Player and asked students to listen to the audio and complete the task in the activity book.
>
> (Lesson Observation, 12 May 2019, Urban School)

The activity seems to follow a common pattern: the teacher providing instruction; students being asked questions; and students completing written tasks. Zeek's example continues this pattern with her third graders (ages 8–9):

> Zeek distributed a worksheet with listening comprehension questions. She asked students to read the questions before showing a short cartoon on the TV. Because students said they were enjoying the cartoon and were least bothered about responding to the questions the first time, Zeek played it a second time, reminding them to finish their work. As the lesson was almost over by the time students finished their tasks, she collected their worksheets to mark them after class.
>
> (Lesson Observation, 30 July 2019, Rural School)

The answers to the listening comprehension question were often discussed orally or by displaying them on the smart board/TV/or using a projector. These discussions did not usually involve asking why students answered the way they did. Also notable was that teachers did not re-play listening tracks to show them why a particular answer was correct or wrong, indicating teachers may need awareness of how to use DTs specifically to facilitate language learning. However, the last task/activity in a listening lesson I observed was always discussing/checking the answers, as in the examples from observation of Sana's and Beena's lessons. In her sixth grade (age 11–12) English class, Sana checked students' responses to the listening task by asking oral questions:

> Sana wrote five questions on the whiteboard and asked the students to write the questions in their English exercise book. It took some time for the students to copy the questions. Sana then discussed each question, specifically focusing on the question words. She asked students to answer the questions in their exercise book while

> listening to the audio track. She played the audio track twice, and afterwards, she asked random students to share their answers with the class.
>
> (Lesson Observation, 18 June 2019, Rural School)

Beena wrote answers to the listening comprehension questions on the whiteboard for her grade 5 (age 10–11) students to check whether they had written the correct answer for the listening task:

> Beena distributed a worksheet with listening questions. She asked students to read the questions and then answer them while listening to the audio track that she was going to play. She played the audio track on cleanliness twice to make sure students could answer all the questions. Beena wrote the answers for the listening task on the board and told the students to check whether their answer was correct.
>
> (Lesson Observation, 31 July 2019, Rural School)

What is unknown is the extent to which this type of practice (i.e., individuals answering, then self-marking) helped the teacher to be aware of which students were having trouble or which ones needed more challenge in developing their listening skills. Two teachers indicated in interviews that the ultimate goal of listening lessons in their primary classes was to prepare students for the IGCSE (International General Certificate of Secondary Education) listening exam at the end of secondary schooling. Sana's justification for carrying out listening lessons in her grade 6 (age 11–12) class indicates what appears to be a common emphasis on preparation for the IGCSE listening paper:

> I give [listening tasks] because I know students need to do better in listening in their higher studies and O levels. Once a week or thrice a week, we download something and then give them listening tasks.
>
> (Sana Interview, 18 September 2019, Rural School)

These teachers appear to feel the pressure of external and distant assessments—yet students have at least 4 years of lower secondary schooling before undertaking such exams—or my OBN data shows that teachers often carried out listening lessons as mirrors of listening examinations. In such lessons, students answer questions after listening to an audio track rather than discussing things together or using the audio as a stimulus for other tasks. Perhaps this exam-oriented focus reduces students' potential enjoyment of their learning in the meantime.

Paper-Based Reading and Writing

The fifth theme related to technological pedagogical practices of Maldivian primary teachers is the preference for paper-based reading and writing tasks. For example, the reason why urban teacher Nuha rarely asked her students to use their devices for homework was that her students had specific homework books for reading and writing. My lesson observations also showed that most readings came from printed materials or English textbooks:

> For a writing project assigned, Fazla asked her fifth graders (ages 10–11) to bring printed reading materials and pictures from home to do the work in the class. (Lesson Observation, 28 April 2019, Urban School)
>
> In her reading lesson, Beena asked her grade 5 students (ages 10–11) to answer at least three out of six questions after reading the text about volcanos on page 36 of their English textbook. (Lesson Observation, 18 July 2019, Rural School)

Teachers sometimes carried out on-screen reading by displaying a specific text on the smart board, TV or projector. In one of her reading lessons, Zeek showed the digital big book pages on the TV screen in her grade 3 (age 8–9) class:

> The teacher made sure everyone was ready and showed big book pages one by one using Adobe Flash Player 10. She also reminded them to observe the pictures too. She asked them to read aloud the story and answer the questions that followed. She asked questions based on the story.
>
> (Lesson Observation, 24 September 2019, Rural School)

Zeek also found that making students read the subtitles while watching the digital story on the TV screen was quite effective in motivating her students to read in comparison to when students are asked to read from printed paper:

> In a reading [lesson], I prefer digital stories because students are really interested and motivated. Earlier, when I tried silent reading in my class after giving some stories [hard copy], they would just look at the pictures, but when I use the TV and with a digital story, all of them would try reading out loud.
>
> (Zeek Interview, 18 September 2019, Rural School)

Similarly, teachers also used digital readings in online classes held via Microsoft Teams during the COVID-19 pandemic. Urban school teachers sometimes shared their screens with students to let them read the text displayed. Apart from that, students did not do online readings on their own from their devices as teachers did not assign readings before or after the synchronous classes. However, reading from physical books was favoured over e-texts because of the expectations of the parents. Hana said in her second interview:

> At the end of the first term, we collected feedback from parents about online classes [held during COVID-19]. Almost all the parents wanted us to use textbooks and activity books. They said that it would be a waste not to use the books. So, in the second term, we started using textbooks more often. We assign tasks from the book, even in online classes. (Hana Viber Interview, 15 December 2020, Urban School)

In addition to reading, the preferred medium for writing was also paper-based. Lesson observations confirmed that teachers assigned writing tasks in students' English exercise books or activity books. From the 98 lessons observed, students undertook work in their exercise book in 42 lessons. However, the only lesson where I observed students doing digital writing was in Nuha's sixth grade (ages 11–12) class:

> It was a BYOD lesson. Students used their devices to do collaborative writing in Microsoft OneNote. The teacher asked students to search for information and pictures and to write an article about a famous place of their choice.
>
> (Lesson Observation, 2 May 2019, Urban School)

Before the COVID-19 pandemic, students in the rural school did not get any chance to use tablets in class for various reasons (see the section on external barriers). Even during the pandemic, there was not much opportunity for grades 1 and 2 (age 6–8) students in the rural school as they did not have any devices to access digital resources. In her second interview, Ina explained the teaching and learning situation in the rural school during COVID-19:

> Our students mainly depended on *Telikilaas* [the local name for teleclass] for their lessons. Grades 1 and 2 [age 6–8] students did not have their own devices. Tablets were distributed in 2018, and these students joined the school after that. So, we did not conduct online classes for grade 3 [age 8–9] also because they are all Key Stage 1 [grades 1 to 3] students. Grade 4 and above students mainly used tablets to get online as we conducted some lessons weekly using Google Classroom.
>
> (Translated Ina Viber Interview, 9 December 2020, Rural School)

Data indicates that paper-based reading and writing remained the most preferred medium in both the urban and rural schools, even for online learning during the pandemic. Such preferences may be related to DT infrastructure and resourcing in the schools. It may also suggest that teachers need awareness of the benefits of online reading and writing for 21st-century learners.

Underutilisation of DTs in Some Areas

The final theme that emerged from my participant teachers' pedagogical practices in the English lessons is the underutilisation of DTs in speaking lessons and for assessment purposes. An important aspect of the teachers' pedagogical practices centred on teaching phonics and practising pronunciation, especially in grades 1–2 (ages 6–8). On the other hand, lessons focusing on improving students' spoken English were extremely rare within the participant group. For instance, while listening was the focus in 22 lessons, only 7 out of 98 observed lessons centred on offering students opportunities to practise speaking English. Additionally, it was only in one lesson that I observed students using DTs for speaking. Below is the OBN from that lesson:

> In a lesson on famous places with her sixth graders (age 11-12), Nuha asked her students to use the smart board to present their group work. The presentations were based on an article that the groups had written. Each member of the group presented a section of their presentation. The remaining students and teacher gave oral feedback on their presentation skills and content when each group finished. (Lesson Observation, 9 May 2019, Urban School)

In relation to using DTs for assessment purposes, there was a difference in the type of tools used. Rural teachers tended to use PPT quizzes most frequently due to the lack of internet access in the classrooms. The few times rural teachers conducted online quizzes occurred when they hotspotted their own smartphones to their laptops, which were connected to the TV or projector for better display. These quizzes were mainly multiple-choice or gap-filling quizzes. I also observed that some websites had daily limits for free access. In the urban school, teachers differentiated their tools depending on the class levels. For lower grades, urban teachers used online quizzes such as those from www.softschools.com and www.ixl.com on the smart board. In the higher grades, urban teachers conducted Kahoot quizzes on days students had their own devices.

> I assess them [students] very often [using DTs]. We can find out how much students know by giving them a quiz at the end of the lesson. I give both online as well as PowerPoint quizzes.
>
> (Translated Reem Interview, 25 September 2019, Rural School)

> Some students don't like to do bookwork [work given in the book]. So, if we want to do an assessment without books and paper/pencil, we can assess them through online games, which we do now.
>
> (Hana Interview, 15 May 2019, Urban School)

> For grade 5 [age 10–11], since the beginning, we have used [teacher-created] Kahoot quizzes. It's a very effective tool [for assessing]. (Fazla Interview, 14 May 2019, Urban School)

All the assessments with DTs, such as PPT quizzes, online games, and Kahoot, consisted of objective-type questions such as sentence completion, matching or multiple-choice questions. Such assessments with DTs could only check students' ability to identify or produce grammatically correct sentences rather than the communicative function of language. Based on my observations, I realised that not all students got the chance to respond to the quizzes or games for two reasons. First, quizzes and games were played in the final 2–3 minutes of lessons. Second, they were played on teachers' laptops (in the rural school) or smart boards (in the urban school), except in BYOD lessons.

Theme 2: Perceived Benefits of DTs

The main themes that emerged as the benefits of DTs from teachers' practices and perspectives were the use of DTs as administrative, substitution, and motivational tools.

Administrative Tools

The first theme related to the benefits of DTs is the advantages that the teachers associate with the use of DTs for administrative purposes. Teachers specifically noted that DTs made the following much easier: lesson planning, accessing teaching resources, and communicating with parents. For example, urban teachers Hana and Fazla mentioned how easy lesson planning was with the help of DTs:

> Lesson planning is easy. It [lesson plan] is shared through Microsoft 365. So, everyone can put their ideas into it.
>
> (Hana Interview, 15 May 2019, Urban School)

> Earlier, we wrote the lesson plan, and then it remained for the rest of the week, and we couldn't change anything, but now as we are doing [it] online, whenever we feel like changing something, we can do it there. All the teachers can see this, and they can also change it as they have access. It has made life very easy. (Fazla Interview, 14 May 2019, Urban School)

Teachers also highlighted that DTs facilitated preparation and access to teaching resources, making teaching more convenient. Many teachers compared the preparation of teaching aids in the past with the current convenience of online access to resources:

> [DTs] made the process of making learning material easier.
>
> (Leena, Mini Survey 1 for Teachers, Urban School)

> ...earlier, if we were to prepare for a lesson, we had to prepare so many teaching aids, and we had to carry so many things to the class, but now it is rather simple; we just have to take them to the class, only a device whether a laptop or anything else.
>
> (Translated Beena Interview, 16 September 2019, Rural School)

Some teachers preferred videos as a teaching resource because videos were available instantly from the internet and did not require much preparation on the teacher's part:

> When I use something like that [PPT], I have to prepare them 1 day before, but I can get them instantly if I'm using a video.
>
> (Zeek Interview, 18 September 2019, Rural School)

> Videos are used most frequently because it takes more time to prepare a PPT. So, most of the time, videos are used. (Translated Reem Interview, 25 September 2019, Rural School)

> If we want to show a video to the students, we can search for the video [during class time]. Before, we used to save it [on a pen drive], and if we got the AV room only, we could use it.
>
> (Hana Interview, 15 May 2019, Urban School)

While these comments show teachers preferred using pre-existing videos over the preparation of PPTs, it needs to be reiterated that my lesson observations showed that when teachers used videos, they did not make an explicit connection between the videos and the activities that followed.

Teachers also viewed DTs as storage facilities for record keeping and communicating with parents. As noted by Hana, she used the smart board as storage space, where she saved all her documents for easy access:

> Whatever work I do is done on the smart board. My lesson plans are there. Whatever I want to share with my students is stored there. So, basically, everything will be there on the smart board now.
>
> (Hana Interview, 15 May 2019, Urban School)

Nuha used DTs to keep a record of the performance of her sixth graders (age 11–12) and to share feedback with parents:

> Microsoft OneNote ClassNotebook, we have this feature when they [students] upload their assignments; we can mark it online...you can just give feedback and then parents can be notified.
>
> (Nuha Interview, 9 May 2019, Urban School)

In Leena’s class, she used online rubrics to record marks of her grade 2 (age 7–8) students, which she later shared with lead teachers and parents:

> The assessing tools are already made. Tools, we don’t show it, but the details of the marks or records that kids get, we write it with the rubric online. So, we share it with our leading teachers. And with parents, we share it later.
>
> (Leena Interview, 20 May 2019, Urban School)

The following remark from the IT coordinator at the urban school also confirmed that one of the benefits of DTs was communicating with parents through the parent portal:

> If a student is absent, they [parents] have to fill [out] an online form and the only information is sent to the parents through the parent portal. Nothing is printed now, no slips, and nothing is given to the students. Everything is done through [the] parent portal. And if there is anything, an emergency, parents will be sent a message. (Ramiz Interview, 15 May 2019, Urban School)

The examples from transcripts showed that teachers viewed DTs as administrative tools that made lesson planning, access to teaching resources, and communicating with parents more convenient than before. Such findings perhaps indicate teachers' limited awareness of DT affordances for student learning.

Substitution Tools

The second subtheme in the benefits of DTs' theme was direct tool substitution. The participant teachers viewed DTs as substitution tools that helped them shift from handwritten to printed and digital media when preparing teaching aids and lesson delivery. The following extracts from interviews show DTs were viewed and adopted as substitution tools that enabled teachers to use digital resources over paper-based material.

Ina's remark shows that DTs provided the opportunity to change the teaching resources from handwritten to printed content:

> Earlier, we used to write and draw on the Bristol board [paper board] with our hands. We had to colour. So, it was time-consuming. Later on, we started using printed pictures that we searched for on the internet.
> (Translated Ina Interview, 17 September 2019, Rural School)

Zeek's example illustrates the benefits she believed students gained when she changed her teaching aids from printed flashcards to digital content in the form of animated images called GIF (graphics interchange format) images:

> I have taught grade 3 [age 8–9] students for 2 years. I taught them the topic 'idioms' by showing [them] some flashcards. It was difficult for most of them, but this year I tried to change it by using a presentation [PPT]...I was able to show pictures related to that as well. I mean GIF pictures. So, I think it was really easy for them. (Zeek Interview, 18 September 2019, Rural School)

Leena explained how DTs enabled her to make teaching resources paperless in comparison to the past when DTs were not available:

> We used to mostly have a lot of paper in our class like if you want to show something also, we have to bring it printed, and if we want to do work also it's always, even if it is a game, we have to print and bring the pieces and play with them. (Leena Interview, 20 May 2019, Urban School)

Both Nuha's and Beena's remarks about the use of online dictionaries in place of physical ones indicate that DTs also acted as substitution tools for students. Referring to her BYOD lessons with her sixth graders (age 11–12), Nuha said:

> It's easy to access information and then even a dictionary. We don't have to carry anything heavy. Everything is there on the device.
>
> (Nuha Interview, 9 May 2019, Urban School)

As the dictionary could be accessed offline as well, Beena's grade 5 (age 10–11) rural students used the device mainly to access the dictionary installed on it. She explained:

> Now they use it as a dictionary installed on their tablets. Students find it difficult to carry the dictionary, but now as a dictionary is installed on their tablets, they can search for a specific word. That's how it is used.
>
> (Translated Beena Interview, 16 September 2019, Rural School)

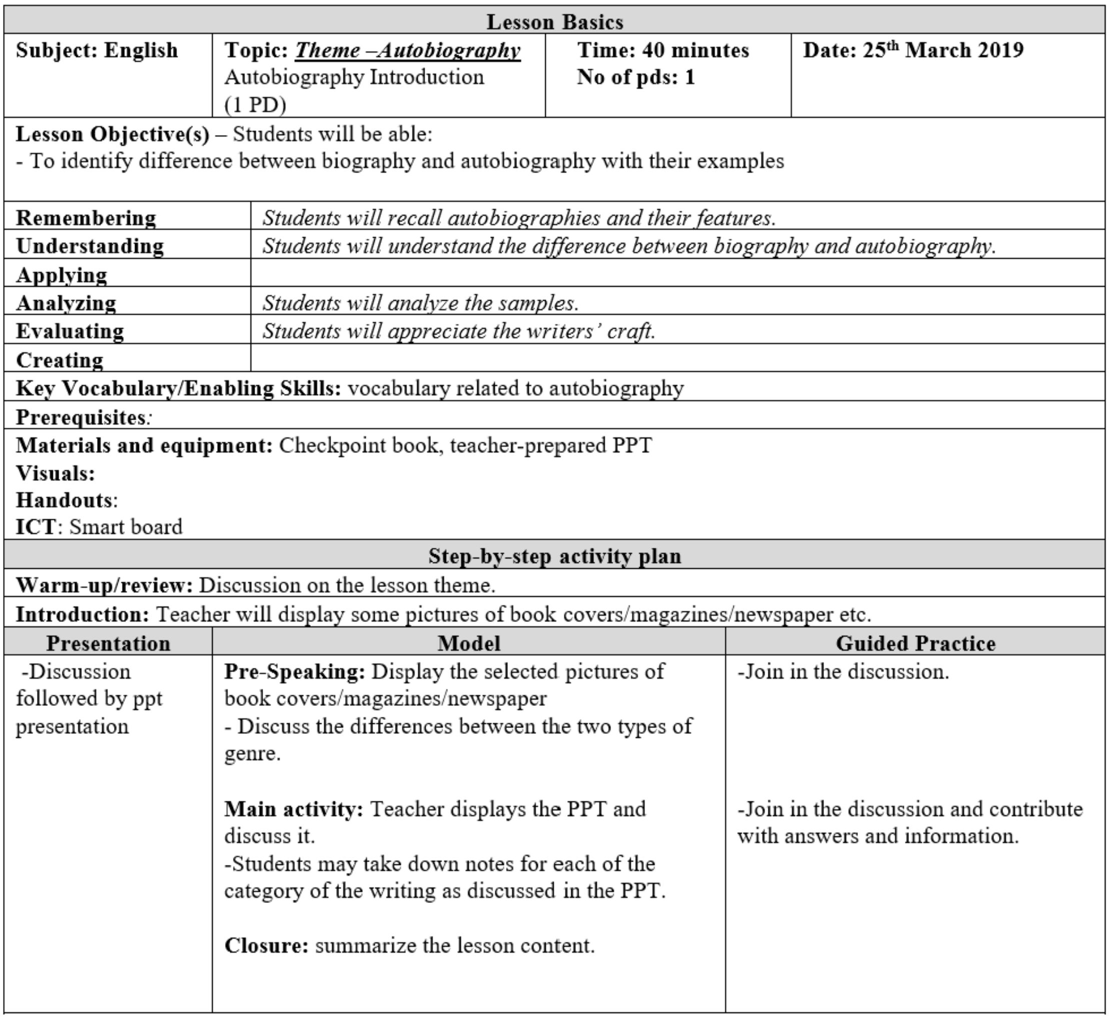
All the participant teachers frequently used DTs such as Microsoft Word, PPT presentations, and videos for content delivery. In a lesson on professions in her grade 5 class (age 10–11), Beena used a Microsoft (MS) word document instead of a worksheet to display questions related to the lesson:

> Beena talked a bit about specialists in the medical field before showing a list of questions on an MS word document using the wall-mounted projector connected to her laptop. She asked students to write all the questions in their English exercise book and answer the first five questions.
>
> (Lesson Observation, 18 September 2019, Rural School)

The following lesson plan (Figure 4.11) written by Nuha for her grade 6 (age 11–12) class shows that she used a PPT presentation to explain the difference between biographies and autobiographies before carrying out a whole-class discussion on this difference:

Figure 4.11

Nuha's Lesson Plan, 25 March 2019, Urban School



<table>
<tr><th colspan="4">Lesson Basics</th></tr>
<tr><td>Subject: English</td><td>Topic: <i>Theme –Autobiography</i>
Autobiography Introduction
(1 PD)</td><td>Time: 40 minutes
No of pds: 1</td><td>Date: 25th March 2019</td></tr>
<tr><td colspan="4">Lesson Objective(s) – Students will be able:
- To identify difference between biography and autobiography with their examples</td></tr>
<tr><td>Remembering</td><td colspan="3"><i>Students will recall autobiographies and their features.</i></td></tr>
<tr><td>Understanding</td><td colspan="3"><i>Students will understand the difference between biography and autobiography.</i></td></tr>
<tr><td>Applying</td><td colspan="3"></td></tr>
<tr><td>Analyzing</td><td colspan="3"><i>Students will analyze the samples.</i></td></tr>
<tr><td>Evaluating</td><td colspan="3"><i>Students will appreciate the writers' craft.</i></td></tr>
<tr><td>Creating</td><td colspan="3"></td></tr>
<tr><td colspan="4">Key Vocabulary/Enabling Skills: vocabulary related to autobiography</td></tr>
<tr><td colspan="4">Prerequisites:</td></tr>
<tr><td colspan="4">Materials and equipment: Checkpoint book, teacher-prepared PPT
Visuals:
Handouts:
ICT: Smart board</td></tr>
<tr><th colspan="4">Step-by-step activity plan</th></tr>
<tr><td colspan="4">Warm-up/review: Discussion on the lesson theme.</td></tr>
<tr><td colspan="4">Introduction: Teacher will display some pictures of book covers/magazines/newspaper etc.</td></tr>
<tr><th>Presentation</th><th colspan="2">Model</th><th>Guided Practice</th></tr>
<tr><td>-Discussion followed by ppt presentation</td><td colspan="2">Pre-Speaking: Display the selected pictures of book covers/magazines/newspaper
- Discuss the differences between the two types of genre.

Main activity: Teacher displays the PPT and discuss it.
-Students may take down notes for each of the category of the writing as discussed in the PPT.

Closure: summarize the lesson content.</td><td>-Join in the discussion.

-Join in the discussion and contribute with answers and information.</td></tr>
</table>

Teachers' practice of using DTs as substitution tools was also evident from observation of lessons, as explanations via YouTube videos replaced teacher explanations. For example, Ina used a YouTube video to explain the use of capital letters and full stops to her first graders (ages 6–7) in the rural school.

> Ina greeted her class of 15 students and asked them to sit quietly in front of the wall-mounted 65" TV connected to Ina's laptop. Then, she played a YouTube video saved on her laptop using VLC (VideoLan Client) media player. After this, she explained how and when to use capital letters and full stops, and asked her students to open page 27 of their textbook. She reminded students to make sure to use capital letters and full stops appropriately when writing sentences

> based on the picture given in the textbook. (Lesson Observation, 6 August 2019, Rural School)

Teachers with access to smart boards treated them like a whiteboard, but with benefits. They, thus, used smart boards as direct substitutes. Leena used the smart board to write down notes and to illustrate to students how to write neatly in their exercise books:

> At the beginning of Leena’s lesson in her grade 2 (age 7–8) class, she used the smart board to write notes when revisiting the previous lesson that was based on the past tense. When it was time for students to write sentences using the past tense of the verb in their English exercise book, Leena wrote some verbs on the smart board to help students who needed additional help. On the smart board, she also showed how to write neatly by following the red and blue lines given in the English exercise book.
>
> (Lesson Observation, 30 April 2019, Urban School)

In her grade 6 (age 11–12) class, Nuha used sticky notes on the smart board to display a list of tasks to be completed by the end of the lesson:

> Nuha’s lesson began by finding out how many students had completed the works in their English exercise book. To remind the students of the tasks they should have completed, Nuha displayed a list of tasks on the smart board using Windows 10 Sticky Notes. Students spent the rest of the lesson finishing the incomplete tasks. (Lesson Observation, 14 May 2019, Urban School)

Data from various sources shows that my participant teachers used DTs as direct tool substitutes. While substituting paper-based resources with DTs seems to have made lesson preparation and delivery more convenient, it also suggests that these teachers may have missed the opportunity to explore ways DTs could help student learning.

Motivational Tools

Motivating students is a key focus of most teachers. The participant teachers were no exception. Making lessons ‘interesting’ and using reward mechanisms to motivate students emerged as the two subthemes related to the purposes of DT use in my participant teachers’ English lessons.

Making lessons interesting

Teachers and students in urban and rural schools tended to use the word ‘interesting’ to describe what they meant, which fits with key ideas of initiating and sustaining student motivation in the lesson. All the teacher participants highlighted in the interviews that DTs played a significant role in improving students’ interest in the lesson:

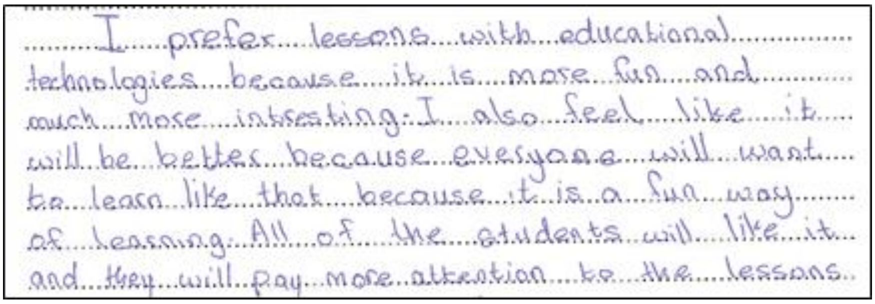
> It has been noticed that the use of technology improves students’ interest. [During coordination meetings], we suggest using technology if it can make the lesson more interesting for the students.
>
> (Translated Ina Interview, 17 September 2019, Rural School)

> The lessons become more colourful [with DT use], and it’s very helpful to use technology during teaching. I feel that the students are more interested [when DTs are used]. (Fazla Interview, 14 May 2019, Urban School)

In the mini survey, students from the urban and rural schools highlighted why they preferred lessons with DTs. Figure 4.12 shows what a student in grade 6 (age 11–12) in the urban school wrote.

Figure 4.12

Student Response, Mini Survey 1 for Key Stage 2, Urban School

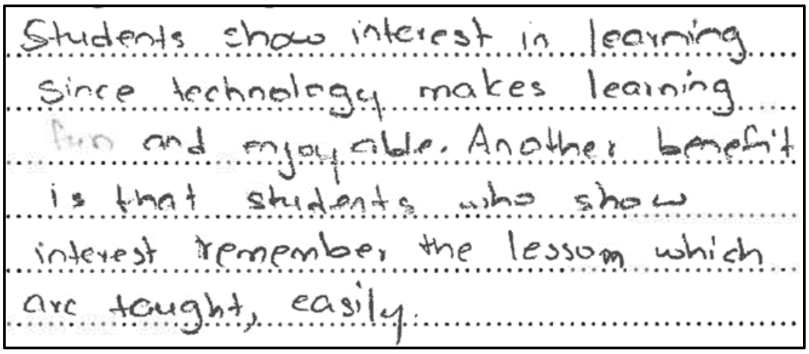


I prefer lessons with educational
technologies because it is more fun and
much more intresting. I also feel like it
will be better because everyone will want
to learn like that because it is a fun way
of learning. All of the students will like it
and they will pay more attention to the lessons.

Similar thoughts were expressed in the mini survey of a grade 6 (age 11–12) student in the rural school (see Figure 4.13):

Figure 4.13

Student Response, Mini Survey 1 for Key Stage 2, Rural School



Students show interest in learning
since technology makes learning
fun and enjoyable. Another benefit
is that students who show
interest remember the lessom which
are taught, easily.

Making lessons interesting involved playing games and quizzes using DTs, as students were keen to play them. Reem and Hana explained their students' reactions when they played online games:

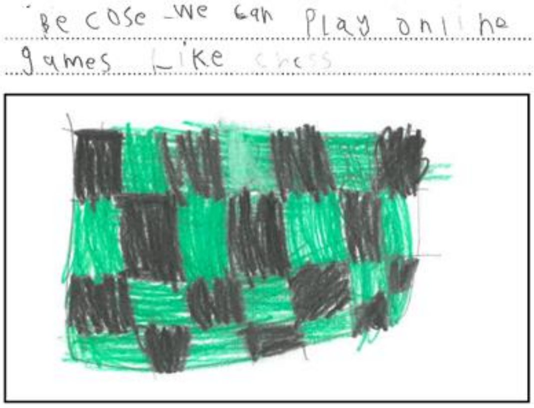
> I have seen that students enjoy online games a lot. Students are interested in different types of games. (Translated Reem Interview, 25 September 2019, Rural School)

> I see a lot of motivation when we use [DTs] like ClassDojo, smart board, online games...They are very exciting. (Hana Interview, 15 May 2019, Urban School)

Students' enthusiasm to play online games was expressed verbally and visually in a mini survey by one of the grade 1 (age 6–7) students when asked why they wanted their teacher to use the smart board in the English class (Figure 4.14):

Figure 4.14

Student Response, Mini Survey 1 for Key Stage 1, Urban School



Be cose we can Play onli ne
games Like chess

I also observed in the lessons how anxiously students waited in Hana's grade 1 (age 6–7) class for an opportunity to use the smart board:

> It was the closure of Hana's lesson. She opened the page www.softschool.com on the smart board. She randomly selected students to go to the smart board and play the online phonics game. The game required students to touch the correct vowel sound from the screen options to complete the spelling of the given word. The rest of the class waited anxiously for a turn. All the students had their hands raised. They kept asking for a chance, but only a few could participate as the class was over in a few minutes.
>
> (Lesson observation, 21 February 2019, Urban School)

Although students had limited opportunities to play online quizzes and games on the smart board (in the urban school) and the teacher's laptop (in the rural school), teachers highlighted that students enjoyed physically interacting with the tools. For instance, Leena articulated how much her grade 2 (age 7–8) students liked to interact physically with the smart board:

> Using a smart board, the most exciting thing that I think even children like is that they can touch and move items.
>
> (Leena Interview, 20 May 2019, Urban School)

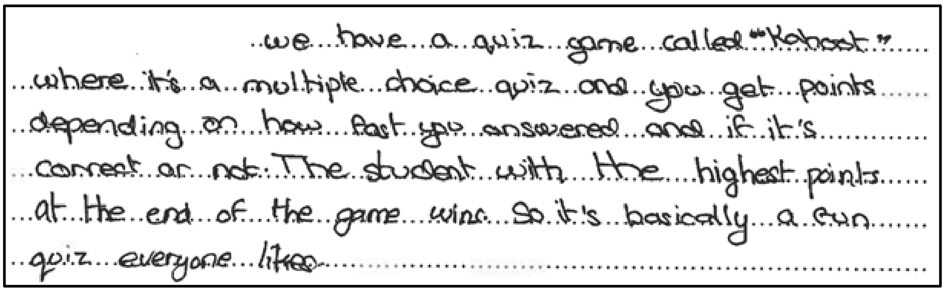
Nuha also said that her grade 6 (age 11–12) students enjoyed grammar revision lessons when students were able to play Kahoot quizzes on their own devices during BYOD lessons:

> We use Kahoot, especially when we are doing grammar and revising grammar. It's a fun way. (Nuha Interview, 9 May 2019, Urban School)

I did not observe any instances where students were given the chance to make Kahoot or any other quiz-type questions themselves. However, students reiterated what Nuha said about their interest in Kahoot quizzes. As found in the following extract (Figure 4.15) from a mini survey for sixth graders (age 11–12), many students mentioned Kahoot quizzes as something that all the students enjoyed playing:

Figure 4.15

Student Response, Mini Survey 3 for Key Stage 2, Urban School



we have a quiz game called "Kahoot"
where it's a multiple choice quiz and you get points
depending on how fast you answered and if it's
correct or not. The student with the highest points
at the end of the game wins. So it's basically a fun
quiz everyone likes

Data from various sources indicates that the participant teachers and their students perceived DTs to be useful in making lessons more interesting for the students. Hence, it appears that making lessons fun, enjoyable, and interesting was an important aspect of my participant teachers' pedagogical practices.

Using rewarding mechanisms

In the urban school, digital badges and Dojo points were used to incentivise learners to engage in the desired learning behaviours. While the teacher from grade 6 (ages 11–12) gave her students digital badges, Dojo points were given to students in grades 1–5 (ages 6–11) as rewards to motivate students to do their work. A digital badge or eBadge is a type of digital credential given in recognition of learning or achievement. Nuha said that she gives digital badges to work submitted by her grade 6 (age 11–12) students:

> [In] Microsoft OneNote ClassNotebook, we have this feature when they upload their assignments, we can mark on the spot, and we can give stickers [digital badges]…
>
> (Nuha Interview, 9 May 2019, Urban School)

Urban teachers used ClassDojo (a school communication platform for teachers, students, and parents) to give their students Dojo points as rewards to motivate them. The following is what I recorded in my OBN of Fazla's lessons in her grade 5 (age 10–11) class:

> The teacher opened the ClassDojo page for the class on the smart board. She asked students to touch their names on the smart board once they finished writing the biography and after keeping their books on the allocated table. She used the app to reward students who completed their work. Gaining Dojo Points seemed very important for all the students.

(Lesson observation, 8 May 2019, Urban School)

When asked about the purpose of using ClassDojo, urban teachers replied that it was mainly for motivating students to do their tasks. Fazla’s views encapsulate the collective views:

> It [ClassDojo] motivates kids to do almost all the tasks, listening, reading, finishing the work on time, and doing neat work.
>
> (Conversation with Fazla, 21 March 2019, Urban School)

In a postobservation conversation, one of the students in grade 5 (age 10–11) commented on what had been motivating her to gain Dojo points:

> We don’t really get to play with it [smart board] that often, but when we get our points in the Dojo, we can choose our names, and it’s really fun to tap the [smart] board because we don’t usually get to.
>
> (Conversation with Students, 2 May 2019, Urban School)

Because teachers displayed the names of students with the highest scores for each month on the classroom wall, parents also took a keen interest in Dojo points, as the first grade (ages 6–7) teacher Hana explained:

> Sometimes, when the students complain that they don’t get the point or the teacher deducted the points, parents would come and ask. But we have told the parents that it is just for the reinforcement, just to encourage the students to do the work.
>
> (Hana Interview, 15 May 2019, Urban School)

Data from various sources suggests that my participant teachers frequently used DTs to make their lessons enjoyable and extrinsically motivate their ESL learners to complete their work.

Theme 3: DT Enablers

In the context of DT integration in education, enablers are the factors that facilitate the use of DTs for teaching and learning. These factors may be related to the institution, the management, the DTs or the teachers and students. In my study, the subthemes that emerged as enablers of DT use are divided into external enablers and internal enablers. The external enablers for teachers’ DT use include technology leadership, technology infrastructure, and professional learning, support, and development (PLSD). The internal enablers were teachers' beliefs, attitudes, knowledge, and confidence.

External Enablers

The external enablers theme highlights the huge difference in funding and resourcing between the urban private school and the rural public school in my study. The three external enablers, including technology leadership, technology infrastructure, and PLSD, illustrated here are from the urban school. The reason for not having data from the rural school under external enablers is that rural teachers and students face various constraints on DTs use at the school and classroom level, as presented in the section on external barriers.

Technology leadership in the urban school

Technology leadership emerged as a critical enabler for DT use in classrooms. For instance, the urban school principal's vision about DTs and the initiatives taken to plan, implement, and improve the use of DTs at the school are an indication of his technology leadership. The urban school principal shared why he thought DT integration was important:

> School is a training ground where you prepare the students for life, for the future. If life has so much to do with technology, you cannot live in a primitive style of teaching and learning in school and then live [a] 21st-century life when you are a bit grown-up...in school, if you just do everything on the blackboard or whiteboards and paper and books, then we are not actually embracing the changes that are happening in the world. Rather, I think we are saying that that's a different world. This is a different world. So, that mindset has to be changed, and it has to be real. That's the reason why it has to be that way. (Ahmed Interview, 25 April 2019, Urban School)

When asked about a national educational ICT policy, Ahmed said:

> I am not aware of any national level policies, but it's time that we had policies, rules and regulations, laws because though the island nation is small in size and number, I think, we are a very tech-savvy population. (Ahmed Interview, 25 April 2019, Urban School)

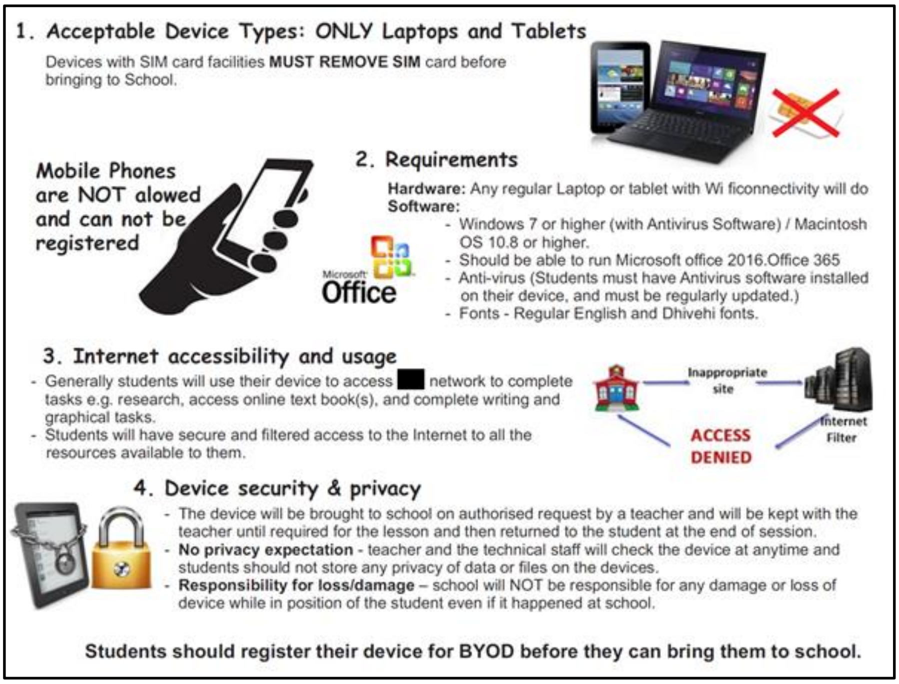
By the time of my initial data collection period, the urban school already had its own ICT policy. It played a pivotal role in making DTs easily accessible in the urban school. This school's policy meant that the IT department could monitor users' internet activities to check that teachers and students used the equipment for educational purposes. All users had a school username, password, and the IT department performed routine checks. As the policy states:

> The IT Coordinator and any designated staff can access any data stored on the school's systems at any time to ensure the system is being used appropriately. Also, at the request of the administrator or the school heads, the IT coordinator will investigate if there has been a breach of this policy by searching files and communications on the school's systems. Users should not expect nor assume that their school files, emails and Internet activities are private.
>
> (School ICT Policy, School Document, Urban School)

All students bringing a device to school for the BYOD (bring your own device) programme had first to register it with the school. To register the device, parents and students completed and submitted a form for that purpose. The following picture of the BYOD flyer (Figure 4.16) summarises all the important aspects of the programme:

Figure 4.16

An Excerpt from Urban School's BYOD Flyer



1. Acceptable Device Types: ONLY Laptops and Tablets

Devices with SIM card facilities **MUST REMOVE SIM** card before bringing to School.

Mobile Phones are NOT alowed and can not be registered

2. Requirements

Hardware: Any regular Laptop or tablet with Wi ficonnectivity will do
Software:
- Windows 7 or higher (with Antivirus Software) / Macintosh OS 10.8 or higher.
- Should be able to run Microsoft office 2016.Office 365
- Anti-virus (Students must have Antivirus software installed on their device, and must be regularly updated.)
- Fonts - Regular English and Dhivehi fonts.

3. Internet accessibility and usage

- Generally students will use their device to access [redacted] network to complete tasks e.g. research, access online text book(s), and complete writing and graphical tasks.
- Students will have secure and filtered access to the Internet to all the resources available to them.

4. Device security & privacy

- The device will be brought to school on authorised request by a teacher and will be kept with the teacher until required for the lesson and then returned to the student at the end of session.
- **No privacy expectation** - teacher and the technical staff will check the device at anytime and students should not store any privacy of data or files on the devices.
- **Responsibility for loss/damage** – school will NOT be responsible for any damage or loss of device while in position of the student even if it happened at school.

Students should register their device for BYOD before they can bring them to school.

The urban school took internet security extremely seriously, as the principal explained:

> When devices are registered here, their IP address is registered in the school network. So, when students enable Wi-Fi, we know what they are doing through the device. Also, we have a firewall. We have Ruckus software. These features will enable us to prevent them from abusing or misusing technology. (Ahmed Interview, 25 April 2019, Urban School)

Interestingly, during my data collection at the school, I also had to register my device to access the school Wi-Fi. The following is what I recorded in my field notes:

> Today, I asked the principal whether there was any way I could get access to the school Wi-Fi on my laptop so that I could work in the library in between observations. He told me I would have to go to the office and meet the IT technician to register my device. This procedure made me realise how seriously the school management has thought about the possible misuse of DTs.
>
> (Field Notes, 18 February 2019, Urban School)

My view of the school's serious approach is illustrated by its policy regarding student breaches:

> The use of the school's computer network and Internet connection is a privilege, not a right. Anyone found or believed to be using the service inappropriately will automatically have their entitlement to use this facility suspended without notice. Anyone who violates this policy and breaches his/her agreement may have his or her access to the computer network and Internet terminated indefinitely. The school may also take other disciplinary action.
>
> (School ICT Policy, School Document, Urban School)

Nuha believed that monitoring students' online activities (for example, the websites they visit) could minimise the misuse of their devices:

> Very few use the devices for purposes other than education. These things will be there. Once they come to know that the teacher has the authority or the administrator will be able to see or their IT coordinator will be able to find out, they will not [misuse the internet].
>
> (Nuha Interview, 9 May 2019, Urban School)

The above excerpts indicate the possibility of widespread surveillance. On the other hand, the policy clarifies how seriously the school treats digital safety and the misuse of DTs. As such, teachers may have gained assurance that the IT department will monitor students' online activities and take action in case of any breaches. Hence, misuse might have been one less problem for teachers to worry about.

Technology infrastructure in the urban school

The school's technology infrastructure also emerged as a critical external enabler of DT use. However, while the availability of technology infrastructure is vital, accessibility plays a significant role in encouraging teachers to use DTs in their lessons.

Each urban school classroom was equipped with the necessary infrastructure, including the internet, Wi-Fi, a smart board, a computer system, a projector, and speakers. The IT coordinator shared that all the required hardware and software were available in the classrooms:

> All the classrooms are equipped with a smart board, internet, projector, and everything. Hardware side, we don't have any issues. Everything is there. The software also, we don't have any issues.
>
> (Ramiz Interview, 15 May 2019, Urban School)

Hana believed that her school was "one of the best schools in the whole of Maldives… because internet connectivity is one of the best". She also believed that the school had "all the facilities". (Hana Interview, 15 May 2019, Urban School)

Fazla used CDs with listening tracks that come with the English textbooks in her lessons, so her classes could practise listening, saying:

> There is a special component for every lesson in the English books, especially the audio work and the listening task. So, we have to use it. The book comes with a CD. (Fazla Interview, 14 May 2019, Urban School)

An attempt to improve DT use at the urban school was the bring your own device (BYOD) programme. The programme requires students of grade 5 (age 10–11) and above to bring their device (a laptop/an iPad) to the school on a specified day of the week to be used in all the lessons. Student devices and Microsoft 365, a learning management system (LMS), were crucial for the BYOD programme. The principal said:

> At this school, from grade 5 [age 10] onwards, we have structured timetables for teachers to use devices and then the security aspect is taken care of, and also there is a platform. The learning management system is there through Microsoft OneNote, ClassNote, and StaffNote.
>
> (Ahmed Interview, 25 April 2019, Urban School)

The urban school principal also shared how they had been upgrading the DTs available in the school:

> We used to use Moodle, and then we started using Google Classroom, and then we moved to Microsoft 365. I looked at it this way. Like, if it is free, people may stop it, and you can't even complain if certain features are not available or certain things are not working. So, you just can't depend on your school for a free application. So, economically it (Google Classroom) is a viable option. It's a very good choice because you don't have to spend any penny on that. But as far as continuation is concerned, there is nobody responsible for that. So, we thought, even though we have to spend some money on this investment, we have to depend on something that the management should be answerable to.
>
> (Ahmed Interview, 25 April 2019, Urban School)

Interview data suggests that the participant teachers used DTs such as the smart board frequently in their English lessons because all the necessary infrastructure was reliable and easy to access.

Professional learning, support, and development in the urban school

Lastly, another external enabler was professional learning, support, and development (PLSD). The two subthemes that emerged under PLSD in the urban school were professional learning and IT support.

Professional learning

The urban school had a school PD policy that outlined observations, mentoring/coaching, research, meetings, workshops, and online courses such as MOOCs offered, for example, by Udemy and Coursera as PD activities. However, staff professional development related to developing DT expertise was limited to school-based PD sessions. These are lecture-style sessions where the facilitator explains and demonstrates how to use various features and functions of a specific DT. These sessions were carried out at least once a year as part of PD days, split into sessions and topics. However, PD on DTs was not limited to annual events. Whenever something changed or was new to the school, the IT coordinators provided training sessions about DTs and not the pedagogical aspects of DT use. New staff were introduced to the school's systems and processes via orientation sessions. Nuha and Leena described their experiences when they joined the urban school:

> Here, for OneNote ClassNotebook, we got [training] at the very beginning, and all the new teachers are given the basic training.
>
> (Nuha Interview, 9 May 2019, Urban School)

> The very first day when we joined [the urban school], the first thing they did was to introduce this software that we use, like...the school management system for administrative purposes and then Outlook and this smart tools and smart board. They gave us training. First, it was just 1 day, but they gave us a detailed session in the following PD after that.
>
> (Leena Interview, 20 May 2019, Urban School)

Due to the COVID-19 pandemic, teachers had to explore more avenues than just depending on the annual PD sessions held in the school. As the urban school was a private school, its teachers had already been using Microsoft 365, although not for online learning. So, at the urban school, additional workshops were offered to support online teaching. Hana and her colleague recorded a demo-online lesson and used it in a workshop to share their experience of using Microsoft Teams for synchronous online teaching:

> One of my colleagues and I conducted an online lesson for a group of selected students from grade 2 [age 7–8]. It was at the beginning of the lockdown when the schools were closed. The lesson was recorded. It was shown to the other teachers in the series of workshops conducted for the teachers. It helped teachers understand the problems they may face when teaching online.
>
> (Hana Viber Interview, 15 December 2020, Urban School)

IT support

Teachers also felt enabled to use DTs in lessons because they could rely on timely IT (information technology) support. All the teachers mentioned the value of the IT coordinator and assistant in solving technical issues. Leena praised the timely and efficient IT responses:

> Since this is a technology-friendly school, those problems are significantly less, and even if we come across a technical problem, it's solved within a second like we just have to give a call to our staff [from the IT department]. He will come and fix it, and if it's not something we can do on the spot, we just need to send [an] SMS or email to him. He will make sure that it's done for the next day. So, it's really [helpful]. The school is very supportive of using it, and when we are having any issues, it's not prolonged that much. So, he makes sure it's done. It's our duty to inform him. It gets delayed sometimes because we forget to inform him [giggles], but the next day we see it's done, big problems like even the projector and smart board problems also. Mostly, it takes 24 hours maximum [to solve the issue], but at minimum, it could be even within an hour or so if he is free.
>
> (Leena Interview, 20 May 2019, Urban School)

The urban school principal said that there was also a tech-savvy teacher group that provided DT support for teaching and learning, some of whom have "been doing online training to become expert teachers to train others". (Ahmed Interview, 25 April 2019, Urban School).

Teachers' responses indicate that the IT department and tech-savvy teachers' assistance helps other teachers have greater confidence in using DTs in their lessons. The fact that all the data on external enablers comes from the urban school suggests that various aspects of the urban school and classroom contexts have facilitated the frequent use of DTs by urban teachers. Unfortunately, it also indicates the absence of enablers to DT use for teaching and learning in the rural school, a topic which will be presented under external barriers.

Internal Enablers

The internal enablers of DT use in teaching and learning are related to individual teachers. These enablers were teachers' beliefs about the usefulness of DTs, their positive attitude toward the use of DTs, and their technological knowledge (TK) and confidence in using DTs.

Teachers' beliefs about the usefulness of DTs

All the participating teachers (N=9) believed that DTs were beneficial in teaching and learning. Their reasons were varied:

> With DTs, students' engagement and interest are more. (Leena, Mini Survey 1 for Teachers, Urban School)

Zeek thought the use of DTs made it possible to gain the attention of students who would otherwise get distracted during her class:

> I believe that it has made my lessons more interactive and more interesting than before. The students are more interested in my lessons, and they are even more attentive in my class. The misbehaving students even listen to me, at least while I am explaining.
>
> (Zeek Interview, 18 September 2019, Rural School)

Sana believed that replacing teacher explanations with video presentations made her lessons easier for students to understand:

> Before using technology, we usually used the lecturing method, but nowadays, we are showing through whatever they [students] want. We are reducing the lecturing method, and then we are showing video presentations. So, it is very helpful for us teachers, and it helps our students to understand the concepts. (Sana Interview, 18 September 2019, Rural School)

Urban school teachers' beliefs about the usefulness of DTs, perhaps, are related to the urban school's vision for DT integration and the fact that these teachers have access to reliable infrastructure. However, despite the 'shakier' DT infrastructure in the rural school, it is remarkable that rural teachers expressed their beliefs about the benefits of DTs in their pedagogical practices.

Positive attitudes towards DT use

Another internal enabler was the positive attitude of teachers regarding the use of DTs in teaching and learning. Leena voiced her excitement about using DTs when she joined the urban school, saying:

> Oh my god! I was surprised to see all the possible things that we can do. It was in 2015 that I joined. Like, the smart board was not new, but I had never seen one before, and here we see it in every class with an internet connection. All of us have our separate systems in the class. And the very first year I joined, they

> started this BYOD [bring your own device] programme for higher grades. So, there was quite a lot [of DTs].
>
> (Leena Interview, 20 May 2019, Urban School)

In her second interview, Leena acknowledged that it was students' access to DTs that enabled them to continue learning even during COVID-19:

> My grade 2 [age 7–8] students used their own devices at home to get online. We used Microsoft Teams to conduct [synchronous] lessons. If not for these technologies, we might not have been able to teach online classes during the pandemic. (Leena Viber Interview, 23 November 2020, Urban School)

A positive attitude of teachers toward DT use is usually associated with the school's facilitative conditions for using DTs in teaching and learning, which may be why much enthusiasm to use DTs was found among urban teachers and but not rural teachers, even though rural teachers believed DTs were beneficial for teaching and learning.

Teachers' technological knowledge (TK) and confidence

Teachers' knowledge about DTs (their TK) and confidence was also an internal enabler that facilitated the use of DTs in teaching and learning. When DTs are accessible, one explanation for any gap between teachers' knowledge of DTs and whether they actually use them in their pedagogical practices relates to their confidence in using DTs. Though not in every lesson, I observed that rural and urban teachers taught with DTs in their English lessons throughout the 4-month data collection period I spent at each school. The confidence all my participant teachers showed in using the tools accessible to them in their respective schools may be because of their TK. With the exception of Fazla and Beena, who had done a diploma in teaching, the remaining seven teachers gained TK from their bachelor's degree and postgraduate programmes. Hana explained the focus of the technology module in her teacher education programme:

> They gave us ideas of different ways we can use educational technology. Not specific subjects, in general.
>
> (Hana Interview, 15 May 2019, Urban School)

As Beena’s diploma programme did not have a technology-related module, she did a basic computer course on her own:

> Even at college, there was no training provided on how to use technology in teaching. There was no ICT module in [the] diploma. We used technology on our own to get ready for something or to do a presentation. I took the initiative and did a basic computer course earlier. As I did that, I knew how to use the computer.
>
> (Translated Beena Interview, 16 September 2019, Rural School)

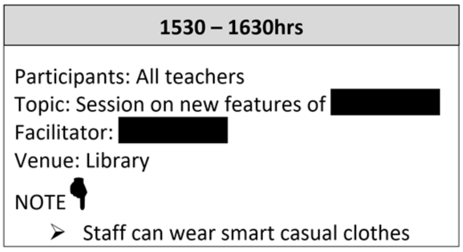
Despite her self-initiated learning about DTs, she was one of the two teachers in the rural school who experimented with alternatives when certain DTs were not available or accessible. For instance, Beena would confidently use her own Bluetooth speaker and smartphone when speakers were not available in the classroom:

> Beena gave her fifth-graders (ages 10–11) a worksheet. She asked them to read it carefully and fill in the blanks while listening to the audio track on Usain Bolt. She used her smartphone and a small Bluetooth speaker to play the audio.
>
> (Lesson observation, 1 July 2019, Rural School)

Urban teachers also gained TK from the professional development (PD) sessions held in the school. The following excerpt from the schedule of activities for day two of the PD at the urban school (Figure 4.17) also confirmed that TK was provided for all the teachers in the PD sessions held at the urban school:

Figure 4.17

An Excerpt from Urban School’s PD Schedule



1530 – 1630hrs

Participants: All teachers
Topic: Session on new features of [redacted]
Facilitator: [redacted]
Venue: Library
NOTE

- Staff can wear smart casual clothes

The regular PD sessions at the urban school may be why the urban teachers felt they have sufficient knowledge to use DTs in their everyday face-to-face lessons. For example, Leena's remark on her TK shows her confidence in using DTs in her second grader class:

> I'm not giving that much time to learn [more] because I think what I know now is suitable for kids of this grade [grade 2, age 7–8].
>
> (Leena Interview, 20 May 2019, Urban School)

Due to the sudden change to online classes during COVID-19, both rural and urban teachers gained further TK. As their school was a public school, the rural school teachers gained Google Certification by completing training to use Google Classroom as a platform for online learning that the MoE conducted in collaboration with UNICEF. On the other hand, as it was a private school, the urban school initiated its own workshops for teachers to use various online applications. In her second interview, Hana explained how those workshops helped in building her confidence to use DTs in online classes:

> When schools were closed during the lockdown in Male', we were asked [by the school SMT] to attend online workshops in late March. It was 1–1.5 hours each day for about 4 months. We learned how to use Microsoft Teams and other applications, create assignments, and solve technical issues. One other teacher and I carried out a mock lesson for a group of grade 2 (age 7–8) students. It was recorded and shown to other teachers to show the problems that they may come across. I was hesitant to conduct online classes initially, but I'm more confident now.
>
> (Hana Viber Interview, 15 December 2020, Urban School)

COVID-19 lockdown teaching relied on teachers' using DTs to connect with learners. This increased their beliefs and attitudes regarding the value of DTs for classroom use. They also felt that they had sufficient technological knowledge (TK). Teachers' TK may have made them more willing and confident to use DTs in their lessons. Given that TK seems to be accepted as sufficient for teachers' DT use, it is possible that teachers might not be as aware as they could be of how their practices and understanding might be further enhanced if they deliberately focused on understanding the learning value of their efforts for learners. Perhaps, teaching as an inquiry approach to their practices might be useful.

Theme 4: Barriers to Effective DT Use

Barriers to the effective use of DTs for meaningful learning comprise both external and internal factors. The external barriers include the inaccessibility of DTs, the internet speed, unresolved technical glitches, and device specifications and classroom design. The internal barriers were textbook-driven practices, teachers’ concerns, limited awareness of pedagogically meaningful DT use, and limited DT-related professional learning and development (PLD).

External Barriers

Absence of DT leadership, inaccessible DTs and unresolved technical glitches were external impediments at the rural school. On the other hand, slow internet speed, device specifications, and classroom design were the external barriers in the urban school.

Absence of DT leadership in the rural school

Frequent change of school principal was an issue for the rural school. I witnessed a change of principal during my data collection at the school. In such situations, IT technicians usually become the de facto DT leaders in a school. With no IT technician at the rural school, the school librarian acted as the IT technician. When asked about ICT policy, the acting IT technician said, “So far, we don't have any school policy specifically for ICT, and I don’t know whether an ICT policy was sent by the Ministry of Education”. (Translated Ibrahim Interview, 15 September 2019, Rural School). Without any DT leadership, the rural school was not in a position to plan or share the vision for DT integration among the school’s stakeholders

Inaccessibility of DTs in the rural school

Although Mimio bars (interactive systems) were available in the rural school, they were not easily accessible to teachers. Mimio bars are portable interactive devices capable of transforming standard whiteboards into interactive whiteboards (IWB) by mounting the Mimio bar to the whiteboard. The Mimio bars, a donation from a businessman a few years before, had been kept in storage for a number of years. Reem explained why teachers in this rural school were unable to use Mimio interactive systems in their lessons:

> Because the Mimio bar was not available in the classroom, we didn't use it. It is in the school's storage. It is difficult because it is not attached [to the whiteboard] yet. The thinking [of the school management] was to attach it every time the teacher wanted to use it, remove, and return it afterwards. That's because there is no lock in the classroom. Maybe that's why. Taking a Mimio bar to the class and installing it for every lesson is time-consuming.
>
> (Translated Reem Interview, 25 September 2019, Rural School)

As Sana articulated, rural school teachers already had to carry their own laptops or laptops from the office to their classroom every time they wanted to use the TV or the projector in the classroom:

> Teachers carry their own laptops to the classrooms and connect them [to the TV/projector]. On very few occasions, some teachers use laptops provided by the school. Otherwise, they use their own laptops.
>
> (Translated Ina Interview, 17 September 2019, Rural School)

Not having access to Wi-Fi in the classrooms was also an external barrier that the rural teachers faced. Rural teachers shared how they managed to use DTs in their lessons without access to Wi-Fi in the classroom.

> I give a hotspot to the laptop from my phone. Wi-Fi is there, but we don't have access to Digital School Wi-Fi [for teachers] yet because the password is not shared. (Translated Reem Interview, 25 September 2019, Rural School)

> To be frank, we don't get it [Wi-Fi] on our laptops. We get staff Wi-Fi only in that area [pointing towards the staffroom]. Here we have Digital School Wi-Fi, but the password is not given. What we have to do is to give a hotspot to the laptop from our phone and then search. [We] use 3G as we do even now in the class.
>
> (Translated Beena Interview, 16 September 2019, Rural School)

While DTs are used to make the professional lives of teachers easier, Ina's concern suggests that DT use for rural teachers has been nothing but burdensome:

> We download in advance if we are using a video in the lesson. That's a reason why we cannot use [DTs] so much. We end up not using it because we have to

> do everything in advance before going to the class. If we could access resources while carrying out the lesson, we could have used them more frequently. (Translated Ina Interview, 17 September 2019, Rural School)

Lack of Wi-Fi access in the class also affected rural students' use of their devices for learning despite having tablets. For example, a grade 5 student (age 10–11) from the rural school stated in the mini survey:

> "We have tablet[s], but we don't use [them]." (Mini Survey 3 for Key Stage 2 Students, Rural School)

Overall, data suggests that using DTs in the classroom was quite inconvenient for the rural teachers due to the hassle of carrying laptops to the classroom and the lack of Wi-Fi access. This inconvenience is likely to have resulted in limiting their opportunities to use DTs in ways meaningful for student learning.

Unresolved technical glitches in the rural school

Another external barrier that hindered rural teachers' DT use in lessons centred on unresolved technical glitches, particularly regarding infrastructure and resourcing. Sana explained the kinds of technical problems she had in her grade 6 (age 11–12) class in the rural school:

> Sometimes the speakers don't work when I try to show a video or something. And mostly, the projector and the laptop will be disconnected. So, I can't use it. Even yesterday, in the last 10 minutes, it lost connection. Even if I try to reconnect, it does not work. So, I just have to show the video using the laptop itself. And sometimes, the laptop also does not read the pen drive.
>
> (Sana Interview, 18 September 2019, Rural School)

In a postobservation conversation, one of Sana's students shared the difficulties they experienced in their classroom:

> Sometimes, we can't hear clearly. Sometimes, the presentation won't open. We can't see clearly, and we have to use the laptop because the projector is broken. So, it wastes time, and we can't finish our work on time.
>
> (Conversation with Students, 27 August 2019, Rural School)

In the rural school, teachers had to solve their own technical issues as there was no IT technician. Ina explained how difficult this situation was:

> We used to have a technician earlier. We don't have a technician now. The librarian takes on the technician role. Recently, there was an issue with the TV display, and there was no sound. So, we just called someone in the office. Actually, there is no one to address that problem. So, it is challenging. If there was an IT technician and he addressed such issues, it would have been easier. For example, if an issue is reported, it is solved within a week, even if it cannot be solved on the spot.
>
> (Translated Ina Interview, 17 September 2019, Rural School)

Data from rural teachers suggests that their frustrations about unresolved technical issues could have led teachers to be more reluctant to use DTs in their lessons.

The internet speed in the urban school

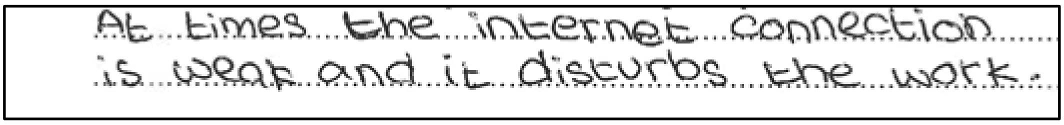
Teachers in the urban school highlighted internet speed as a barrier to using DTs in their lessons. Nuha sometimes had to use plan B when she had problems with the internet speed in her face-to-face class in the urban school:

> Technical issues are also there sometimes. Sometimes the internet is very slow. So, we need to wait for it and then we need to have a second plan [plan B] for the same lesson.
>
> (Nuha Interview, 9 May 2019, Urban School)

A student also confirmed slow internet speed issues (see Figure 4.18) in the third mini survey for Key Stage 2 students (age 9–12):

Figure 4.18

Student Response, Mini Survey 3 for Key Stage 2, Urban School



At times the internet connection is weak and it disturbs the work.

Internet speed remained an issue even in online classes during COVID-19. For example, Hana sometimes got disconnected during the online classes she conducted for her grade 1 (age 6–7) students via Microsoft Teams during the pandemic:

> When we had online classes, the internet speed was so slow that we had to ask students to keep their videos off. It was so difficult because we could not see the students. Even then, sometimes, I would lose connection. It took time to get connected again. If we didn't have another teacher present in the online class, students and parents would have been really confused.
>
> (Hana Viber Interview, 15 December 2020, Urban School)

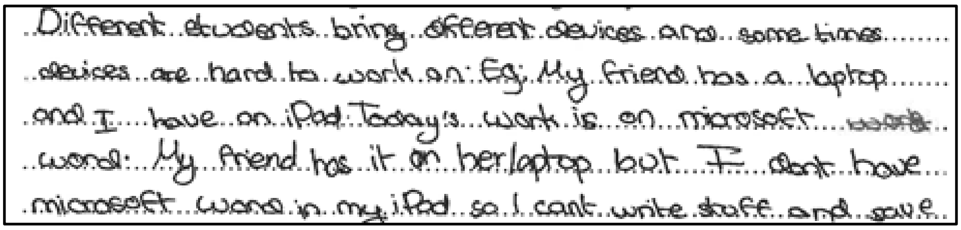
The excerpts suggest that urban teachers sometimes had to change their lessons as they could not continue the planned lesson due to slow internet speed. Such bad experiences may have impacted teachers' choice to use DTs in lessons or not.

Device specifications and classroom design for BYOD in the urban school

The kinds of technical issues that urban teachers faced when teaching the fifth and sixth grades were different to those the rural teachers faced. For instance, using different types of devices in the BYOD lessons was also a problem in the urban school. As some of the devices' configurations did not support specific applications, students and teachers found it challenging to conduct BYOD lessons. One student wrote that she could not do her work as her iPad did not have Microsoft Word (see Figure 4.19).

Figure 4.19

Student Response, Mini Survey 3 for Key Stage 2, Urban School



Different students bring different devices and some times
devices are hard to work on: Eg: My friend has a laptop
and I have an iPad. Today's work is on microsoft ~~work~~
word: My friend has it on her laptop but I dont have
microsoft word in my iPad so I cant write stuff and save

Some technical issues were also related to classroom design and layout, as classrooms were not originally designed to accommodate the new DTs. For instance, there were no ports for the students to charge their devices for BYOD lessons. Nuha raised concerns about the difficulties she had in continuing BYOD lessons due to classroom design:

> Some students say my device is not charged. There are some ports, but they are not appropriately installed. For the time being, what we say is that we instruct them to charge their devices before they come to school.
>
> (Nuha Interview, 9 May 2019, Urban School)

While rural teachers had issues with accessing DTs and getting technical problems solved in a timely manner, urban teachers and students found slow internet speed and device specifications and the unavailability of charging ports in the classroom were constraints to using DTs in their lessons. The vast difference in the kinds of issues that the rural and urban teachers faced seems to be associated with the resourcing and funding differences between the two schools, with one being public and the other private. The findings indicate that rural teachers are more disadvantaged in terms of overcoming the first-order barrier of accessing digital infrastructure for teaching and learning.

Internal Barriers

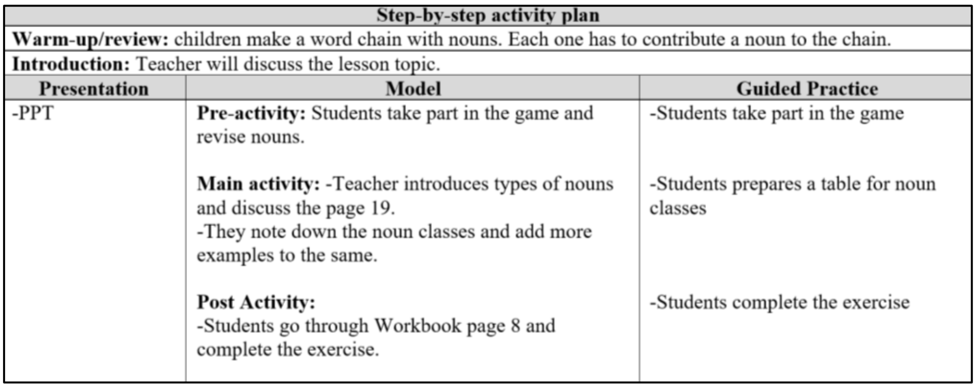
Internal barriers to pedagogically meaningful DT use were (a) textbook-driven practices, (b) teachers' concerns, (c) limited awareness of the pedagogical use of DTs, and (d) limited opportunities for DT-related PLD.

Textbook-driven practices

I found that a critical aspect of teaching and learning in the primary grades was the completion of exercises in the prescribed textbooks, which may have affected my participant teachers' more meaningful use of DTs in their lessons. The emphasis given to completing pages from the textbook, activity book or workbook was evident in the lesson plans. For example, the following excerpt from a lesson plan written for a grade 6 (age 11–12) class (see Figure 4.20) has page numbers that students need to complete by the end of the lesson.

Figure 4.20

Nuha's Lesson Plan, 17 February 2019, Urban School



<table>
<tr><th colspan="3">Step-by-step activity plan</th></tr>
<tr><td colspan="3">Warm-up/review: children make a word chain with nouns. Each one has to contribute a noun to the chain.</td></tr>
<tr><td colspan="3">Introduction: Teacher will discuss the lesson topic.</td></tr>
<tr><th>Presentation</th><th>Model</th><th>Guided Practice</th></tr>
<tr><td>-PPT</td><td>Pre-activity: Students take part in the game and revise nouns.
Main activity: -Teacher introduces types of nouns and discuss the page 19.
-They note down the noun classes and add more examples to the same.
Post Activity:
-Students go through Workbook page 8 and complete the exercise.</td><td>-Students take part in the game
-Students prepares a table for noun classes
-Students complete the exercise</td></tr>
</table>

In addition, my observations also confirmed heavy reliance on books in the teachers' pedagogical practices. For instance, in more than half (57 out of 98) of the lessons I observed, teachers asked students to complete one to two pages from either a textbook, activity book or workbook. The following OBN shows that Reem assigned her second graders (age 7–8) tasks from the textbook as the main activity of her lesson on the past tense:

> Reem played a video that explained how simple past tense is formed by adding the suffix -d or -ed to the regular verbs. She also did a PPT presentation to explain the rules further and provide examples. Next, she asked her students to do page 53 of their English textbook, which required students to underline the correct verb form to complete the sentences in the simple past tense.
>
> (Lesson Observation, 15 July 2019, Rural School)

Furthermore, I found the discussions in subject coordination meetings were mainly around which lessons and pages from textbooks needed to be completed the following week. These weekly meetings were held to discuss the lessons and resources to be used to ensure all the teachers who taught parallel classes were taking the lessons at the same pace. I wrote the following in my field notes while observing a coordination meeting for Key Stage 1 teachers:

> The meeting started at 3 pm in a classroom where teachers of the same grade sat in a group. They all looked exhausted after a busy day. The academic coordinator for the grade sat with them and participated in the discussion. They discussed subject by subject. They decided on the pages from the prescribed books they needed to complete for each subject and the homework they would give their students.
>
> (Field Notes, 28 April 2019, Urban School)

As highlighted in the section on teachers' pedagogical practices at the beginning of this chapter, it is common practice among my participant teachers to follow the pattern of presentation, practice, and production in their lessons. The practice and production stages in the lesson usually involved the teacher assigning students some individual or group works. These works typically involved getting students to do some work in their prescribed English books or a printed worksheet. Such textbook-driven planning and practices of teachers may have influenced how frequently teachers used DTs in their lessons and how they used DTs in lessons. The emphasis on completing assigned book pages may not have given teachers enough flexibility and time to use DTs in a pedagogically meaningful way. Perhaps, such practices in assigning exercises from the textbooks indicate a gap in my participant teachers' awareness of how to teach English as a second language in a pedagogically meaningful manner.

Teachers' concerns

Teachers were worried about the impact of using DTs, such as students' devices or the smart board, on their performance in written exams. Nuha, in particular, worried about the performance of her Key Stage 2 (ages 9–12) students in the English written exam:

> We cannot entirely rely on them [devices] because we still have the written exams...I find that children are very reluctant to write. So, their handwriting is comparatively very horrible. When we say you have to write neatly, then they say, "No, teacher, I can use my device. We don't have to write anymore". They also say, "My device will correct my spelling if I make any spelling mistakes". Writing is not challenging as it is automatically corrected for grammar. We cannot say it is their own writing because most of it, like a bigger percentage, is corrected by the device, and the rest is your idea.
>
> (Nuha Interview, 9 May 2019, Urban School)

The principal of the urban school also raised the same concern:

> The exams and assessments are not developed to the extent to which you do everything or all the assessments through online mechanisms or the computer. So, you should do all the work on the computer and depend on it so much and sit for the exam and start writing. You find yourself handicapped in that regard.
>
> (Ahmed Interview, 25 April 2019, Urban School)

Some teachers were also concerned about the possible misuse of devices by the students. Having good protocols in place in the urban school was a relief for Nuha. Sharing such an incident, she commented that similar situations could be avoided by raising students' awareness and monitoring their online activities:

> We have recently come to know that they [students] create their own [Microsoft] Teams and do not do it for education purposes. They just use it for chatting, and then unnecessary messages will be passed, and then it will hurt everyone else's feelings. Like that some incidents are there, but most of the children are very reliable. They are very trustworthy. In the beginning, these

> things will be there. Once they know that the teacher has the authority or the administrator will be able to see or their IT coordinator will be able to find out... They need to be told. Actually, the basic culture we have to plant in them.
>
> (Nuha Interview, 9 May 2019, Urban School)

On the other hand, without proper monitoring mechanisms in place in the rural school, Sana was concerned about her grade 6 (age 11–12) students accessing blocked sites:

> When the tablets were given to the students, many sites were blocked, including YouTube, Facebook, and Instagram. The students are more advanced [than teachers]. During class, they also watch some videos. Already it is blocked, but somehow through settings, they are getting access.
>
> (Sana Interview, 18 September 2019, Rural School)

Data from the interviews suggests that teachers' focus on exam performance and their concerns regarding possible misuse of devices by students may have influenced the manner and frequency of DT use in their lessons.

Limited awareness of the pedagogical use of DTs

Another internal barrier was the teachers' underdeveloped knowledge of how to 'marry' technology, pedagogy, and subject content in ways meaningful for student learning. Having completed their initial teacher education (ITE) programme many years before, teachers lacked opportunities to trial DTs during their ITE. They have, therefore, had to learn how to use these tools on the job. Although a module related to technology was taught in the ITE programme, seven out of nine participant teachers who did the paper said that it was subject-independent. Being subject-independent may mean that the module focused on the tool itself rather than how teachers might use it for students' learning. I wonder if this approach to DT initiates a separation between DTs and their value in supporting learning outcomes in teachers' minds. The principal of the urban school highlighted that in addition to technological knowledge (TK), the pedagogical use of DTs should also be a part of any teacher education programme:

> Even for all the courses, I think technology should be a module. All the other modules should also be integrated into technology so that even the lecturers taking sessions could demonstrate technology use in that particular subject area.

> The application of technology in all the modules of any teacher training programme, plus a specific subject devised for the technological aspect of teaching and learning, should be necessary for the school system.
>
> (Ahmed Interview, 25 April 2019, Urban School)

With such visionary thinking on the part of the principal for DT integration, the urban school seems to be moving in the right direction. Having a specific IT department with an IT coordinator in the urban school shows the importance the school leadership gives to DT integration. Additionally, there seems to be a strong connection between the principal's vision and the roles and responsibilities of the IT coordinator, indicating a well-functioning school structure. Ramiz's explanation of his role as the IT coordinator of the urban school shows this connection:

> I have to make sure all the [new] teachers who join [the school] are trained to appropriately use the technology in the classroom. And I have to make sure they are familiar with all the different online apps and Microsoft apps so that they should not have any difficulties when they go into the classroom. I just started with all the apps in Office 365. We concentrate mainly on Microsoft Teams and OneNote. Then I introduce how to use Sway in the classroom and Microsoft Forms, and other online apps like Socrative, Quizlet, then [Google] Formative, and then Kahoot. (Ramiz Interview, 15 May 2019, Urban School)

Training teachers to use various DTs is one of the critical first steps toward making teachers more confident to use DTs in their everyday lessons. However, as the focus of PDs is still on the tools themselves rather than the pedagogical uses, there seems to still be a long road to travel, even for the urban school, to reach the goal of using DTs meaningfully in subject-specific content.

Limited opportunities for DT-related PLD

The final internal barrier to the pedagogically meaningful use of DTs in teaching and learning appeared to link to few opportunities for professional learning and development (PLD) beyond the school. I found that my participant teachers view PLD as short training sessions. Fazla viewed PLD as school-based professional development (PD) sessions held at school:

> We have short training sessions, which are compulsory, of course. All of us attend and benefit from that. It’s generic. All the sessions are usually for everyone. (Fazla Interview, 14 May 2019, Urban School)

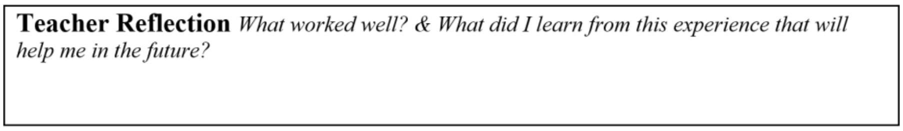
A narrow conception of PLD could mean my participant teachers were unaware of more practical ways of gaining knowledge and practice using DTs in pedagogically meaningful ways. On the other hand, while the situation seemed worse for the rural teachers where DT-related school-based PDs had not been held for years, some teachers had to take the initiative to get trained through other means, as explained by Ina:

> No training [related to DTs] was conducted after Mimio training. That was a few years back. To tell you the truth, we get training by working ourselves. We learned Excel even by joining short courses on our own. Some people come and conduct courses here on the island. Those are the kind of opportunities we get. (Translated Ina Interview, 17 September 2019, Rural School)

PLD was also limited because there were few opportunities for reflective practice. It appears that none of the participants reflected in any documented way on their practices. Coordination meetings also did not appear to be occasions when teachers were invited to reflect on their practices. Interestingly, although the last section of the lesson plan template for Key Stage 1 of the rural school is entitled ‘Teacher Reflection’ (see Figure 4.21), the section was left blank in all the lesson plans my participant teachers emailed me. Leaving the section blank may mean a gap in their understanding of the importance of reflective practices in making their lesson more meaningful for student learning.

Figure 4.21

An Excerpt from Rural School’s Lesson Plan Template



Teacher Reflection *What worked well? & What did I learn from this experience that will help me in the future?*

Lesson feedback from the senior management team (SMT) appeared to be an opportunity for PLD, as SMT observed lessons once a term. However, it appears that feedback to teachers tended to be generic and not specifically about the pedagogical aspect of DT use. The urban school principal suggested that they needed to conduct a more in-depth study of how teachers used DTs:

> We [have] made general comments to teachers regarding what they are doing in the classroom based on general observations and the floor observations, the window observations, and whether they are using the right application for the right purpose. Those things are not yet being analysed.
>
> (Ahmed Interview, 25 April 2019, Urban School)

Even though teachers asked students orally about their lessons, I did not observe any lesson where teachers asked students specifically what effect a particular DT had on their learning. All nine teachers admitted that they did not collect any written feedback from their students about their learning, the materials or the tools used in class. Feedback appears to focus more on oral reports of like or dislike:

> After the lesson, I ask them [students] whether they liked the lesson, but that's [asked] orally. (Conversation with Hana, 9 May 2019, Urban School)

In short, the findings from various sources (interviews, conversations, lesson plans) suggest that limited opportunities for professional learning and development (PLD) potentially hindered teachers' ability to reflect on and improve their DT use for achieving learning purposes.

Chapter 5

Discussion

This study explored primary teachers' pedagogical practices with digital technologies (DTs) in English classes in two Maldivian schools and the contextual factors that affected their DT use. I have organised this chapter around the three research questions this study seeks to answer. I begin the chapter by discussing the findings relevant to teachers' English as a second language (ESL) pedagogical practices with DTs to help answer research question one:

> **RQ1:** What impacts do DT use have on ESL pedagogical practices of primary teachers in two Maldivian schools?

Next, I discuss the findings on various contextual factors that either helped or hindered DT use for teaching and learning to help answer research question two:

> **RQ2:** What contextual factors affect teaching and learning English with and through DTs in two Maldivian schools, and do they differ across schools?

Finally, I discuss the findings pertinent to how internal and external factors interacted in influencing teachers' practices with DT in English lessons to help answer research question three:

> **RQ3:** What interplay of factors influence Maldivian primary teachers' DT use in their English lessons?

Research Question 1

What impacts do DT use have on ESL pedagogical practices of primary teachers in two Maldivian schools?

This question involved understanding any potential impact on teachers' pedagogical practices when they use DTs in their English lessons.

My findings indicate that when participant teachers used DTs their administrative practices became more streamlined and time-efficient. As such, lesson planning, lesson delivery, and motivating students (gaining attention and rewarding) became easier with DTs than when they used paper-based media. In other words, they were using DTs to replace paper-based tools. This practice approximates to Puntadera's (2012) SAMR substitution level. During the data collection phase, I noted that these teachers' pedagogical practices had not altered to demonstrate the SAMR redefinition level. This top level signifies that practices have been transformed through using DTs and that this transformation could not occur without them. My finding aligns with other studies reporting similar effects, where substitution is the most common practice with DTs (Adam, 2015; Cheung, 2021; Lie et al., 2020; Rabah, 2015; Tunjera & Chigona, 2020). Perhaps this practice indicates a lag between pedagogical and technological knowledge, and being able to transfer those to creative ways of facilitating learning.

Substitution means that existing pedagogical practices have remained intact. As Wright (2010) pointed out, the “pedagogically wise” (p. 17) use of DTs is crucial for effective learning to occur because DTs (such as the videos my participants used) by themselves are insufficient for meaningful learning. For instance, research suggests that when teachers use guiding questions (Brame, 2016; Lawson et al., 2006) and incorporate learning moments to facilitate active learning (Gedera & Zalipour, 2018, 2021), they are more likely to increase students’ engagement with learning new information or ideas via tools like videos. Such efforts are more desirable for learning than merely watching a video without sufficient preparation. When students can interact with the content and tools, this interaction suggests a positive difference in learning. In my lesson observations, where teacher explanations were frequently replaced with YouTube video explanations, video watching for students tended to be an isolated, passive, and silent activity. Teacher instruction, especially before showing the video, generally did not appear to focus on guiding students to link the video to subsequent activities or know what they should notice while watching. Telling students, ‘We are going to watch a video on…’ and playing it without priming students to notice certain things in the video is unlikely to link sufficiently to key learning intentions. Therefore, substituting teacher explanations with YouTube explanation videos in this manner suggests that teachers did not necessarily understand how to get the most out of DT tools such as videos. That teachers’ efforts rest at the SAMR substitution level, therefore, is unsurprising.

These tool substitutions for lesson delivery indicate that, just as Wright’s (2015) secondary teachers married DTs with their existing practices, my participant teachers substituted DTs with existing teacher-centric practices. Incorporating DTs in this way indicates these teachers might be placing the “pedagogic horse” before the “technology cart” (Sankey, 2020, p. 46), assimilating DTs into their existing practices. Despite the advice from Anderson and Dron (2011), Fawns (2022), and Tsui and Taraves (2021) that instruction should neither be technology- nor pedagogy-driven, my participant teachers’ instruction is content-driven and teacher-centric. Such teaching appears to be "technologised" (Lankshear & Bigum, 1998, p. 12) by "adding-on" (Prestridge, 2005, p. 10) DTs into existing transmissive pedagogy. For example, an important aspect of pedagogically meaningful DT use involves careful planning around not only *technology* and *pedagogy* but also *content* (in this case, L2 input). Ellis (2005, 2015) has consistently argued that the quality and amount of language input influence learners' L2 proficiency. Hence, it is paramount to deliberately choose L2 input (such as videos and PPTs) that is authentic (Canale & Swain, 1980), comprehensible (Krashen, 1981, 1985, 1989) or enhanced (Smith, 1993) depending on learners' needs. While authentic input takes the form of written or spoken records of real-world communications (such as movies, weather forecasts, and TV interviews), comprehensible input includes simplified language materials to facilitate comprehension. In contrast, the enhanced input includes content modified to make language items more salient. To select the content that will meet those criteria, gathering student feedback about the value of the DT they have been using (video, PPT, picture) for their learning is a wise pedagogic move. However, no findings indicate that participant teachers gathered such oral or written feedback from students.

A common finding is that DTs were used for *teaching* rather than *learning* purposes. This finding aligns with many studies in various countries that report similar teacher-centric DT use (Andrei, 2017; Chen, 2008; Cuban et al., 2001; Ding et al., 2019; Er & Kim, 2017; Ertmer, 1999, 2005; Hew & Brush, 2007; Li et al., 2018, 2019; Orlando, 2013; Waseela, 2022). With teacher-centric approaches, teachers appear 'tempted' to use DTs as content delivery tools rather than facilitating learning where students use DTs to support meaningful L2 learning. Like Li's (2014) teachers, my participant teachers frequently used DTs (mainly PPTs and YouTube videos) for content delivery. Li's lesson observations of Chinese secondary English teachers show that the most frequently used DT was PowerPoint (PPT) to display language content such as "phonological units, vocabulary, grammar and discourse" (p. 8). This finding may simply reflect the cultural context of Chinese society, which tends to be hierarchical and where students are more likely to be taught to respect teachers as experts. My findings also align with studies such as Ding et al. (2019) and Andrei (2017), as DTs were used as display tools in all these studies. In Ding et al.'s (2019) study in the Taiwanese EFL context, although the teachers' pedagogical focus varied from skilled-based, rule-based to function-based practices, all the teachers in their study used PPTs and videos primarily for content delivery. Similarly, the middle school ESL teachers in Andrei's (2017) study also used DTs as instructional tools to display content. However, Prestridge (2012) and Tran

(2020) contend that constructive pedagogical practices, where DT use is more student-centric, are more meaningful for students' learning because students are active in their learning rather than passive.

When applied to grammar teaching, *inductive* approaches may be more motivating (Ellis, 2008) and learner-centric (Mohamed, 2004) than *deductive* approaches. However, using DTs for deductive (teacher-centric) approaches to grammar teaching was common practice among participant teachers of both schools. Similar to two of the three Maldivian ESL teachers in Mohamed's (2014) study who taught grammar explicitly, my participant teachers' grammar lessons (with DTs) also followed the presentation-practice-production (PPP) instructional format, which is considered a teacher-centric model. Participant teachers used lesson templates that followed the PPP model, and this approach accounts for the lessons I observed exhibiting similar instructional patterns.

As an individual's behaviour is affected by their beliefs (Bandura, 1986; Rokeach, 1968), it is highly probable that participant teachers were influenced by beliefs and practices they absorbed over time as learners, then as student-teachers, and then as practising teachers (Albion & Ertmer, 2002; Keys, 2007; Pajares, 1992; Richards & Lockhart, 1994). Long-held beliefs and practices have been demonstrated to influence teachers' practices even as they may consciously do their best to change. Adam (2015), for example, found that teacher educators in the Maldives frequently used PPTs to deliver course content. She argues that an important reason for teacher educators' focus on content delivery and teacher-centric practices lies in their first childhood experiences of learning to recite the *Qur'an*. Also, Adam's (2015) point may be significant, especially regarding the kinds of ways teachers I observed expected students to learn, given that our different research projects took place in the same country. This way of teaching may be one impact of unconscious prior learning that teachers bring into their pedagogical practices. Thus, beliefs formed as learners (Adam, 2015; Ertmer et al., 2014; Mohamed, 2006), trainee teachers (Saudelli & Ciampa, 2016), and novice teachers (Prestridge, 2017) could have been major contributing factors to how my participant teachers used DT for content delivery. It is likely, too, that as student teachers, they would have been modelled teacher-centric practices, and so this normality would have thus reinforced traditional pedagogical behaviours.

According to the SAMR model (Puentedura, 2012), the impact on student learning is significantly greater when DT use is at the transformation (modification and redefinition) levels than at the enhancement (substitution and augmentation) levels. Transforming learning with DTs requires adopting more student-centric approaches (Cheung, 2021), for which, I contend, *students, rather than teachers* need to use DT. However, due to various contextual factors that hindered such use (see discussion of RQ2), I observed a few occasions where DTs were used as *learning* rather than *teaching* tools. One noteworthy observation was in Nuha's class, where students undertook group presentations on the smart board using PPTs that they had collaboratively prepared on their devices. She felt such a task would allow students to search for information independently. Although limited, such instances of student-centric DT use align with Windschitl and Sahl's (2002) findings. Like one of the three teachers in their study who used DTs for collaborative student work, Nuha's DT use in this fashion indicates the potential for breaking the backwash effect or the effect tests and exams exert on teachers' practices. While I observed more of these learning-with-DTs moments in the urban classes rather than the rural school classes, even so, the urban school's bring your own device (BYOD) programme was limited to 1 day of the week for grades 4 (ages 10–11) and above. This rule raises questions about the effect of regulatory or policy decisions constricting teachers' opportunities to facilitate students' use of DTs, for example, in speaking practice.

DT use was also constricted because of exam-oriented and textbook-driven teaching among my participant teachers. Consistent with Tunjera and Chigona's (2020) assertion, exam-focused teaching in my participant teachers' practices hindered their DT use. Teachers' practices with DTs were shaped by their perceived need to prepare students for tests and examinations, particularly ones not occurring for 3–5 years when students reach secondary school. This finding aligns with previous studies that reported the backwash effects that examinations exert on teachers' practices with DTs (Bindu, 2017; Cheung, 2021; Hew & Brush, 2007; Li, 2014; Lim & Chai, 2008; Mohamed et al., 2016; Salehi & Salehi, 2011). Teachers' exam-oriented pedagogical thinking was evident, for example, in their reluctance to allow students to use devices for writing tasks. Teachers felt it would do a disservice in preparing them for later secondary school pen-and-paper examinations, perhaps because of the importance given to students' proficiency in English in the Maldives (as discussed in chapter 1). These teachers' pedagogical thinking mirrors Mohamed et al.'s (2016) findings related to teachers in a Maldivian high school. Those teachers also believed that tablets were ineffective in preparing students for the Edexcel A Level examination and were reluctant to let students use tablets in class.

In my study, the backwash effect was strongest in listening lessons. I observed listening lessons where teachers used DTs mainly to play listening tracks, mirroring the way formal listening tests took place. In other words, the key practice in these primary school classrooms centred on the kind of repetitive practice that leads to exams in secondary schools. It is debatable whether such listening drills support listening skills development. Mariya's (2012) findings are similar as she reported that her participant secondary teachers' lessons focused on preparing students for high-stakes examinations rather than improving students' overall English proficiency. It is telling that Mariya's observation over a decade ago about the practice of "teaching to examinations" in the Maldives (p. 189) currently reflects that observation. It is important to note, however, that primary students do not enter high-stakes examinations until near the end of their secondary schooling, and yet primary teachers feel obliged to teach to this endpoint. In school cultures where "external accountability measures are very dominant" (Van der Heijden et al., 2015, p. 695), teachers feel pressured to focus on these rather than exercising their agency as creative and innovative risk-takers. Preparing primary-aged students for distant and external examinations seems to have affected how teachers use DTs in their primary English language learning classes.

Another common practice was textbook-driven instruction. This practice was often visible in participant teachers' lesson planning or lesson delivery in both physical and online classes. Lesson planning meetings for participants centred mainly on how they could coordinate lessons by doing the same things with specific textbook pages. Task completion seemed to be a key driver in such lesson planning. This rigidity probably reduced teachers' ability to act flexibly to address specific student needs within their own classrooms. When applying the lessons with textbook pages, teachers assigned students tasks from textbooks, activity books or workbooks in 57 of the 98 (physical) lessons I observed. This practice seems to be highly persistent in the Maldives: 15 years ago, Mohamed (2006) argued that textbooks were the primary source of content in the Maldives. Little has changed since, even as technological developments have made DTs and other knowledge sources much more accessible. It may be that since the textbooks sequenced content, teachers felt assured that they could cover the syllabus by the end of a school term. In that regard, my findings coincide with Tallvid's (2016) ethnographic case study in Sweden and Orlando's (2013) longitudinal study in Australia. Their teachers resorted to using textbooks to ensure they covered the necessary curriculum/syllabus content in the available time. Thus, content coverage from textbooks, coupled with long-term preparation for exams, has longevity in Maldives classrooms. These practices may indicate some of the difficulties teachers have in adapting their pedagogical practices to take advantage of what DTs might afford that is different from that offered by textbooks.

When COVID-19 forced learning online, teachers continued to assign students tasks from prescribed, hard-copy textbooks. This finding is similar to Fikuree et al.'s (2020) survey with 7568 students in grades 7 and above (ages 12–18) in the Maldives during the pandemic. They found that students were assigned more tasks to be done in the physical books than on their devices during online learning. In my participant teachers' case, they felt pressure from parents and school management to continue focusing on textbook learning, even as circumstances changed. In this regard, their experiences resonate with Chen's (2008) participants' experiences more than a decade ago. Chen's study in Taiwan revealed that 9 out of 12 high school teachers felt pressure from parents and school leaders' expectations to complete syllabus content, potentially hindering more creative DT use.

Although not directly linked to developing students' English language skills, both technology-enhanced set inductions and reward mechanisms helped motivate students. Student motivation is important because both Krashen (1981) and VanPatten and Williams (2015) argue that learners' mental and emotional state has an impact on their successful L2 learning. When students feel relaxed, motivated, and less anxious, their attitude towards language learning is more positive than when they are uncomfortable, bored or highly anxious. An important aspect of student motivation for my participant teachers was gaining students' attention, which they achieved through technology-mediated set inductions (Aubertine, 1968; Perrott, 1982; Schuck, 1970, 1981). Like Li and Walsh's (2010) Chinese EFL teachers, my participant teachers thought DTs were powerful tools they could harness to gain students' attention, using mainly digital pictures, YouTube videos, and PPTs for this purpose. According to Aubertine (1968), when deliberately designed and incorporated, instructional sets can facilitate students' active participation in the tasks ahead. For him, set induction not only includes using stimuli (such as pictures, videos or realia) but also connects students to learning through analogies and associations. The intention is that a set induction helps students be in the right mindset for learning what comes next. Hence, merely displaying a still image or showing a YouTube video is unlikely to facilitate students' active learning. My findings indicate that teachers did not always make such transitions when they moved from the initial instruction act to the subsequent activities. This failure to connect activities may be linked to the idea that while the teachers are focusing only on the ability of a DT to gain students’ attention they remain unaware of its potential value in positively affecting students’ active learning.

Like set inductions, technology-enhanced reward mechanisms also played a significant role in student motivation. Fastier and Mohamed (2015) and Ibna (2018) found that awarding extrinsic rewards such as paper-based stickers, badges, and certificates is a common practice among Maldivian teachers. Instead of paper-based rewards, teachers in my study used digital stickers and Dojo points as motivational tools. While my study aligns with the findings of Tan et al. (2020) and Homer et al. (2018) because their teachers also used digital badges and points, a significant difference seems to be what teachers associated the rewards with. In Tan et al.’s (2020) study with Taiwanese secondary EFL students, teachers gave rewards to encourage students to listen at an average speed rather than repeatedly listening to the same sentence or slowing down the pace. However, in my study, rewards were given for task completion, doing neat work or bringing materials. None of these appeared to link the reward to a specific learning goal. These findings align more with Homer et al. (2018) because primary ESL teachers in their study gave students digital badges and points for similar purposes, such as listening to the teachers, work completion, and responding to questions. Their teachers also deducted points for undesirable behaviour, as did my participant teachers. My findings indicate that students’ parents also took a keen interest in this carrot-and-stick reward mechanism. It is unclear if teachers noticed whether replacing paper-based rewards with digital ones helped learners’ skill development in ESL lessons.

In summary, RQ1 reveals that my participant teachers subsumed DTs into their existing pedagogical practices. Although DT use made their practices more efficient and convenient, their practices were not transformed. The next RQ focuses on situating participants’ practices within the national, school, classroom, and teacher-level contexts.

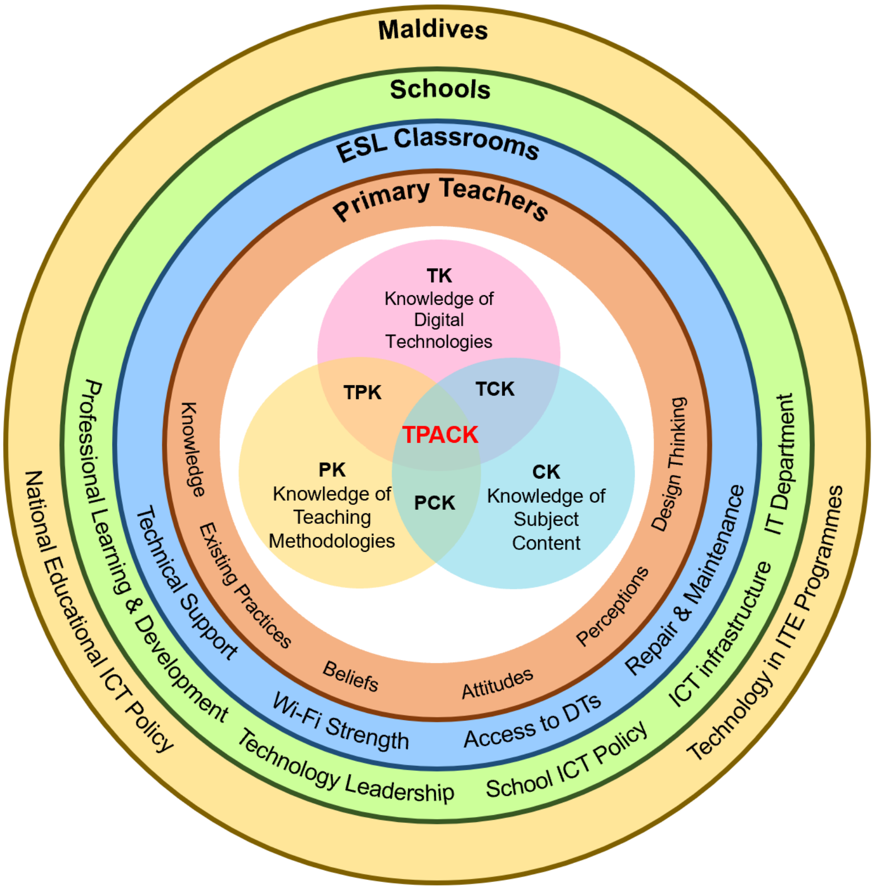
Research Question 2

What contextual factors affect teaching and learning English with and through DTs in two Maldivian schools, and do they differ across schools?

My second research question (RQ2) sought to discover what contextual factors affected teachers’ DT use. The contextual factors were multilayered. Their practices appeared to be affected by national, school, classroom, and teacher-level factors, as represented in the following diagram (Figure 5.1). Each of these contextual layers in relation to RQ2 is discussed in turn.

Figure 5.1

Multilevel Contextual Factors Affecting Maldivian Primary Teachers' TPACK Enactment in ESL Classrooms


Maldives
Schools
ESL Classrooms
Primary Teachers
TK
Knowledge of Digital Technologies
TPK
TCK
TPACK
PK
Knowledge of Teaching Methodologies
PCK
CK
Knowledge of Subject Content
Knowledge
Existing Practices
Beliefs
Attitudes
Perceptions
Design Thinking
Technical Support
Wi-Fi Strength
Access to DTs
Repair & Maintenance
IT Department
Professional Learning & Development
Technology Leadership
School ICT Policy
ICT infrastructure
National Educational ICT Policy
Technology in ITE Programmes

Note. My TPACK-in-Context model was adapted from Koehler and Mishra's (2012) TPACK framework. Four contextual layers were added to the TPACK framework.

National Level

As illustrated in the outermost light yellow circle of Figure 5.1, the key national factors affecting schools' and teachers' practices with DTs centred on educational policy and initial teacher education.

Educational ICT policy

Literature on DT integration in education emphasises the importance of a national educational information and communications technology (ICT) policy (Cubukcuoglu, 2013; Nangue, 2011; Ramorola, 2013; Waseela, 2022). For instance, Koh et al. (2015) asserted that macro-level factors such as national ICT policies could determine how teachers design lessons with DTs to support 21st-century learning. While Kinaanath (2013) reported about a decade ago that the lack of national-level ICT policies in the Maldives hindered the implementation of ICT-based higher education models, the current issue seems to be the *promulgation* as much as the *formulation* of national ICT policies. Although the MoE had developed its first ICT in education master plan for 2015–2018, by the time I gathered my data, it would appear that not all schools or IT leaders in schools were aware of it. This lack of awareness was found to be true in the case of my participant teachers and schools. Ahmed (the principal of the urban school) and Ibrahim (the acting IT technician in the rural school), for example, were unaware of this plan. It is unclear what the reasons for this lack of awareness are. Additionally, there was a 2-year gap (2019–2020) between the MoE's first and second ICT in education master plan. The second was developed for 2021–2024 and may indicate an effect of COVID-19 on national education policy planning.

The national ICT master plans may not have been sufficiently promulgated and may have left both schools in the challenging situation of defining their own ICT policies and visions without reference to a national policy framework. While the use of technology and media is identified in the national curriculum framework as a key competency (as highlighted in chapter 1), the situation appeared worse for the rural school since it was without a school-level ICT policy and properly functioning broadband access. This situation meant that the rural school embarked on the DT-integration journey without a shared vision among its stakeholders, including teachers, students, parents, and the wider island community. Furthermore, the absence of a school ICT policy appears to have affected a range of associated ICT factors: investment, sustainability, and support for robust technology infrastructure at the rural school (as discussed in the following sections).

Initial teacher education (ITE)

The emphasis on technological knowledge in initial teacher education (ITE) programmes was another national-level factor that potentially impacted classroom DT use. Except for Fazla and Beena (with a diploma), the remaining seven participant teachers had completed either a bachelor’s degree or a postgraduate diploma programme. Even in programmes where DT modules/papers were taught, the focus was mainly on providing technological knowledge rather than exploring ways to enrich their technological pedagogical content knowledge (TPACK), as my participant teachers highlighted. My findings confirm Hanson-Smith’s (2016) and Tsai and Chai’s (2012) assertion that knowledge about DTs is given more attention than their pedagogical use in teacher education programmes. While all my participant teachers believed they were confident in using the DTs available in their respective schools, they were unsure how to use a specific DT in a particular subject area. This finding possibly implies that when teachers gain technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) as separate entities rather than as parts of a greater whole that knowledge is insufficient for pedagogically meaningful DT use. Mishra and Koehler (2006) pointed out that the overemphasis on TK rather than TPACK may not be effective as “merely knowing how to use technology is not the same as knowing how to teach with it” (p. 1033). Not being able to actively test out and review the learning value to students of various tools is a missed opportunity for teacher growth and satisfying student learning.

Teacher educators’ technological pedagogical practices could also have indirectly impacted in-service teachers’ classroom practices with DTs. For example, in a mixed-method study exploring ICT profiles of 44 teacher educators in Turkey, Adnan and Tondeur et al. (2018) concluded that teacher educators acknowledged their responsibility as role models for student teachers. However, they lacked techno-pedagogical knowledge to design and implement lessons with DTs. As student teachers are likely to consider teacher educators as role models, they may continue to imitate the practices of their lecturers even as in-service teachers until they learn and explore how to teach with DTs differently.

School Level

The two most influential contextual factors at this level were DT leadership and professional learning and development, as depicted in the green circle in Figure 5.1.

Digital technology leadership

In schools, DT leadership could play a significant role in the DT-integration process. Unlike some researchers, such as Lafont (2011) and Raman et al. (2019), who are unconvinced about the relationship between principals’ DT leadership and teachers’ DT integration, many others

(Fisher & Waller, 2013; Tan, 2010; Thannimalai & Raman, 2018) have found a significant relationship between the two. This relationship is borne out in my findings. For example, teachers in the urban school acknowledged that school management and especially the principal played a critical role in supporting and encouraging the use of DTs in their lessons. On the other hand, the rural school's DT integration initiative suffered without specific DT leadership, as acknowledged by the rural school librarian, Ibrahim who acted as the school's IT technician. Ertmer et al. (2012) found that teachers believed that administrators' support was one of the most influential enablers for DT use, a notion which is reflected in my findings. Li's (2014) investigation into Chinese language teachers' DT use also highlighted school principals' support as crucial.

According to Yilmaz (2011), the two determinants for successful ICT integration at an institutional level are leadership and having a DT integration plan. The urban school's approach offers an illustration of these points. School leaders planned for DT integration by developing their own ICT policy and guidelines to contextualise their vision. This initiative played a crucial role in the school's DT-integration initiatives. Their shared DT-integration vision appears to have led to regular DT classroom use. This finding aligns with previous research suggesting how important a shared vision in successful ICT integration is in schools (Culatta, 2019; Nangue, 2011; Vanderlinde et al., 2014; Yilmaz, 2011). Tondeur et al.'s (2008) survey findings of 574 teachers from 53 primary schools in Flanders are a case in point. They confirmed that teachers were more likely to use DTs regularly in schools that had an explicit ICT school policy. It seems clear that stressing shared goals about integrating DTs into classroom pedagogical practices is key to successful practices.

Tondeur (2020) postulated that formulating a school ICT policy is an opportunity for stakeholders to reflect on their educational beliefs about classroom DT use and its value. In urban schools, policies regarding the role of DTs in teaching and learning seem relatively narrow despite the available range of DTs. For instance, limiting BYOD programmes to students of grades 4 and above (age 10+) and/or allowing students to bring their devices only on 1 day a week might reduce opportunities for students to use DTs as learning tools. Furthermore, such restrictions on students' use of devices indicate a narrow interpretation of DTs as instructional tools rather than as tools that students can use independently and creatively for learning. Thus, although the participant urban school ICT policy appears to facilitate more regular use of DTs in lessons by teachers, it may have missed an opportunity to provide students with more access to DTs for independent and self-paced learning.

It is apparent that the main focus of the urban school ICT policy is more on the *functional* rather than the *pedagogical* potential of DTs in education. Its policy documents centred on teachers' and students' accountability in using various DTs at school. However, the policy document did not include mandatory technology-related professional learning and development, observing the delivery of lessons with DTs or providing feedback based on lesson observations. As Timperley et al. (2007) and Desimone and Garet (2015) contend, observing teachers' DT practices and providing timely feedback could help teachers adopt new practices or refine their existing approaches. It may be that the school eventually develops a more comprehensive school ICT policy, and this might eventuate if national policies offer guidance and signposts for achieving it. Despite several researchers (for example, Anderson & Dexter, 2005; Baylor & Ritchie, 2002; Culatta, 2019; Hew & Brush, 2007) indicating that ICT policy, planning, and vision would make a positive difference in my urban school case, having a school ICT policy did not necessarily result in meaningful teaching and learning DT use. Perhaps this situation may alter through DT-related mentoring for participant teachers. It is in the interests of the urban and rural participant schools to develop a comprehensive ICT policy that suits their particular school context in order to enhance meaningful pedagogical DT practices. However, developing such policy and practice frameworks is unlikely to be easy. Doing so may require further training of the schools' technology leaders in collaboration with the MoE.

Professional learning and development (PLD)

While all my participant teachers believed DT-based professional development (PD) is necessary to integrate DTs in classrooms, my findings suggest these teachers may have relatively narrow and linear conceptions and experiences of DT professional learning and development (PLD). For example, when asked about technology-based PLD opportunities, all teachers mentioned school-based PD sessions as the main form of DT-based PLD they have had. Hooker (2017) recommends that professional learning ought to be a "continuous dialogue on more complex and sophisticated uses of technology that can enable teachers to shift from technology literacy to knowledge deepening and knowledge creation levels" (p. 139). Such an approach to PLD could enable teachers to use DTs to transform their pedagogical practices rather than to support comfortable practices. However, my observations were very different from Hooker's recommendation. Although subject coordination meetings could have been opportunities for PLD via collaboration and exchange of ideas for DT use, data from both schools shows no discussions on the pedagogical use of DTs during subject coordination meetings or when planning lessons.

Mishra and Koehler (2006) recommended learning technology by design, which involves teachers learning by using DTs in their practices, discussing their DT use experiences, and reflecting on their practices with DTs rather than through conventional overt lecturing about DTs. However, as DT-related PLD mainly took the form of whole-school workshop-style sessions on TK, these sessions are probably insufficient to support teachers in transforming their DT practices from the functional to the pedagogical. Such a shift is crucial if teachers are to achieve meaningful DT use for learners. My findings coincide with Rabah's (2015) study in seven Québec English schools in which teachers felt that PD sessions held thrice or four times annually were insufficient to support DT use in their pedagogical practices. Therefore, it is crucial to alter the one-shot sessions for continuous learning and reflection opportunities to develop classroom practices with DTs. This finding also confirms the literature on the importance of continuous rather than one-off PD sessions to increase teachers' technological pedagogical practices (Adegbenro & Olugbara, 2018; Jita & Munje, 2020; Liu et al., 2018; Mouza & Barrett-Greenly, 2015; Tondeur et al., 2017).

The generic nature of DT-based PD sessions might also have impacted teachers' classroom DT use as school-based PD sessions were held for the whole staff in both schools. Kennedy (2016) argued, after reviewing 28 experimental studies on PD in K–12 within the United States, that PD sessions for teachers should not be exclusively focused on transmitting content knowledge. This same point is reflected in my findings related to the transmission of technological knowledge in school-based PDs. As such, the literature suggests that individualised support rather than blanket PD for all teachers is more beneficial (Snow, 2015) for more "complex and substantial" DT use for student learning (Kopcha, 2010, p. 186). Perkins (2010), for example, argues for a personalised approach to PDs to facilitate learning for teachers of 21st-century students. Similarly, Ruggiero and Mong's (2015) online survey of 1048 K–12 teachers in the United States found that DT-based training was identified by teachers as more effective when it was relevant to their own classroom context. This study's finding confirms findings that contributed to the creation of the TPACK framework (Mishra & Koehler, 2006). The TPACK originators argue that "learning environments that allow students and teachers to explore technologies in relationship to subject matter in authentic contexts are often most useful" (p. 1045) for helping teachers understand the potential learning values of DTs.

The focus of DT-based PLDs could also influence how and how frequently teachers use DTs in their lessons. Unlike many studies (Hew & Brush, 2007; Kaumba et al., 2021; Spangenberg & De Freitas, 2019) that highlighted teachers' limited TK as a hindrance, my participant teachers' willingness and confidence in using DTs available to them can be attributed to TK they had gained from school- or self-initiated (as in Ina's case) PLDs. Nonetheless, literature (Al-Awidi & Aldhafeeri, 2017; Franklin, 2007; Polly et al., 2010) also stresses that while TK is necessary for DT integration it may not be sufficient for the pedagogical use of DTs. As such, a key issue common to both schools seems to be that PD sessions were centred on the tools themselves rather than on exploring design ideas for pedagogically meaningful classroom use of DTs. As Wright (2015) argues:

> Understanding learning per se and understanding learning with and through mobile technologies requires teachers to think deeply, read widely and develop an understanding of how to purposefully use these devices as part of their pedagogical practices designed to aid learning. (p. 71)

Pedagogically meaningful use of DTs is not necessarily an easy thing to achieve. One-off technology-focused school-based PD does not help teachers develop the understanding of the complex relationship between *content* (English language components), *pedagogy* (how to teach ESL), and *technology* (DTs) that teachers require for the pedagogical use of DTs (Mishra & Koehler, 2006). Such findings suggest that teachers need a wide variety of ongoing learning opportunities throughout their professional lifespan to explore, experiment with, and reflect on innovations in DT-rich ESL pedagogical practices.

Classroom Level

The two most significant factors at the classroom level were access to DT infrastructure and technical support (see the blue circle in Figure 5.1).

Access to DT infrastructure

The need for teachers and students to have access to robust DT infrastructure is a significant finding. My findings suggest that accessibility means more than the mere availability of DTs in schools. In chapter 4, I explained how rural teachers had to carry equipment from place to place. Carrying tools becomes time-consuming and burdensome. It is probably also inefficient. Poor access to DTs has also been addressed by Buabeng-Andoh (2012), Hew and Brush (2007), and Mikusa (2015). For instance, it is not surprising that none of the rural teachers has ever used Mimio bars in their lessons because these were kept in the school's *storage* rather than installed in the *classrooms.* Consistent with the situation in South African schools in Tachie's (2019) study, the rural school management's decision not to have these devices installed in the classrooms was the fear of damage or theft. Hence, several questions arise from the well-intentioned decisions that impede rather than facilitate the use of DTs in the rural school. This finding further supports the idea that DT leadership could be pivotal in the extent to which a school successfully facilitates teachers' DT use in their everyday classroom practices.

Research on DT infrastructure often considers accessibility in terms of the availability of DTs in computer laboratories or audiovisual (AV) rooms (Cubukcuoglu, 2013; Kaumba et al., 2021; Nsolly & Charlotte, 2016; Tachie, 2019). However, my findings from both schools show that when teachers have equipment in their own classrooms rather than ICT rooms, AV rooms, storerooms or computer laboratories, they are more likely to use DTs in daily lessons. This finding resonates with Goktas et al. (2009) that DTs should not be limited to specific centres such as laboratories but should be accessible in classrooms. For example, all four urban teachers in my study pointed out that they used DTs frequently in lessons because they had easy access to all necessary DTs, such as smart boards, projectors, speakers, and computer systems with internet access in their classrooms. However, it is also important to note two unique access issues they faced during BYOD lessons. The first is the limited number of power points students could use to charge their devices. The second was that some student devices and some applications teachers wanted them to use in the lessons were incompatible. The latter challenge is in line with McCulloch et al. (2018), as they reported that having different types of hardware, such as laptops and tablets, was a hindrance as teachers had to ensure the software they used was accessible across all the devices and platforms. Nonetheless, it appears that accessibility was not an issue for the urban teachers as it seems the school has already overcome the first-order barrier, as Ertmer (1999) described. Also, this finding coincides with studies that recommend that access to technology infrastructure in classrooms can facilitate DT use for teaching and learning (Francom, 2016; Gotkas et al., 2009).

Besides hardware, accessibility also involves providing robust and reliable Wi-Fi in locations where teachers and students can use it. Without Wi-Fi access in classrooms, rural teachers often downloaded and saved videos, PPTs, and other resources onto their laptops at home or in the staffroom ahead of their classroom teaching. This finding echoes Adam (2015) as one of the teacher educators in her study also had to download resources prior to her contact hour as the internet in her classroom was unreliable. However, this process adds another layer of complexity to DT use in lessons and might involve teachers spending their own money (their own data use at home) on classroom items. Poor or no internet connection is a barrier to using DTs as pedagogical tools (Bindu, 2017; Jita & Munje, 2020; Muslem et al., 2018). In such situations, only a few teachers went the extra mile to get access to the internet using their own smartphone data as a hotspot for their laptops in classrooms. Similarly, Al-Awidi and Aldhafeeri (2017) reported that while 15 Kuwaiti teachers they interviewed complained about no or poor internet connection, only five used smartphone data to present internet resources in the classroom. Without internet access to take full advantage of DTs, teachers are likely to use DTs as delivery tools rather than adopting student-centric approaches. Teachers do not want their students to be frustrated in their learning if broadband issues make learning with or through DTs difficult. This common finding appears to have contributed to content-heavy, teacher-centric delivery modes.

Another problem of not having Wi-Fi in the classroom is that there will be little or no use of student devices without it, as was the case with rural students who had tablets but could not use them. Students' inability to use their devices might have been why teachers could not use DTs for student assessments. For instance, rural teachers often used their personal laptops to conduct quizzes to check students' understanding of the concepts they had taught. However, within the short time frame of the lesson and with only one tool, they could not involve all the students in those quizzes. Based on their ethnographic case study in an elementary school in Singapore, Tay et al. (2017) also highlighted that stable wireless internet access was not only necessary for using DTs in teaching and learning but was clearly crucial. Providing devices does not automatically mean they will or can be used for learning without robust and stable WiFi in place to facilitate DT integration. Students' inability to use their devices in lessons probably contributes to teachers' not adopting a more student-centred use of DTs in their classes.

DT-accessibility dialogue, therefore, needs to go beyond *teachers* to include how *students'* access to DTs affects teaching and learning with DTs, as found in Fikuree et al. (2021), Lie et al. (2020), and Light and Pierson (2012). Despite experiencing few accessibility issues, urban teachers still used a narrow range of DTs for pedagogical purposes, which raises the question of whether teachers' access alone to DTs is sufficient to impact students' learning positively. For instance, in their survey of teachers in 13 developing countries, Light and Pierson (2012) investigated how differing degrees of teachers' and students' access to ICTs influenced teachers' use of DTs with students. They found that students' access to DTs in the classroom supported teachers' use of technology with their students. In my study, the BYOD programme was an opportunity for grade 4 (9–10) and above students in the urban school to use their devices in class for 1 day in the week. However, this limit might not have served the intended purpose of providing students with the opportunity to use devices for learning. It would be interesting to discover whether more open and frequent student access could encourage teachers to treat DTs as *learning* rather than *teaching* tools.

With online classes during the COVID-19 pandemic, DT accessibility could no longer be considered in terms of simply accessing tools in classrooms or school but also at home. As both students and teachers had access to necessary DTs and Wi-Fi at home, the urban school was among the first schools in the Maldives to move to online learning during the pandemic. The pandemic also gave rise to positive initiatives in the rural school as students in grades 4 and above could finally use their tablets for online classes at home using mobile data and Wi-Fi dongles provided by the MoE. However, the pandemic exacerbated the already unfavourable accessibility situation for rural Key Stage 1 students with no devices. For almost the whole of 2020, these students relied only on a few weekly lessons of *Telikilaas* broadcasted nationally. Indonesian teachers in Lie et al.'s (2020) study also said that most students' lack of access to the internet and a device was a significant hindrance to online learning during the pandemic. In a survey with 7,568 Maldivian secondary students, my colleagues and I also found that while 6.9% of students did not have a device, 11% of students had no access to the internet, interrupting their participation in online lessons (Fikuree et al., 2021). Therefore, it seems that the learning loss for lower primary students in the rural school during the pandemic resulted from a lack of access to devices. These findings highlight the importance of the sustainability of the ministry's 'tablet distribution' initiative to provide opportunities for quality and equity in education.

Technical support

As my findings indicate, having technical support on hand for teachers and students is critical for smooth pedagogical implementation as there will always be issues to address, whether software- or hardware-related. Teachers grapple daily with technical issues, which can significantly hinder their technology uptake (Al-Awidi & Aldhafeeri, 2017; Walsh & Farren, 2018). This finding shows that access to technical support can critically affect DT use in classrooms (Li, 2014; Liu et al., 2018). Even though the technical support situation was different in both study schools, the findings emphasise the importance of such technical support for teachers' DT use. Based on findings from Turkish high schools, Gürfidan and Koç (2016) reported similar results: technical support had the highest effect on high school teachers' use of DTs among different school-related variables.

Urban school teachers' acknowledgement of the IT department's efficiency in maintaining DTs and addressing technical issues suggests how this support resulted in minimal classroom interruptions to learning during lessons. Data also indicates that contacting urban school IT staff was easy and convenient as they were usually a phone call away. This finding contrasts with Adam's (2015) tertiary context study in the Maldives. Most of the teacher educators in her study were frustrated with the quality of technical support regarding DT maintenance and the availability of IT staff when needed. Poor quality support negatively affected their desire to persist with these tools because of reliability issues. The same reliability issues occurred for my participant teachers.

Peer support or tech-savvy teachers also played a crucial role in enabling urban school teachers' confident DT use. Seeking assistance from colleagues in the next class for simple technical issues also minimised the pressure on the IT staff. In the literature, peer support is often associated with collaborations for professional learning and development (Adnan & Tondeur, 2018; Koh & Chai, 2016; Li, 2014) rather than providing technical support to colleagues.

The rural school context further confirmed the pivotal role of technical support in classroom DT use. For instance, rural teachers were hindered as they were left to attend to technical glitches independently, without access to an IT department or a trained IT technician. This finding is in line with other studies concluding that teachers' DT use is impeded when there is poor repair and maintenance (Buabeng-Andoh, 2012) and a lack of technical support staff (Nangue, 2011; Nsolly & Charlotte, 2016). For instance, based on an online survey with 430 K–12 in-service Canadian teachers, Hechter and Vermette (2013) noted inadequate support as one of the leading barriers to DT use experienced by all teachers. Teachers in their study pointed out that, at a minimum, schools could ensure that an IT specialist was available to provide daily support. Also, in a 3-year time-series survey with K–12 teachers in the US, Francom (2020) found that a decline in technical support over time was a barrier to technology integration, recommending that having sufficient technical support staff was necessary to enhance technology integration.

My classroom observations show that rural teachers had to abandon lessons due to technical issues beyond their expertise. Constant technical problems led to frustrations and even unwillingness to use DTs. However, it is interesting that some rural teachers attended to minor technical issues themselves or found replacements for faulty DTs despite the lack of technical support. Their effort suggests strongly positive beliefs about DT use which could have driven them to explore strategies to circumvent school-related barriers and develop their expertise in spite of the obstacles. This circumvention costs these teachers time, effort, and energy.

Teacher Level

Teacher-level factors that influenced the use of DT in teaching and learning are depicted in the orange inner circle of Figure 5.1. The factors include teachers' (a) knowledge, skills, and confidence, (b) pedagogical practices and beliefs, and (c) perceptions about the usefulness and ease of use of DTs.

Knowledge, skills, and confidence

The three basic knowledge constructs required for TPACK enactment are content, pedagogy, and technology (Mishra & Koehler, 2006). When applied to my study, teachers require knowledge about subject *content* (English language skills and components), *pedagogy* (teaching and learning ESL at the primary level), and *technology* (DTs, including hardware, software, and peripherals). All my participant teachers were confident in their knowledge of available DTs (technological knowledge), although they occasionally sought technical assistance. Therefore, unlike studies reporting teachers' lack of or limited TK as a barrier to using DT (Hew & Brush, 2007; Kaumba et al., 2021; Spangenberg & De Freitas, 2019), this did not seem to be a barrier to my participants. Establishing why TK was not an impediment differed across the two case study schools. Urban teachers not only had access to various DTs (for example, smart boards with an internet connection) in their classrooms; they also had annual school-based PD focused on TK. On the other hand, the rural school teachers did not have regular technology-based PD or internet connections in their classrooms, nor could they access a wide range of DTs. It is possible that being familiar with available DTs may have contributed to rural and urban teachers' willingness and confidence to use these tools in lessons. Hence, even if teachers have limited DTs, having TK seems pivotal for these teachers to continue to use the DTs that are accessible in their classrooms.

For the pedagogical use of DTs, none of the three knowledge domains in TPACK should be viewed in isolation or separate and independent of the other two. Due to the complex interplay of the three knowledge domains in TPACK "a change in any one of the factors has to be 'compensated' by changes in the other two" (Mishra & Koehler, 2006, p. 1030). Mishra and Koehler (2006) also pointed out that learning *about* DTs (as was the case in the school-based PDs in my study) might be a consequence of perceiving technology as a separate and independent knowledge domain. According to Mishra and Koehler, the problem with treating technological knowledge (TK) as a separate or isolated body of knowledge is that DTs come with their own functions and features that could facilitate or constrain their use for teaching and learning specific subject content. Additionally, few software items used in schools are specifically designed for classroom use as they were originally created with business or industry in mind. Hence, teachers are required to appropriate these tools for their own purposes.

The urban school principal, Ahmed's comment about teacher education indicates he understands that knowledge about DTs may not be sufficient to incorporate them meaningfully in specific content. However, for all my participants, the focus of their initial teacher education (ITE) programmes and subsequent in-service PDs was exposure to DTs and providing TK about their use. Without professional learning and development (PLD) to help teachers make connections among DTs with their second language (L2), pedagogy, and English language content, their TPACK is likely to be underdeveloped. Franklin (2007) and Polly et al. (2010) highlight how technology-oriented training often focuses more on teaching *about* DTs than teaching *with* DTs. Also, Al-Awidi and Aldhafeeri (2017) found that training sessions addressing basic computer skills, such as Microsoft applications, did not support Kuwaiti teachers in learning more about ways to use DTs in their lessons. In other words, such PD ignored the pedagogical implications of learning with or through DTs. As long ago as the end of the last century, Ertmer (1999) suggested demonstrating meaningful technology integration through peer, mentor, and practitioner modelling to help teachers overcome second-order barriers.

In addition to TPACK, researchers (for example, Choi & Young, 2021; Koh et al., 2015; Tsai & Chai, 2012) argue (pedagogical) design thinking skills are also crucial for successful DT integration. According to Tsai and Chai (2012), a teacher's design thinking capacity enables them to adapt DT-integrated lessons to accommodate contextual differences across different classrooms. Referring to their TPACK-in-Action framework, Koh et al. (2014) also stated that designing lessons with DTs requires considering various contextual factors that could either facilitate or hinder the pedagogical use of DT. This suggestion implies that ‘one size does not fit all’ as classrooms are dynamic places. Hence, teachers are required to plan lessons with DTs specifically for their classrooms. While teachers may know about technology, pedagogy, and content (but possibly separately), integrating all three into their pedagogical practice matters because each classroom context is different. With the constant evolution of DTs and revisions in curriculum and national assessments, teachers are required to continuously use “strategic, practical reasoning and situational decision-making” when designing lessons with DTs (Choi & Young, 2021, p. 232).

Pedagogical practices and beliefs

Similar to previous research (Adam, 2015; Ertmer et al., 2012; Liu et al., 2018; Prestridge & Aldama, 2016; Tran, 2020), my findings indicate teachers were influenced by traditional pedagogical beliefs when they incorporated DTs in their lessons. Teachers took the role of a ‘sage on the stage’ on such occasions, a role associated with traditional teaching. For instance, as in Adam’s (2015) study with Maldivian teacher educators, teacher-centric use of DTs such as PPTs and YouTube videos for content delivery was common among all the teachers in my study. My findings also align with Cheung (2021), in which her case study teacher, Grace, adopted transmissive pedagogies using PPT and Microsoft Word for content delivery in her Zoom ESL lessons.

Teachers used DTs such as still pictures or short videos to make lessons interesting and fun, a practice that indicates they perceived DTs as motivational tools. This finding echoes Li (2014), as her Chinese secondary English teachers also articulated that computers are tools to gain students’ attention and interest. My findings are also consistent with those of Li and Walsh (2010), as their teachers thought that showing pictures, animations, and digital photos helped make lessons interesting and enjoyable. Additionally, as in Hashim et al. (2019) and Hung (2017), my participants said that the purpose of playing online games and quizzes was to make lessons fun and enjoyable for their students. The problem with viewing DTs as motivational tools is that making lessons fun, enjoyable, and interesting may be prioritised over helping students develop their language skills.

Another strong feature of the participant teachers’ practices was using DTs to reward students, a practice which seems to have its roots in behaviourist beliefs. As discussed earlier in relation to RQ1, urban teachers used digital stickers and Dojo points as positive reinforcement for completing work on time and bringing materials from home. My findings align with both Tan et al. (2020) and Homer et al. (2018), as they also found that teachers use reward mechanisms such as digital badges and points to encourage their students to repeat the desired behaviour. However, while extrinsic rewards such as stickers and points may be a short-term ‘fix’ for behaviour modification, they are unlikely to be powerful long-term motivators for students. Also, using DTs as ‘carrots’ could give teachers and students the impression that DTs are being used for student learning. Consequently, teachers may not feel the need to explore ways to facilitate students’ learning using DTs.

Perceptions about DTs

According to the technology acceptance model (TAM), an individual’s behavioural intention to use a particular system is regulated by their perception of its usefulness and ease of use (Davis, 1989). Therefore, perceived usefulness and perceived ease of use are the most commonly adopted predictors in studies examining teachers’ intention (Joo et al., 2018; Teo et al., 2016) and actual use of DTs (Liu et al., 2018; Sadaf et al., 2016).

Perceived usefulness refers to ‘‘the degree to which an individual believes that using a particular system would enhance his or her job performance’’ (Davis, 1986, p. 82). Thus, if teachers perceive DTs to be useful, there is a greater chance of their using DTs for teaching and learning. My findings suggest that teachers’ perceived usefulness aligned closely with the actual use of DTs in their lessons. For example, teachers who used DTs as administrative tools used DTs mostly for lesson planning and accessing teaching resources via the internet. Teachers who believed DTs were instruction tools used PPTs and YouTube videos for content delivery. Teachers who perceived DTs as tools for gaining students’ attention used technology-enhanced set inductions to begin lessons or new topics. While the alignment between perceived usefulness and the actual use of DTs is similar to those found in the literature (Liu et al., 2018; Sadaf et al., 2016), my findings suggest that teachers’ perceived benefits do not include the potential of DTs as learning tools. Therefore, there seems to be a gap between what teachers do, know, and understand about how DTs can be used pedagogically and their support to do things differently. This gap signifies the importance of teachers’ realising the possibilities DTs can create for student learning in ways not possible without DTs. For instance, in their study with eight teachers in the United States, Ottenbreit-Leftwich et al. (2010) reported that the motivation behind their participant teachers’ DT use was their strong belief in helping students’ learning process and preparing students for their future. Based on self-reported data from 223 K–12 school teachers in the United States, Hur et al. (2016) found that professional development significantly influenced teachers’ perceived benefits of technology integration. These findings indicate that teachers’ beliefs and attitudes about the usefulness of DTs for teaching and learning tend to influence how frequently they use DTs in their lessons.

Davis (1986) defines perceived ease of use as ‘‘the degree to which an individual believes that using a particular system would be free of physical and mental effort’’ (p. 82). According to TAM, teachers’ beliefs and attitudes can predict their actual technology adoption, which means that the actual use of DTs in teaching and learning depends on a teacher’s perception of how easy or difficult it is to use DTs. In contrast to the previous research that reported perceived ease of use as a significant predictor of intention to use DTs (Teo et al., 2016; Teo, 2010), my findings suggest that perceived ease or difficulty of use may not be such a strong predictor of the actual use of DTs. For example, while urban teachers acknowledged that they used DTs frequently because of the enabling contextual factors, rural teachers continued to use DTs despite the obstacles they faced in their school. Despite challenges in accessing DTs, gaining technical support, and PLD opportunities, rural teachers chose to use DTs in their lessons anyway. This finding contradicts De Freitas and Spangenberg’s (2019) contention that teachers may be reluctant to use DTs if they perceive contextual factors as barriers to DT integration. Therefore, while teachers’ perceived ease of use seems encouraging, perceived hindrances do not necessarily deter the use of DTs either, presumably because of their perceived usefulness. Ertmer et al. (2012) suggested that addressing second-order barriers (such as teachers’ knowledge, skills, beliefs, and attitudes) was more important than removing first-order barriers. Hence, while providing teachers with an enabling environment for DT use may be necessary, it seems pivotal that school technology leadership explores teachers’ perceived usefulness of DTs and that leaders work with teachers to fine-tune their focus on maximising student learning.

In short, the findings related to RQ2 indicate that factors at the national (ICT policy, ITE), school (DT leadership, PLD), classroom (access to DTs and technical support), and teacher level (knowledge, practices, beliefs, perceptions) affect my participant primary teachers’ decisions around DT use in English lessons. The complex interplay of these factors in influencing teachers’ TPACK enactment in ESL pedagogical practices is the focus of my third and final research question, RQ3.

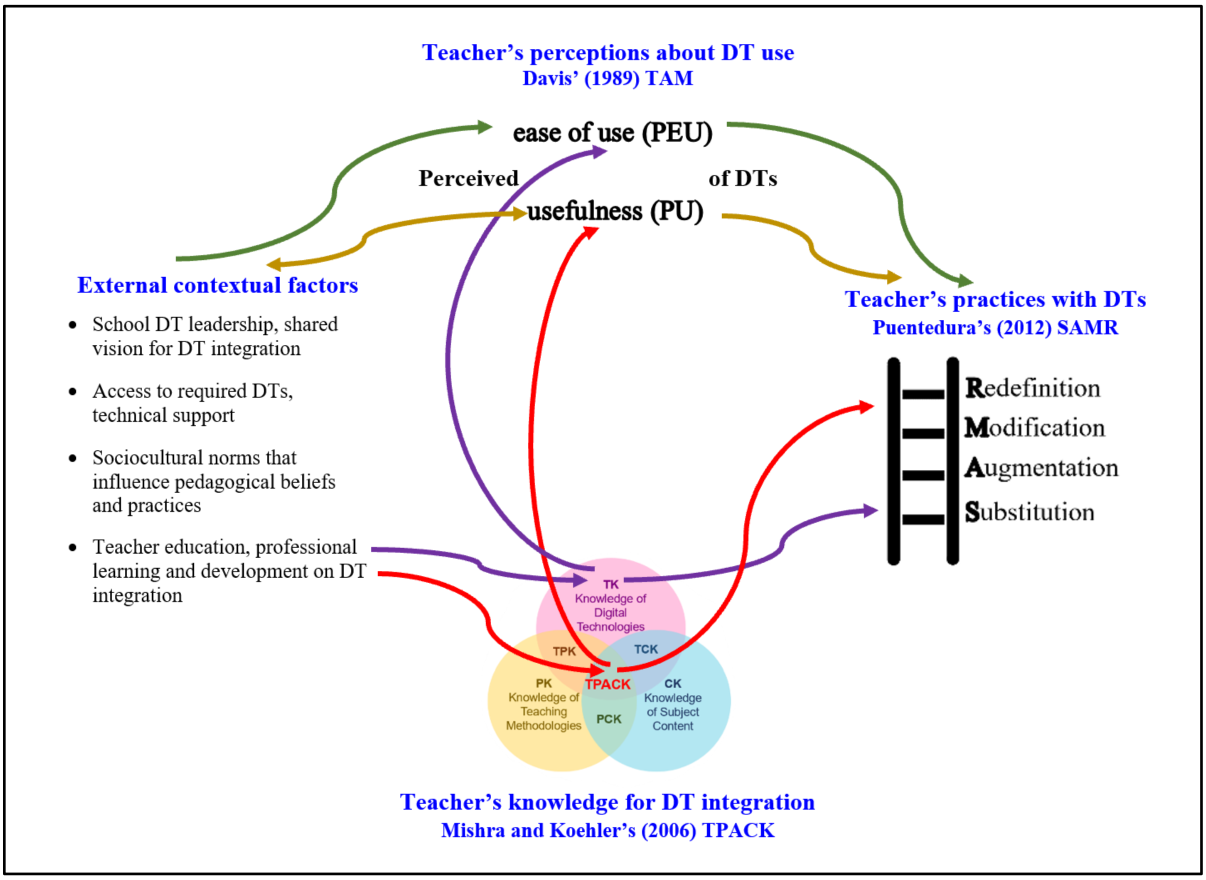
Research Question 3

What interplay of factors influence Maldivian primary teachers' DT use in their English lessons?

This question explores the complex interplay of external and internal factors in facilitating or impeding primary teachers' DT use in their English lessons. Figure 5.2 illustrates the complex relationship between external factors (such as DT leadership, DT accessibility, PLD) and internal factors (teachers' knowledge and perceptions) in influencing how teachers enact their TPACK in ESL pedagogical practices (based on SAMR levels, such as substitution or redefinition). To understand the complex interplay of these factors, I discuss the relationship depicted by each of the coloured arrows (see Figure 5.2), beginning with purple, followed by red, green, and finally gold.

Figure 5.2

The Complex Interplay of Factors Affecting Pedagogical Use of Digital Technologies



Teacher's perceptions about DT use
Davis' (1989) TAM
ease of use (PEU)
Perceived
of DTs
usefulness (PU)
External contextual factors
School DT leadership, shared vision for DT integration
Access to required DTs, technical support
Sociocultural norms that influence pedagogical beliefs and practices
Teacher education, professional learning and development on DT integration
Teacher's practices with DTs
Puentedura's (2012) SAMR
Redefinition
Modification
Augmentation
Substitution
TK
Knowledge of Digital Technologies
TPK
TCK
PK
Knowledge of Teaching Methodologies
TPACK
CK
Knowledge of Subject Content
PCK
Teacher's knowledge for DT integration
Mishra and Koehler's (2006) TPACK

Purple Arrows: External-TK-PEU-SAMR Enhancement

The purple arrows in Figure 5.2 illustrate that with TK the focus of teacher education and PLD (*external factors*), teachers may perceive DTs easy to use (*internal factor*), but their pedagogical practices with DTs may not go beyond SAMR's enhancement levels: substitution and augmentation. Technological knowledge (TK) is one of the three basic knowledge constructs essential for TPACK enactment. The purple arrow from *TK* to *perceived ease of use of DTs* indicates that a potential factor contributing to teachers' confidence in (and, to some extent, their perceived ease of) using DTs at hand can be attributed to their TK. While some teachers gained TK from their initial teacher education (ITE) programme, for others, it was gained from school-based PDs (as in the urban school case) or self-initiated learning (as in the case of some rural teachers). Hence, contrary to studies such as Kaumba et al. (2021) and Spangenberg and De Freitas (2019), TK was not a barrier for my participant teachers' DT use. However, my findings still support the point that regularly updating teachers' TK is of utmost importance, especially given the rapid technological advancements. Mishra and Koehler (2006) argue that learning about DTs results from viewing *technology as* a knowledge domain separate and independent of *content* and *pedagogy*. This perception applies to my participant teachers' case as their initial teacher education (ITE) and school-based PDs focused mainly on TK.

However, the problem with focusing on TK is that "merely knowing how to use technology is not the same as knowing how to teach with it" (Mishra & Koehler, 2006, p. 1034). A potential consequence is that teachers may use TK to subsume DTs into their existing pedagogical practices if they are unaware of how to integrate TK with pedagogical content knowledge (PCK). My participant teachers' frequent use of DTs as tool substitutes indicates that they are yet to learn how to integrate the three knowledge constructs: content, pedagogy, and content to enact TPACK. For instance, teachers replaced Bristol boards (paper boards) with PPTs for content delivery, substituted teacher explanations with YouTube explanation videos, and used online quiz tools instead of printed worksheets to check students' understanding. These practices indicate that teachers substituted one set of tools for another. Based on the SAMR model (Puentedura, 2012), this finding suggests that all the teachers (N=9) in my study used DTs at the substitution level, the most basic of the SAMR levels. This observation reflects similar findings reported in recent research (Lie et al., 2020; Rabah, 2015; Tunjera & Chigona, 2020), where substitution practices dominated DT use. Hence, the purple arrow from TK to SAMR's substitution level in Figure 5.2 indicates that knowledge about DTs is insufficient to encourage teachers to use DTs at higher levels. Instead, moving up the SAMR ladder requires teachers to know the complex interactions among content, pedagogy, and technology, which is the focus of my discussion in the next section (red arrows).

Red Arrows: External-TPACK-PU-SAMR Transformation

The red arrows are similar to the purple ones regarding the potential influence teacher education and PLD (*external factors*) have on teachers' TPACK construction (see Figure 5.2). The difference is that the red arrows indicate the potential to reach SAMR's transformation levels (modification and redefinition) when teachers enact TPACK in their ESL pedagogical practices. Puentedura's (2012) SAMR model helps identify what a DT allows us to do at different levels of use. On the other hand, Mishra and Koehler's (2006) TPACK framework helps understand what kind of knowledge teachers require to climb the SAMR ladder to achieve new pedagogical and technological proficiency levels when teaching with DTs. Reaching SAMR's redefinition level, for example, is possible when teachers enact TPACK. However, for this, teachers require more than just TK, as I argued in the previous section. Knowledge about tools is insufficient because TPACK construction involves developing knowledge of the complex interplay among three main components: content, pedagogy, and technology. For instance, teachers in my study were familiar with the available DTs but seemed unsure how to adapt practices using DTs. For some of my participant teachers, a barrier to TPACK enactment also seems to be their limited pedagogical content knowledge (PCK). With their generic primary teacher education, they might not be as well versed in teaching English to speakers of other languages as trained ESL/EFL teachers. The frequent reliance on YouTube videos to explain English language content, for example, might have been their way of compensating for their limited PCK.

Therefore, teachers' underdeveloped TPACK seems to be a reason for their DT use at the substitution level of SAMR. Even with all the hardware and software available to teachers, they still require knowledge to design tasks to use DTs at the modification and redefinition levels. Such findings indicate that when there is a gap in teachers' knowledge about how to marry technology, pedagogy, and content knowledge, they may revert to using DTs for comfortable practices rather than transforming them. It seems rural and urban teachers' limited TPACK hindered DT use in pedagogically meaningful ways in their ESL lessons. Therefore, my findings concur with those studies that have reported that internal (teacher-related) factors significantly impact how meaningful DT use is for student learning (Choi & Young, 2021; Ertmer et al., 2012; Liu et al., 2018; Tsai & Chai, 2012).

Nonetheless, as the red arrow from *TPACK* to the *perceived usefulness of DTs* illustrates (see Figure 5.2), perhaps teachers will realise the pedagogical affordances of DTs for student learning with more opportunities for TPACK enactment. This realisation could, in turn, drive them to use DTs purposefully for the benefit of students. However, the complex, multifaceted and situated nature of TPACK requires learning how to marry English language content, ESL pedagogy, and DTs *in the individual teacher's classroom context* rather than *in lecture-style sessions*. Being mainly one-way transmission of knowledge about DTs, the DT-related PDs provided at the school level were of little help to my participant teachers' TPACK enactment in their own classrooms. Therefore, my findings support the argument of researchers such as Mishra and Koehler (2006) and Ruggiero and Mong (2015) that personalised PLD opportunities are more effective than generic PD sessions for all, especially for teachers' TPACK enactment.

Green Arrows: External-PEU-SAMR

In Figure 5.2, the green arrows depict the connection between *external contextual factors* and teachers' *perceived ease of using DTs* in influencing teachers' *decisions around DT use in their ESL pedagogical practices*. This relationship yielded positive outcomes for the urban teachers due to the numerous facilitative conditions at the urban school. Urban teachers enjoyed several facilitative conditions such as DT leadership, school ICT policy, technology infrastructure, DT-based PD, and IT support. As in Li's (2014) study in China, the technology-friendly environment created by the urban school DT leadership played a significant role in encouraging and supporting teachers' classroom DT use. For instance, the urban school developed a shared vision about DTs and examined the potential value of such tools to the school community. This initiative led to the development and promulgation of a school ICT policy. Even as far back as two decades ago, Ertmer (1999) argued that "a vision gives us a place to start, a goal to reach for, as well as a guidepost along the way" (p. 54). It appears that this argument is true and related to my findings because the DT-integration vision communicated via the urban school's ICT policies gave teachers a sense of direction for DT integration. Their actions coincide with literature emphasising the benefits of a shared vision for a school's DT integration (Nangue, 2011; Vanderlinde et al., 2014; Yilmaz, 2011).

Classroom conditions also facilitated urban teachers’ DT use. Such conditions include having Wi-Fi access and easy access to hardware, software, and peripherals in all the classrooms. Also, teachers experienced minimal interruptions to Wi-Fi and had access to timely technical support from the IT staff and their tech-savvy colleagues. The underlying argument of Davis’ (1989) TAM model is that perceived ease of use (PEU) positively impacts teachers’ attitudes, which could, in turn, influence teachers’ intention and actual use of DTs for teaching and learning. Consistent with the urban teachers’ case, perceived ease of use associated with accessibility and technical support are often highlighted as factors that affect teachers’ continued use of DTs in their lessons. Gürfidan and Koç’s (2016) study is a case in point. They found that support services (for example, easy access to DTs, technical assistance, and troubleshooting) have a direct and the greatest impact on the increased use of DTs in teachers’ pedagogical practices.

Contrary to the urban school’s case, the relationship depicted with the green arrows was not positive for the rural teachers. From the case of the rural school, we gain insights into how external contextual factors hindered teachers’ ongoing efforts to use DTs in their classrooms. It also shows some rural teachers’ attempts to eliminate or circumvent the barriers they face on a daily basis. In her seminal work, Ertmer (1999) identified barriers external to teachers (for example, the school and classroom level constraints) as first-order barriers to DT integration. She argued that these barriers alone could significantly impede meaningful classroom DT use. My findings indicate that rural teachers faced numerous obstacles when using DTs in their classrooms. For example, there was no shared vision for DT integration; timely technical support was unavailable for the constant technical issues; and teachers experienced difficulty in accessing some DTs. Accessibility does not only mean purchasing DT infrastructure but also having mechanisms in place for the maintenance of hardware and updating software to ensure that teachers can use them regularly.

Findings from the rural school also indicate that with respect to *ease of DT use*, we cannot equate availability to accessibility. For instance, although Mimio bars were available (in the school storage facility), they were not accessible (in the classroom) because teachers were required to take the Mimio bar to the class and install it for every lesson. Also, tablets were available (provided for students and teachers by the MoE) but not accessible for learning as classrooms had no access to Wi-Fi. Echoing the findings on rural teachers in my study, Lucas’ (2018) and Nikolopoulou’s (2020) studies showed that unreliable internet connection hindered teachers’ and students’ use of DTs in their classrooms. As school and classroom level barriers are yet to be addressed in the rural school, my findings align with studies that report external or first-order barriers as impediments to teachers' DT use in their classrooms (Buabeng-Andoh, 2012; Francom, 2020; Nsolly & Charlotte, 2016). For example, Ottenbreit-Leftwich et al. (2018) found that, despite having strong intentions to use DTs, beginning teachers could not enact their intended goals for DT use in the classroom due to school-related barriers such as ICT policies, access to DTs, and school structure and culture. This finding aligns with the rural school's case, as in the absence of a DT leadership teachers were left on their own to plan, initiate, and implement the DT-integration process.

Gold Arrows: External-PU-SAMR

While the green arrows are about *ease of use*, the gold arrows (see Figure 5.2) show how the *perceived usefulness* of DTs is influenced by *external contextual factors* (or vice versa) in impacting teachers' ESL pedagogical practices with DTs. As Rabah (2015) pointed out, "if educators do not buy into the pedagogical value of various technologies, they [DTs] will remain just fashionable add-ons in our curricula" (p. 28). Research also shows that the chances of aligning teachers' intended (Li, 2014; Sadaf et al., 2012) and their actual use (Liu et al., 2018; Sadaf et al., 2016) of DTs are higher if they believe that DTs are useful for student learning. However, in my study, as teachers' perceived benefits of DTs were associated mainly with administration, substitution, and extrinsic motivation rather than student learning, they did not seem to realise the pedagogical affordances of DTs for meaningful learning. These findings indicate that teachers may continue using DTs in their lessons (because of the perceived usefulness of DTs) but not necessarily as learning tools unless they begin associating DT usefulness with student learning.

The literature indicates that the perceived *ease of use* of DTs can also lead to the perceived *usefulness* of DT (Huang et al., 2020; Teo et al., 2019). Such findings imply that facilitative school or classroom conditions would positively impact teachers' views about DTs, resulting in teachers' continuing to teach with DTs or vice versa. However, my findings from the rural school tell a different story. Despite contextual dilemmas, all five teachers continued using DTs throughout my 4-month data collection in the school. They persisted not because of ease of use but despite the challenges they faced. Some teachers' efforts can be seen in their use of personal DTs such as laptops, Bluetooth speakers, 3G or hotspots from their smartphones to circumvent the barriers they faced in classroom DT use. Muslem et al. (2018) reported similar findings in mixed-method research. Their interviews with five teachers revealed that a common workaround was using their own cell phones to hotspot their laptops to access the internet. Such efforts from the teachers indicate that their strong beliefs in the usefulness of DTs might have motivated them to overcome issues related to DT accessibility (thus, the two-way gold arrow). This finding is in line with Ertmer et al. (2012) who found that teachers with strong *positive* beliefs about the role of DTs in their classrooms tend to find ways to overcome contextual barriers related to access and resources. They reported that teachers in less equipped schools brought their personal DTs, such as iPhones and iPads, to the class so that they could take advantage of what the internet could offer in terms of both teaching and learning.

However, the gold arrow from the *usefulness* of DTs to *external contextual factors* may only be a two-way connection for some teachers. For instance, only some teachers could fund the internet connection via their own personal devices and account for their lessons. This practice is unsustainable for teachers, just as Jita and Munje (2020) found. So, teachers' using personal DTs for professional activity is merely a short-term quick-fix workaround. A long-term solution for rural teachers' classroom DT use requires the school to create facilitative classroom-level conditions. This facilitation may need to begin with developing a shared DT vision. Coupled with a vision, the school's infrastructure must support its enactment. This process involves investing in DT leadership to establish ubiquitous and robust access to technology infrastructure across all classrooms.

While the perceived usefulness of DTs can result in teachers' continued DT use in their lessons, the opposite (not believing in DT usefulness) is, unfortunately, also true. Viewing DTs as distractions or deviations from achieving their instructional goals could lead to teachers' reducing or not using DTs in their lessons. As in many other studies (Li, 2014; Orlando, 2013; Tallvid, 2016), some of my participant teachers felt DT use in certain lessons (for example, as student devices for writing tasks) did more harm than good in achieving their instruction goal. The reason for such perceptions can be attributed to the pedagogical beliefs and practices formed due to sociocultural norms. For instance, it appears that exam-focused and textbook-driven instructions influenced participant teachers' DT use in ESL classes. This finding echoes Lim and Chai (2008), as their teachers used DTs for information transmission due to the pressure of preparing students for national examinations. The importance given to textbooks by Maldivian teachers can be seen in the findings of Fittell (2014). Based on observations of primary teachers' practices, Fittell's study concluded that most teachings were didactic, which meant transferring knowledge from teachers or textbooks to students.

As borne out in my study, such a focus on textbooks or syllabi appears to be an obstacle to DT use for teaching and learning, and this finding echoes Li (2014). Exploring English teachers' DT integration in China, she claimed that teachers' traditional belief in rigidly following textbooks influenced their pedagogical practices with DTs. For my participant teachers in a climate of control, compliance, and didacticism, experimenting with DTs in their lessons might have been scary. The situation was fraught for the rural teachers with numerous unresolved issues, especially ones related to technology infrastructure and technical support. These findings indicate that *external contextual factors* could negatively influence teachers' *perceived usefulness of DTs*, hindering *teachers' DT use* in their pedagogical practices.

Overall, RQ3 helped in understanding the complex interplay among external and internal factors in influencing teachers' TPACK enactment in their ESL pedagogical practices with DTs. I discussed the complex relationships depicted by the purple, red, green, and gold arrows. The purple and red arrows showed how teacher education and PLD influenced teachers' TPACK enactment at different levels based on the SAMR model. While the purple arrows denote that TK is necessary for DT use, the red arrows imply that TPACK enactment is required to reach higher modification and redefinition levels of SMAR. With TK, teachers may feel DT is *easy to use*, but TPACK can potentially make teachers realise the *usefulness* of DTs for student learning. In line with the underlying arguments of TAM, the green arrows illustrate that external contextual factors could either facilitate or hinder teaching with DTs, depending on teachers' perception of how easy or difficult DT use is for them. Finally, the gold arrows indicate that teachers' *perceived usefulness of DT*s, depending on the *facilitative or constraining external contextual factors*, could impact their *pedagogical practices with DTs*. The two-way gold arrow indicates that, while external contextual barriers may negatively impact teachers' perceived usefulness of DTs, teachers with strong beliefs in the DT benefits may find strategies to circumvent some contextual barriers. The complex relationship among factors depicted by the purple, red, green, and gold arrows indicates that teachers' practices with DTs should not be understood in isolation but in relation to various factors that could facilitate or impede their attempts to use DTs.

Chapter 6

Conclusion

In this chapter, I conclude my thesis by discussing implications of this research, presenting contributions, identifying limitations in this study, suggesting recommendations for further research, and reflecting on my overall learning. The chapter begins with implications for teachers and schools. Next, I present theoretical, methodological, and substantive contributions from this study, which is followed by limitations of this study and recommendations for further research. This chapter ends with a final thought, reflecting on the learnings and realisations from my doctoral studies.

Implications

The findings from this study have implications for participant teachers and their schools. Below I provide implications and recommendations for the participant teachers, followed by implications and recommendations for the urban and rural schools:

Participant Teachers

My findings have some direct implications for my participant teachers' ESL pedagogical practices with DTs in primary classrooms. The most critical implication is for these teachers to reflect on their beliefs about teaching, learning, and the purpose of using DTs, as those beliefs shape their practices with DTs. Some traditional pedagogical beliefs may be so ingrained that teachers may not realise the impact such beliefs may have on their teaching. Hence, adopting reflective practices may help these teachers become more aware of how various beliefs influence their practices with DTs and, consequently, students' learning. Perhaps this is a lesson for teachers everywhere to look beyond the customs of practice in their school and community. Teachers could use frameworks such as "teaching as inquiry" (MoE, 2007, p. 35) or "spiral of inquiry" (Timperley et al., 2014, p. 5) as a guide to inquire into the impact that their pedagogical practices with DTs have on their students' ESL learning.

As these teachers' DT use was mainly teacher-centric and at the substitution level of the SAMR model, teachers may have to make a deliberate effort to use DTs as learning tools rather than administrative or instructional tools. The SAMR model encourages student-centred DT use. Hence, the model could guide lesson planning aiming at transformative levels to create new and unique opportunities for learning that may not be possible without DTs. As such, the examples of practices at various levels of the model in chapter 3, Table 2.2, might be helpful. When planning lessons with DTs, teachers need to carefully marry pedagogy, technology, and content in a harmonious dance, similar to Anderson and Dron’s (2011) dance metaphor. As such, subject coordination meetings could be ideal places/spaces to carry out deep conversations with colleagues about DT use and ESL pedagogical practices. For example, Choi and Young (2021) recently introduced a CARD-tamen™ TPACK-L card game to create an environment to assess teachers’ pedagogical reasoning behind DT integration. The game provides teachers with unique technological pedagogical situations to think about the spontaneous decision-making needed in the micro-moments of their teaching. Hence, such methods could become practical guides to DT integration in instruction or be used to evaluate teachers’ own design thinking. Planning for DT use needs to go beyond deciding which YouTube videos or PPTs to use in the lesson. Planning based on design thinking could help teachers to deliberately consider how a certain DT can facilitate achieving a specific language learning objective. For instance, teachers need to ask specific questions such as which DTs (TK) would facilitate teaching grammar (CK) inductively (PK) or how do I adapt DT use to enable students to discover the grammatical rule rather than explaining it to them. Such deliberations could help teachers adopt practices with DTs that are more meaningful to enhance L2 learning.

Finally, it is also crucial that teachers become proactive and take the initiative to explore PLD opportunities without relying only on school-based PD sessions. Such “self-mediated professional development” (Farrell & Ives, 2015, p. 607) could contribute to more meaningful use of DTs for student learning. For instance, teachers teaching parallel classes could engage in collegial collaborations (Gerard et al., 2011; Koh & Chai, 2016), building a comentoring (Jipson & Paley, 2000; Mullen, 2000) or a reciprocal mentoring (Gabriel & Kaufield, 2008; Gonzales & Thompson, 1998) relationship to share their experiences with DTs and learn from each other. Ideally, collaborative learning relationships would involve more than two members as there would be more than two teachers teaching the same subject at the same grade level or working in the same department. So, establishing professional learning communities (Hanson-Smith, 2016; Jones & Dexter, 2014; Lave & Wenger, 1991; Wenger, 1998) may also be beneficial for teachers as a form of DT-related PLD. However, support from the school’s senior management team would be crucial for such collaborations.

The Urban and Rural Schools

My findings suggest that if schools are interested in integrating DTs, a school ICT policy can help guide the process and provide a basis for the whole school to know the school's expectations. Crossley (2019) argues the need to use evidence from the local context to inform policy-making so that the policy reflects the local contextual sensitivities. Hence, leaders of these two schools could use my findings to make informed, evidence-based decisions when revising/developing school ICT policies. This step requires the involvement of all the stakeholders of the school. Formulating school ICT policies involves developing a vision for the school DT integration, performing a DT audit, and setting targets and performance indicators to monitor progress. When creating the school ICT policy, DT leaders need to consider the classroom realities, teachers' beliefs and practices, and professional learning and development (PLD) requirements. The school's ICT policy needs to include a clear vision for DT integration, ICT infrastructure investment and maintenance, teachers' professional learning and development, information literacy and cyber security, mechanisms for monitoring and reviewing the process, and technology leadership roles.

In addition, it really helps when school DT leaders understand the difference between the availability and accessibility of DTs, for the two are not synonymous. Having equipment (availability) does not make it usable (accessibility) because if no one knows what the tool can do, or know how to use it, it will remain on shelves. Teachers and students with DT access in their classrooms tend to use DT more frequently than do those who have to carry DTs such as laptops and sound systems to class for every lesson. In classrooms, having computers or other devices without reliable and robust internet access does not make them very accessible for learning. Instead, they may succeed in frustrating teachers and students. Accessibility also means using DTs for teaching and learning is uninterrupted and hassle-free. Therefore, DT leaders need to ensure that mechanisms are in place for teachers to gain technical support whenever required. Consequently, each school needs an IT department or an IT technician with responsibility for repairing and maintaining DTs and providing timely technical support to teachers and students. It would also be prudent to encourage the involvement of tech-savvy teachers, as one IT technician may not be able to support the whole school's needs. Therefore, in addition to depending on the school budget, principals may need to approach local philanthropists and international organisations for grants and financial support to ensure sustainability.

Furthermore, major reforms in school-based PD practices may be necessary as findings suggest that generic PD sessions focusing on TK are insufficient to ensure teachers use DTs in meaningful ways for student learning. Therefore, at both schools, the focus of PDs needs to change from TK to TPACK so that teachers understand the affordances of DTs in subject-specific learning activities. In this regard, more individualised approaches to PLD that cater to individual teachers' needs are required. Additionally, the way teachers conducted their English lessons (for example, exam-format listening lessons and deductive grammar teaching) indicates that teachers may need further professional learning about ESL pedagogical practices. As not all the teachers were trained to be specialists in teaching English to speakers of other languages (TESOL), their underdeveloped ESL pedagogical knowledge might have been a reason for such practices. After all, pedagogical knowledge is one of three basic knowledge constructs necessary for successful DT integration, as argued by Mishra and Koehler (2006) in their TPACK framework. Also, the teacher-centric use of DTs throughout the data collection period at both schools indicates that such practices may be associated with teachers' beliefs. As changes in behaviour may require changes in beliefs (Kagan, 1992; Pajares, 1992), PLD may also be necessary to challenge teachers' inherent beliefs about teaching and learning with DTs.

In addition to the focus of PLD, the approaches to it also need to be varied to develop teachers' DT knowledge and practices. To support a TPACK focus, the closer the PLD is to the classroom use, the better. When teachers use teaching as inquiry in a structured and supported way, for example, then they are likely to see ways in which the DT benefits or hinders learning. Part of such inquiry could be to ask learners about their learning when they use DTs, evaluate the responses, and share with colleagues to compare notes. Additionally, rather than transmitting knowledge through workshop-style sessions, PLD must include different approaches (Baran, 2016).When teachers are not equally tech-savvy, a one-way sharing of knowledge and expertise may be ideal for some situations, as in Cotugna and Vickery (1998). However, unlike Williams (2017), mentoring should not be limited to supporting teachers with technical issues. Instead, a technology coordinator or tech-savvy teachers could mentor other teachers who need support in designing and conducting lessons with DTs (Baser et al., 2021; Kopcha, 2012; Ottenbreit-Leftwich et al., 2018). Such support can be extended by establishing mechanisms for teachers to gain regular feedback (Desimone & Garet, 2015; Timperley et al., 2007) on their practices with DTs, for example, from DT leaders, colleagues, and students. These mechanisms are likely to build capability in a structured and supported sense. Ideally, technology-based PLDs need to be continuous (Ifinedo & Kankaanranta, 2021; Jita & Munje, 2020) rather than one-off sessions. Hence, school DT leaders need to view DT integration as a process rather than an acquired endpoint.

Finally, DT leaders need to be aware of various contextual factors influencing teachers' pedagogical practices with DTs. For example, they need to be aware that access to DTs does not ensure the use of DTs to benefit student learning. Therefore, DT leaders may have to explore teachers' beliefs and attitudes towards DT use for teaching and learning and understand how they may shape teachers' decisions around DT use. In this respect, investing in developing teachers' knowledge, beliefs, and attitudes about DTs is as crucial as improving school technology infrastructure. DT leaders also need to create a school culture/environment where teachers have the authority and flexibility to take risks and try out innovative practices with DTs without feeling pressured to adopt certain practices such as exam-oriented, textbook/content-driven approaches.

Contributions

This study makes theoretical, methodological, and substantive contributions to research on DTs in education. Each of these contributions is explained in the following sections.

Theoretical Contribution

I developed a TPACK-in-Context framework (see chapter 2, Figure 2.4) to understand better the kinds of multilevel contextual factors influencing teachers' discipline-specific TPACK enactments. This framework extends Mishra and Koehler's (2006) TPACK framework (see chapter 2, Figure 2.2) by adding four outer layers representing factors at various contextual levels (teacher, classroom, school, and national). The inspiration to add the contextual layers came from Bronfenbrenner's (1986) ecological framework, even though the levels do not necessarily correspond to the microsystem, mesosystem, exosystem, and macrosystem in that framework. TPACK-in-Context can guide a school's DT-integration process as it helps explore layers of contextual factors that could enhance or impede DT use for teaching and learning. Moreover, it can be adapted to multiple educational contexts irrespective of location (urban, rural), institution (schools, universities), level (kindergarten, primary) or disciplines (mathematics, science).

In addition, my illustration of the complex interplay of factors affecting teachers' pedagogical practices with DTs depicted in Figure 5.2 could serve as a lens for practitioners and researchers to acknowledge and explore the complexities around DT use in micro-moments of teaching. It shows the complex connection between three dominant frameworks/models (TPACK, TAM, SAMR) in DT-integration literature, as well as how external factors come into play in influencing teachers' DT use.

Methodological Contribution

This study makes unique contributions to methodological knowledge by proposing a nonlinear qualitative data analysis (QDA) process and illustrating how a computer-assisted qualitative data analysis software (CAQDAS) enhances the QDA process. First, I have developed a spiral qualitative data analysis (Spiral-QDA) process based on Seidel's (1998) qualitative data analysis (QDA). The spiral illustration of QDA represents the nonlinear, iterative, and recursive nature of the qualitative data analysis process (see chapter 3, Figure 3.6). The iterative and progressive nature makes it suitable for research where data collection and analysis are conducted in phases. On the other hand, the recursive nature allows the flexibility to move back from one phase to the other and to skip a step when going back.

Additionally, Spiral-QDA can be used for both data-driven and theory-driven analysis. Second, this research significantly contributes to computer-assisted qualitative data analysis (CAQDA) as I have outlined how the Spiral-QDA process is enhanced using NVivo, a widely used QDAS. While NVivo does not analyse data for us, its features enhance the complex process and allow a systematic and rigorous treatment of a substantial amount of qualitative data. Therefore, the Nvivo-enhanced Spiral-QDA process illustrated in chapter 3, Figure 3.7 and outlined in Table 3.6 might help other researchers better understand how NVivo helps to uncomplicate the complex nonlinear nature of the qualitative data analysis process. Details of the NVivo features applied at every step of the Spiral-QDA can be found in chapter 3.

Substantive Contribution

This research contributes substantively in two aspects. First, it contributes to the existing literature on TPACK by capturing teachers' lived experiences using interpretive phenomenology as a research design. Second, it adds substantially to understanding the complexities around DT use in the Maldivian ESL context; these contributions are explained next.

TPACK literature

My study contributes to TPACK literature by adopting interpretive phenomenology as a research design, as it is not frequently used in TPACK studies. Gaining an in-depth understanding of primary teachers' DT use in ESL lessons requires capturing their technological pedagogical practices in their sociocultural setting. While surveys (Ifinedo et al., 2020; Lai & Lin, 2018) or qualitative self-reported data (Francom, 2016; Ifinedo & Kankaanranta, 2021) could examine teachers' intention to use DTs, I argue those methods cannot capture teachers' actual classroom practices with DTs. Therefore, to address this research gap, this study explored teachers' practices with DTs in English lessons by adopting a phenomenological research design. A phenomenological research design was most congruent with my research purpose of interpreting and understanding the experience of primary teachers' DT use for teaching and learning English. This research design allowed me to gain an in-depth understanding of the lived experiences of my participants in their sociocultural context, the schools. So, I was able to capture the technological pedagogical practices of nine teachers for 4 months (at each school) through classroom observations. Additionally, using a battery of data collection tools, I was able to interpret what motivated, facilitated, and hindered their DT use for teaching and learning English in primary classes.

DT use in the Maldivian ESL context

This study contributes significantly to research in the Maldives, particularly regarding English as a second language (ESL) and primary teachers' DT use. By exploring various factors affecting the ESL-specific TPACK enactment of nine primary teachers in the Maldives, I have combined primary schools as a context with ESL and DTs. Therefore, this research has provided insights into how DT use affects teaching English language skills and components such as reading, writing, listening, and grammar in specific primary ESL classrooms. The study shows how teachers' DT use was influenced by their pedagogical beliefs, existing second language teaching practices, and the affordances of DTs available in the respective schools. In addition, this study has also elucidated the influence of multilevel contextual factors on teachers' pedagogical practices with DTs in two Maldivian schools. It provides a nuanced understanding of how the enablers and barriers to DT use were regulated by the school, classroom, and teacher-related factors, indicating the sensitivity of the context in teachers' practices with DTs. Therefore, this study emphasises that understanding teachers' technological pedagogical practices requires situating them within contextual factors and not in isolation.

Limitations

As explained in chapter 3, instead of seeking a single, objective reality, my interpretive phenomenological study aimed at understanding a small group of Maldivian primary teachers' lived experiences of using DTs in their professional lives in the school context. As I contend that every teacher's pedagogical practices with DTs vary with the effects of various multilevel contextual factors, I did not aim to make generalisations from my findings to other contexts. However, the DT-integration experiences of my nine participant primary teachers shared in this study are likely to have a wider resonance. Below are three key limitations of my research:

1. This is a small study with nine participants in the Maldivian context. Therefore, the findings may not be generalisable to other Maldivian primary English teachers or teachers in other contexts. The study has limitations not only because of its size but also because the focus is only on ESL and the DTs participant teachers used. It does not illuminate teachers' pedagogical practices with DTs in subjects other than English; it is likely that DT use may vary depending on subject content, as I have argued earlier.

2. My insider-researcher position might have unconsciously introduced bias in two ways, even as I sought to mitigate potential effects. First, a potential bias could be in my translation of the four interviews I conducted in Dhivehi into English. To minimise this possibility, one of my supervisors, proficient in both Dhivehi and English, verified the translated transcripts based on the audio files of those interviews. Second, bias might have affected my interpretation of data since I am from the Maldives and am very familiar with primary school contexts in that country. Furthermore, my long history of working as a teacher and teacher educator in the Maldives made me quite familiar with the senior management teams (SMTs) and teachers of the two schools where I conducted my research. In addition, I worked very closely with participant teachers over 4 months at each school. Hence, I acknowledge that this situation could have led to bias due to my preconceived notions of teaching and learning

in the Maldivian schools and my familiarity with the setting and participants. So, I was mindful of this bias and used several forms of triangulation to validate the data I collected.

3. When I started my research, I did not realise the critical role of school DT leaders in facilitating teachers' DT use. As a result, I missed an opportunity to learn more about their roles and the complexities that might affect how they undertake their roles. I also missed interviewing SMT members other than principals. Unfortunately, I could interview only the urban school principal because an interim principal joined the rural school during my data collection phase, and it would have been inappropriate to interview this new principal about the school's DT integration. Interviews with other members of the SMT might have provided a more comprehensive understanding of the role of leadership in supporting pedagogical and infrastructural DT integration in general.

Recommendations for Further Research

My research findings offer several important areas for future research, as outlined below.

1. Further research could determine whether teachers' beliefs about and practices with DT use varied depending on the subjects they taught. Subject content knowledge may shape the way teachers think, given the organisation of content and established practices and approaches to knowledge creation specific to the subject matter. For instance, my research has concluded that the technological pedagogical practices of teachers in this study were influenced by their beliefs about teaching and learning English as a second language in primary context. Research across curricula or school sectors could also illuminate any similarities or differences in DT use across various subjects and school levels.

2. Practising teachers could conduct participatory action research (PAR) by designing lessons using the TPACK-in-Context framework, carrying out lessons with DTs in their respective classes, and reflecting on their practices using the SAMR model. In collaboration with curriculum developers, PLD providers, and subject coordinators, PAR could provide individual teachers with an opportunity to improve their technological pedagogical practices. PAR is important as my research has identified the importance of pedagogical design thinking's capacity to use DTs in pedagogically meaningful ways. In addition, examining opportunities for teachers to undertake professional inquiries with colleagues is potentially valuable for understanding more about teachers' pedagogical thinking and design practices as they embed DTs into their everyday practices that facilitate learning.

3. Additional research could explore teachers’ TPACK enactment in online teaching and learning and the contextual factors that enhance or impede their practices with DTs. Given the unprecedented times of the COVID-19 pandemic, schools will likely continue online/remote teaching and learning in the post pandemic realm whenever physical schooling is not viable. Such studies could be helpful as my findings indicated that teachers’ pedagogical practices with DTs remained unchanged when they moved to online teaching and learning during the pandemic.

4. As the current study explored primary teachers’ pedagogical practices with DTs in English lessons, potential follow-up research could examine students’ DT use for learning English as a second language at various levels of schooling such as the primary, secondary, and tertiary levels. Such a study could focus on how DT integration impacts the study of students’ language learning experiences as well as their language proficiency.

5. Other researchers may find it practical to use my proposed TPACK-in-Context framework (see chapter 2, Figure 2.4) to explore teachers’ subject-dependent TPACK enactment in various contexts, perhaps in comparative studies. Additionally, they may find my illustration of the complex interplay of factors depicted in Figure 5.2 useful for understanding and exploring how multilevel contextual factors interact in shaping teachers’ pedagogical practices with DTs.

6. Researchers and doctoral students may find my NVivo-enhanced Spiral-QDA process (see chapter 3, Figure 3.7) useful for qualitative data analysis in their own research. Adopting this process would also give them an opportunity to make a methodological contribution by examining the effectiveness of the process in their own study. I propose the NVivo-enhanced Spiral-QDA process because it made the data analysis of this phenomenological study less complicated and more manageable.

Final Thought

I would like to highlight some of my learning from this research and realisations from my PhD journey as a final thought. A significant learning from this research is that the mere use of digital technologies (DTs) in a lesson does not automatically link with any pedagogically meaningful use for student learning. As a result, I had to unlearn my understanding of meaningful DT use. Previously, I thought that any use of DTs in a lesson was meaningful. However, I learned that DTs, for example, for attention grabbing, content delivery or rewarding students’ behaviour, do not necessarily link directly to purposeful learning. I also understand that teachers’ DT use is situated within broader contextual (national, school, and classroom) factors. On the same note, I now understand that internal or teacher-related factors are as critical as external factors to enhancing the pedagogically wise use of DTs for teaching and learning. Moreover, I discovered that policy-makers, curriculum developers, teacher educators, technology leaders, and teachers all have roles to play in making DT use pedagogically purposeful for learners.

As I conclude my PhD journey, I have realised how far I have come in my personal and professional growth and the long road still ahead. With this recently gained knowledge related to DT integration, I am now more conscious of the complexities around DT use. So, instead of saying whether a specific teacher used DTs meaningfully, I will be more cautious about the factors influencing their practices with DTs. Also, I must acknowledge that this journey has made me realise that I have a lot more to unlearn, discover, and understand about DT use for teaching and learning. So, I intend to continue as a life-long learner and reflective practitioner. The journey also made me aware that completion of my PhD is, in reality, a new beginning of my journey to work with the Maldivian teachers to explore ways we could make lessons with DTs more meaningful for student learning. Therefore, I intend to collaborate with policy-makers, curriculum developers, teacher educators, technology leaders, and practising teachers to support the DT-integration process in Maldivian primary schools and beyond.

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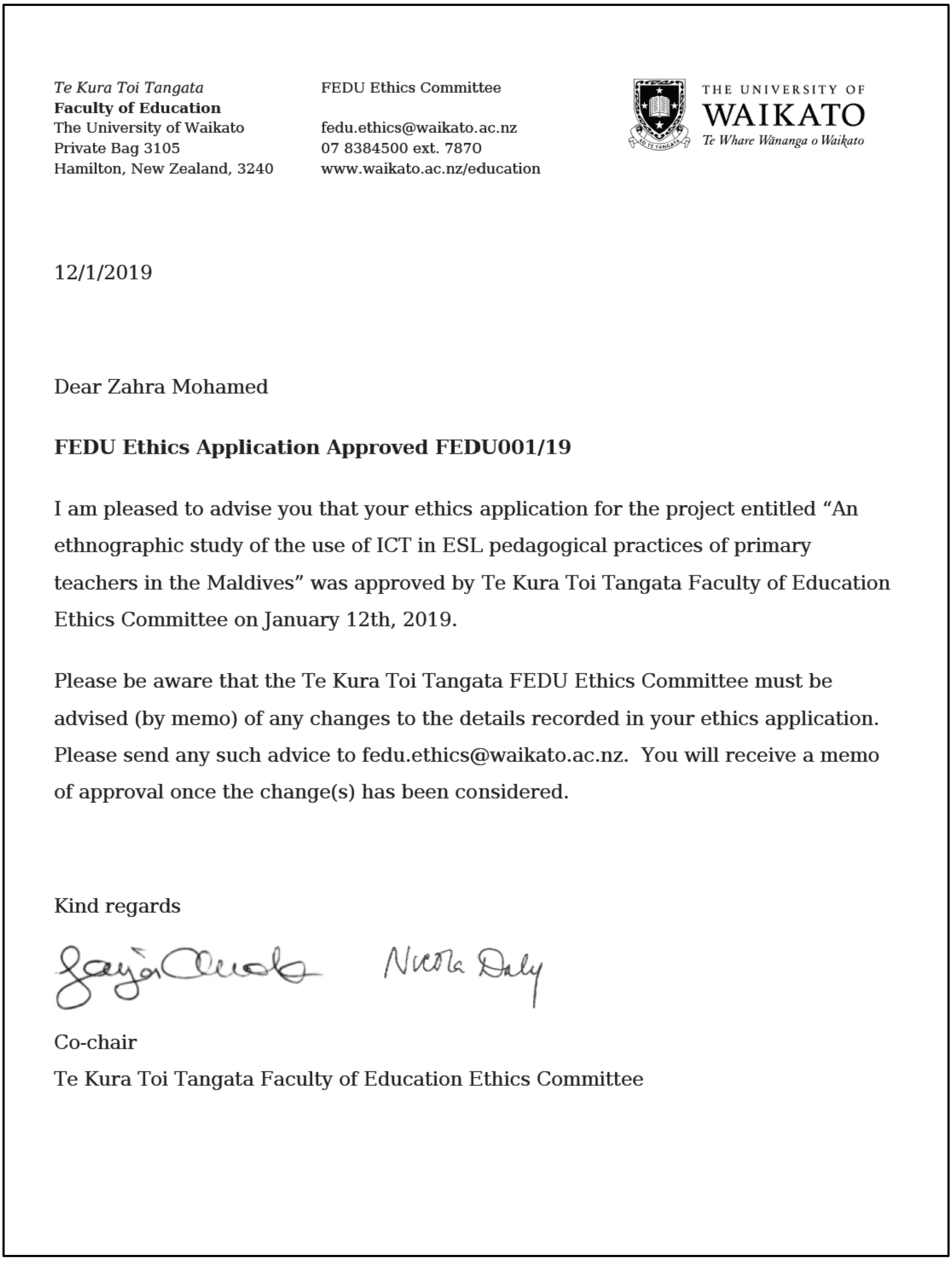
Appendices

Appendix A: Ethics approval



Te Kura Toi Tangata
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FEDU Ethics Committee

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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

12/1/2019

Dear Zahra Mohamed

FEDU Ethics Application Approved FEDU001/19

I am pleased to advise you that your ethics application for the project entitled “An ethnographic study of the use of ICT in ESL pedagogical practices of primary teachers in the Maldives” was approved by Te Kura Toi Tangata Faculty of Education Ethics Committee on January 12th, 2019.

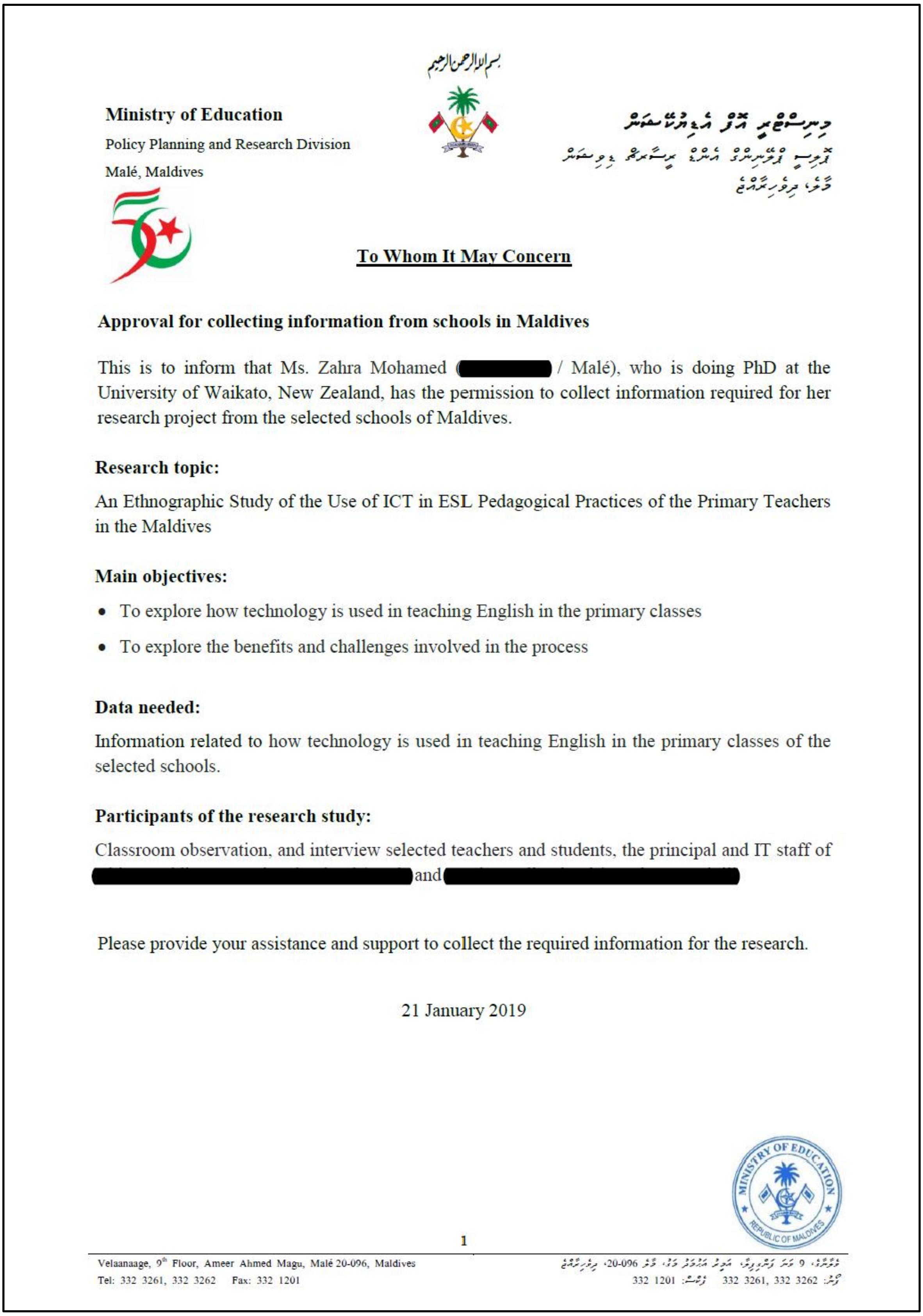
Please be aware that the Te Kura Toi Tangata FEDU Ethics Committee must be advised (by memo) of any changes to the details recorded in your ethics application. Please send any such advice to fedu.ethics@waikato.ac.nz. You will receive a memo of approval once the change(s) has been considered.

Kind regards

Nicola Daly

Co-chair
Te Kura Toi Tangata Faculty of Education Ethics Committee

Appendix B: Ministry of Education permission letter



بسم الله الرحمن الرحيم

Ministry of Education
Policy Planning and Research Division
Malé, Maldives

މިނިސްޓްރީ އޮފް އެޑިޔުކޭޝަން
ޕޮލިސީ ޕްލޭނިންގ އެންޑް ރިސާރޗް ޑިވިޝަން
މާލެ، ދިވެހިރާއްޖެ

To Whom It May Concern

Approval for collecting information from schools in Maldives

This is to inform that Ms. Zahra Mohamed ([redacted] / Malé), who is doing PhD at the University of Waikato, New Zealand, has the permission to collect information required for her research project from the selected schools of Maldives.

Research topic:

An Ethnographic Study of the Use of ICT in ESL Pedagogical Practices of the Primary Teachers in the Maldives

Main objectives:

- To explore how technology is used in teaching English in the primary classes
- To explore the benefits and challenges involved in the process

Data needed:

Information related to how technology is used in teaching English in the primary classes of the selected schools.

Participants of the research study:

Classroom observation, and interview selected teachers and students, the principal and IT staff of [redacted] and [redacted]

Please provide your assistance and support to collect the required information for the research.

21 January 2019

1

Velaanaage, 9th Floor, Ameer Ahmed Magu, Malé 20-096, Maldives
Tel: 332 3261, 332 3262 Fax: 332 1201

ވެލާނާގެ، 9 ވަނަ ފަންގިފިލާ، އަމީރު އަޙްމަދު މަގު، މާލެ 20-096، ދިވެހިރާއްޖެ
ފޯނު: 332 3261, 332 3262 ފެކްސް: 332 1201

Appendix C: Consent form for the school and the principal

Please fill in the information below and sign the consent form.

I ………………………………… (name), as the principal of ……………………………………………… (school), Maldives, agree to allow Zahra Mohamed, a PhD student at the University of Waikato, to conduct her research entitled "*An ethnographic study of the use of ICT in ESL pedagogical practices of primary teachers in the Maldives*" at this school.

Descriptions	**[✓]**
I have read the information sheet provided about the research entitled above.	
I am aware of this study's benefits and potential risks to the school, teachers and students and of ways the risks will be mitigated, including confidentiality of information and anonymity of participants' identity.	
I agree to allow the researcher to organise and conduct meetings with the teachers and students and to invite them to participate in the research.	
I agree to allow the researcher to observe lessons during scheduled classes.	
I agree to allow the researcher to attend school meetings, sessions, and activities.	
I agree to provide the researcher with information related to school policies and ICT infrastructure.	
I agree to participate in an interview which would last no more than an hour, and I know it will be audio recorded only with my consent.	
I am aware that the confidentiality of the information I give, and the anonymity of my identity will be protected as far as possible.	
I am aware that the information provided will only be used for academic purposes in scholarly publications and presentations, in addition to the PhD thesis of the researcher.	

Signature: …………………… Date: ………………………

This research was approved by the University of Waikato Faculty of Education Ethics Committee on 12 January 2019. Approval number: FEDU001/19.

Appendix D: Information sheet and consent form for teachers

I am Zahra Mohamed, a PhD student at the University of Waikato, New Zealand. I am conducting research for my thesis. I aim to explore how digital technologies (DTs) are used in teaching English in primary classes and the benefits and challenges involved in the process. As a primary English teacher, I invite you to participate in my research. Even though your principal has given permission to conduct this research at your school, your participation in this study is voluntary. You may withdraw your consent without giving any reasons for doing so at any time before data analysis which will begin three weeks after it is collected. You can contact me on my mobile phone or via the email provided in this form if you wish to withdraw from this study. I want to reassure you that the risks involved in participating in this research will be minimised to the maximum of my potential. I will ensure that most of the data is collected within regular working hours and in ways convenient for you. I also give assurance that the data collected will be anonymous and that there will be no risk of this research on your teacher appraisal and professional growth and position. If you are willing to participate in this study, I would appreciate your assistance in the following:

1. I would like you to complete the attached consent form, seal it in the envelope provided and return it to me. Signing the consent form indicates your agreement to participate in my study.

2. I would like to observe your teaching weekly for 12 weeks to understand better how digital technologies are used in teaching English. I intend to observe a total of 12 lessons, each of which could be between 35-40 minutes. I would like to audio record the lessons and take photographs of student works with your consent. Also, please note that you can request to turn off the audio recorder anytime you feel uncomfortable. Any photographs that identify you or the students will not be used publicly to protect everyone’s identity.

3. As a follow-up to the observation, I would like to have a conversation with you regarding anything you or I may want to clarify related to your English lesson. These will be held after each of the 12 observations. The conversations will centre around specific activities carried out in the lesson, student participation or your planning and implementation of the lesson. These conversations will not take more than 15 minutes (no more than 3.5 hours over the whole period) and will be arranged at a time and place that is mutually convenient.

4. I would also like you to email me a copy of all your English lesson plans for the chosen class for the 14 weeks I will be at the school. I would like you to email the lesson plans to me weekly by the end of each week. The lesson plans are collected to find out the planning done and required to use different technological tools in teaching English.

5. To explore the benefits and challenges of using technology in teaching, I would also like to conduct an interview with you which would last no more than an hour and be audio recorded with your consent. If you wish, you can tell me to discontinue recording at any time during the interview. This interview will be transcribed, and you will have the opportunity to review the transcript. You will be given three weeks to review the key points before I use them in my

thesis. There might also be information relevant to my study in more informal conversations that we have. If this happens, I will explicitly ask you for your permission to use specific content of our conversations in my study, and I will only use this if you give consent.

6. To further understand various aspects of using technology in teaching English, I would also like to ask you to participate in mini-surveys that will be conducted as and when the need arises during the period of data collection at the school. A total of not more than eight online surveys will be conducted, with each consisting of 1-2 open-ended questions that you can answer in about 10 minutes during school hours. Hence, you will not have to spend more than 80 minutes on the mini-surveys carried out over the 14 weeks of data collection in your school.

While all the hard copies of the information you provide will be kept in a locked cabinet in my house, the soft copies will be saved, and password protected on my laptop. When reporting the findings, pseudonyms will be used instead of your and the school's real name. While every effort will be made to protect your anonymity, this cannot be guaranteed. Even though your identity may be protected, the data shared will not remain confidential since it is reported in the project.

The information gained will mainly be used for producing my thesis, and a part of the research may also be used for other academic purposes, such as scholarly publications and academic presentations. Upon completing my studies, you can access my thesis published in the University of Waikato Research Commons, the digital repository for the thesis.

Thank you so much for your valuable time in making this possible. Should you have any queries related to this study or would like to know more about it, please feel free to contact me:

My contact details in New Zealand:
Zahra Mohamed
Faculty of Education
University of Waikato
Phone: [redacted]

My contact details in Male', Maldives:
Zahra Mohamed
[redacted]
Male', Maldives
Phone: [redacted]
Email: zahra.mohamed9907@gmail.com

My Chief Supervisor is:
Dr Lynne Parmenter
Centre for Tertiary Teaching and Learning,
University of Waikato
Phone: [redacted]
Email: lynne.parmenter@waikato.ac.nz

My Second Supervisor is:
Dr Dilani Gedera
Centre for Tertiary Teaching and Learning
University of Waikato
Phone: [redacted]
Email: dilani.gedera@waikato.ac.nz

This research was approved by the University of Waikato Faculty of Education Ethics Committee on 12th January 2019. Approval number: FEDU001/19.

Please fill in the information below and sign the consent form.
I ……………………………………………… (name) of ………………………………… (school), Maldives, agree to participate in the research entitled "*An ethnographic study of the use of ICT in ESL pedagogical practices of primary teachers in the Maldives*" conducted by Zahra Mohamed, a PhD student at the University of Waikato.

Descriptions	**[✓]**
I have read the information sheet provided about the research entitled above.	
I agree to participate in this study voluntarily and fully understand my right to withdraw from the research at any time before data analysis commences.	
I agree to participate in an interview which would last no more than an hour, and I know it will be audio recorded only with my consent.	
I agree to give the researcher permission to observe my teaching during scheduled English classes weekly for 12 weeks and to take photographs of my students' work with our consent.	
If the content of informal conversations with the researcher is relevant to the study and the researcher wants to use this in her study, I am aware that she will ask my permission to use specific content from the informal conversations explicitly.	
I agree to provide the researcher with a copy of all my English lesson plans for 12 weeks.	
I agree to participate in a maximum of 8 online mini-surveys of 10 minutes each that would be conducted at school by the researcher as and when required.	
I am aware that the confidentiality of the information I give, and the anonymity of my identity will be protected as far as possible.	
I am aware that the information I provide will only be used for academic purposes in scholarly publications and presentations in addition to the PhD thesis of the researcher.	

Email: ……………....................... Signature: …...…………………. Date: ……………….

This research was approved by the University of Waikato Faculty of Education Ethics Committee on 12 January 2019. Approval number: FEDU001/19.

Appendix E: Dhivehi information sheet and consent form for parents

ބެލެނިވެރިންނަށް އެރުވޭ މަޢުލޫމާތު ކަރުދާސް

އަޅުގަނޑު ޢަހުމާ މުޙައްމަދަކީ، ނިއުޒިލޭންޑްގެ ޔުނިވަރސިޓީ އޮފް ވައިކާޓޯގައި ޕީއެޗްޑީ އަށް ތައުލީމު ހާސިލުކުރަމުންދާ ފަރާތެކެވެ. އަޅުގަނޑުގެ ދިރާސާކުރުމަށް ހާއްސަކޮށްފައިވަނީ، ދިވެހިރާއްޖޭގެ ސްކޫލުތަކުގެ ޕްރައިމަރީ ގްރޭޑުތަކުގައި އިނގިރޭސި މާއްދާ ކިޔަވައިދިނުމުގައި ޓީޗަރުން ޓެކްނޮލޮޖީ ބޭނުންކުރާ ގޮތާއި، އޭގެ ފައިދާ އާއި ގޮންޖެހުންތައް ދެނެގަތުމެވެ. އެގޮތުން މި ދިރާސާ އަމާޒުކުރަނީ ތިޔަ ފަރާތުގެ ބެލެނިވެރިކަމުގެ ދަށުގައިވާ ދަރިވަރުގެ އިނގިރޭސި މާއްދާ އުނގެނުމާއި އުނގަންނައިދިނުމުގެ މައްޗަށެވެ.

މި ދިރާސާގެ ސަބަބުން، ދިވެހިރާއްޖޭގެ މަދަރުސާއެއްގައި އިނގިރޭސި ބަސް ކިޔަވައިދިނުމުގައި ޓެކްނޮލޮޖީ ބޭނުންކުރުމުގެ ސަބަބުން ކުރާ ފައިދާތަކުގެ އިތުރުން، ކުރިމަތިވާ ގޮންޖެހުންތަކާ ކޮބައިކަން ހޯދިގެންދާނެއެވެ. އަޅުގަނޑު ތަޙުޤީޤުކުރާއިރު، ތިޔަ ފަރާތުގެ ބެލެނިވެރިކަމުގެ ދަށުގައިވާ ދަރިވަރުން އެއްވެސް ގެއްލުމެއް ނުލިބޭނެ ގޮތަށް ގޮވާ ކަމެއް، އަޅުގަނޑުގެ ޒާތީ ފަރާތުން ތަން ދިން އެއްގެ މަޢުލޫމާތު މަސައްކަތްކުރުމުގައި ކަމެވެ. ދަރިވަރުގެ ފަރާތުން މަޢުލޫމާތު ހޯދުމަށް ބައިވެރިކުރުމަށް ބައިވެރިވެ، ސުވާލުގެ ވަގުތުގައި ސުވާލުގެ ކަންކަން ބަރާބަރަށް ހިނގަމުންދެވެ. މި ދިރާސާއަށް ދަރިވަރުންގެ ފަރާތުން ސުވާލުތަކުން ސާފުވާނެ ފަދަ ހުރި މަޢުލޫމާތު، ދަރިވަރުގެ އެއްވެސް މަޢުލޫމާތެއް ހާމަނުކުރާ، ސިއްރުކޮށް ރައްކާކުރެވޭނެ ގޮތަށް ހުށަހަޅާނެ. އެގޮތުން ދަރިވަރު ދާ މަޢުލޫމާތުތަކުގެ ސަބަބުން އެ ދަރިވަރަށް ލިބޭ ގެއްލުމެއް (ނަތީޖާ) ނުވަތަ ސުވާލުގައި ދަރިވަރު އަދާކުރާ މަޤާމަށް (ޤާނޫނީ ސިފަކަން) އެއްވެސް ނުރައްކާ އަސަރެއް ނުކުރާނޭ ކަމުގެ ޔަޤީންކަން ވެސް ދެމެވެ.

ޕްރައިމަރީ ދަރިވަރެއްގެ ގޮތުގައި ބައިވެރިވެދޭނެތީ ތިޔަ ދަރިވަރު މި ދިރާސާގައި ބައިވެރިވުމަށް ދަޢުވަތުދެއްވަމެވެ. މި ދިރާސާ ކުރިއަށް ގެންދިއުމަށް، ތިޔަ ދަރިވަރު ބައިވެރިވާ ސުވާލުތަކަށް ޖަވާބުދެއްވުން ލާޒިމު ނޫނެވެ، މި ދިރާސާގައި ބައިވެރިވުމުގެ އިޚްތިޔާރު ދަރިވަރަށް ލިބިގެންވެއެވެ. ތިޔަ އަށް ދިނަ ދަރިވަރަށް. އެގޮތުން ބައިވެރިވާ ދަރިވަރުނަށް ދިރާސާގެ ބައިވެރިވުމުން ފުރަތަމަ ޖުމްލަތަކުގެ ފުރިހަމަ އިޚްތިޔާރު ދޫކޮށްލެއްވުން. މިގޮތުން، މި ދިރާސާއަށް މަޢުލޫމާތު އެކަށައަޅާ ކުރިން 3 (ދިރާސާއަށް މަޢުލޫމާތުދިނުމާ ހަފްތާގެ ތެރޭގައި) ދެކުން މަޢުލޫމާތު ދިރާސާގައި ހިމެނުމަށް ޖަވާބުދެވުނު ފުރިހަމަ އިޚްތިޔާރު ލިބިގެންވާނެއެވެ. މިގޮތުން، މި މަޢުލޫމާތު ކަރުދާހާއި ބައިވެރިވާ އަޅުގަނޑުގެ ނަމްބަރަށް ގުޅާލައިގެން ނުވަތަ ބައިވެރިކަމާ ގުޅިގެން އެކުލަވާލުމުގެ ފަހުން ދިރާސާގައި ބައިވެރިވާނަމަ ފުރިހަމަ ދަރިވަރުގެ ނަމާއި ކުރީގެ ނުވަތަ ބައިވެރިކަން ނުގެނެސް ހުށަހަޅާނެ ގޮތަކާއެކު 18 އަހަރުން ދަށުގެ ކުދިންކަން ވުމާއި، ބެލެނިވެރިއާގެ އިޙްތިރާމްކޮށްދެވޭނެ އެއްބަސްވުން މި ދިރާސާގައި ކަންކުރުން ވެސް ބޭނުމެވެ.

މިބާގެ ދަރިވަރު މި ދިރާސާގައި ބައިވެރިކުރުމަށް ހުއްދަދެއްވަނަ އެންގެވުމަށް ކަރުދާހުގައި ސޮއި ފުރިހަމަ އެދެވިފައިވާ ނަމަ ނުވަތަ އެދެމެވެ.

1. މި ދިރާސާގައި ބައިވެރިވާ ކަމުގައިވާނަމަ، މި މަޢުލޫމާތު ކަރުދާހާއި ހަވާލުކުރެވޭ އިޙްތިރާމެއް ނެތިކަން ބަލާނެ ކަމެއް (ކަންބޮޑުވުމެއް ވާނަމަ)، ހަވާލުކުރެވޭ ސިޓީ އެކަމުގައި ބޭނުންކަން، ދަރިވަރު ބަލާ ސުވާލު ފުރަތަން އަންނަ ގޮތުގައި އަޅުގަނޑާ ހަވާލުކުރެއްވުމަށް އެދެމެވެ.

2. ތިބާގެ ދަރިފުޅުގެ އިނގިރޭސި ކުލާހުގައި ޑިޖިޓަލް ބުކްޝެލްފް ބޭނުންކުރާގޮތް ދަސްކުރުމަށްޓަކައި، އެ ކުލާހުގެ އިނގިރޭސި ޓީޗަރާ 12 ހަފްތާ ވަންދެން އަޅުގަނޑު އޮބްޒާވްކުރާނަމެވެ. ކޮންމެ އޮބްޒާވޭޝަނެއް ވެސް ޕީރިއަޑެއްގައި ދިގު މުއްދަތަކީ 45-35 މިނިޓެވެ. މިގޮތުން އޮބްޒާވްކުރާ ގޮތް އޯޑިއޯ ރިކޯޑްކުރެވޭނެއެވެ.

3. މި ދިރާސާއަށް ބޭނުންވާ ހިސާބުގައި، ތިބާގެ ދަރިފުޅާއި ވާހަކަދައްކައިގެން އޭނާގެ އިނގިރޭސި ގަޑީގެ ގުޅުންހުރި މަޢުލޫމާތު ހޯދާނަމެވެ. މި ގޮތުން ދަރިފުޅުގެ ވަކި ވަގުތެއް ކަނޑައެޅުމަކީ، ގުޅުންހުރި ވެސް ދެކޮޅުވާނަމެވެ. މިކަމަށް ގިނަ ވެގެން ހާދަވާނީ 15 މިނެޓެވެ.

4. ދަރިފުޅު ފުރިހަމަކުރާ މަސައްކަތްތަކުގެ ފޮޓޯ ނެގުމަށްފަހު އަޅުގަނޑަށް ފޮނުއްވުމަށް އެދެމެވެ. މިގޮތަށް ދަރިފުޅު ވަކިން ކުރާ މަސައްކަތްތަކާއި ގުރޫޕު ތަކެއްގައި ފުރިހަމަކުރާ މަސައްކަތް (ފުރިހަމަކުރެވުނު ފޮޓޯގައި ތަސްވީރުވެފައި ހުންނަ މަސައްކަތްތައް) ހިމެނޭނެއެވެ. މިއިން އެއްވެސް ފޮޓޯއެއްގައި ތިބާގެ ދަރިފުޅު ސާފުކޮށް ފެންނަގޮތަށް އެއްވެސް ފޮޓޯއެއް ނެގުމެއް ނުކުރާނެއެވެ.

5. އިނގިރޭސި މާއްދާ އުނގެނުމުގައި ޑިޖިޓަލް ބުކްޝެލްފް ބޭނުންކުރާގޮތް އިތުރަށް ދަސްކުރުމަށް ތަފާތު ގޮތްގޮތުން ކުރާ މަސައްކަތްތަކުގެ ތެރެއިން، ދިރާސާއަށް މަޢުލޫމާތު އެއްކުރުމަށް މަސައްކަތްތަކާއި ގުޅޭ ތަކެތި ކުރިއަށް ގެންދާ ކުރި ސާމްޕަލްތަކުގައި ތިބާގެ ދަރިފުޅުގެ ބައިވެރިވުމަށް ވެސް ހިމެނޭނެއެވެ. މިގޮތުން، 8 އަހަރު ފުރި ގިނަ ދަރިންނަށް، މި ބާވަތުގެ ސާމްޕަލް ކުރިއަށް ގެންދިއުމަށް ޒަރޫރީކުރަމެވެ. މިއީ ގޮތް ގަސްތުން 10 މިނެޓް 2-1 ދުވަހުގެ ހަފްތާ ބޮޑު ހަފްތާ ސާމްޕަލްތަކުގެ މަޢުލޫމާތު ކުރިއަށް ގެންދިއުމަށް ޒަރޫރީކުރާ ކުރި ސާމްޕަލްތަކެވެ.

ދިރާސާގައި ތިބާގެ ދަރިފުޅުގެ ވަޒީފާ ހުރި މަޢުލޫމާތުތަކުގެ ހުރި ކޮޕީއެއް އަލަށް ރިޕޯޓްތަކުގައި ތަޢުލީމީ ރިޕޯޓްތަކުގެ ރިކޯޑްތަކާއި އަޅުގަނޑުގެ ގާތުގައި ބަހައްޓާނަމެވެ. އަދި ސަލާމަތް ކޮމްޕިއުޓަރުގައި، އަޅުގަނޑުގެ ލެޕްޓޮޕްގައި ރިޕޯޓްތަކުގެ ކޮޕީ ޕާސްވޯޑްއެއް ވެސް ޖަހައިފައެވެ. އަދި ދިރާސާގައި އެ މަޢުލޫމާތުތައް ހިމެނޭ، ތިބާގެ ދަރިފުޅުގެ ސަލާމަތުން އެކަން ބަލަހައްޓާ ބޭނުންކުރެވޭނެ. އެއްވެސް ކަމަކުން ދިރާސާގެ އެއްވެސް ހިއްސާއެއްގައި، މި ދިރާސާއަށް މަޢުލޫމާތު އެހެނިހެން ތިބާގެ ދަރިފުޅުގެ ކިބައިން ނަންގެނެވޭނެއެވެ. ދިރާސާގައި ތިބާގެ ދަރިފުޅުގެ މަޢުލޫމާތު ހާމަނުކުރާނެ ނަމަވެސް، ތިބާގެ ދަރިފުޅު މި ދިރާސާއަށް ދެން މަޢުލޫމާތު ސިއްރުކޮށް ބޭނުންކުރެވޭނެއެވެ. ސަބަބަކީ، އެ މަޢުލޫމާތެއް މި ދިރާސާގައި ހިމަނާނީއެވެ.

މި ދިރާސާގެ ޖަރީދާއިން ހޯދާ މަޢުލޫމާތެއް އަޅުގަނޑުގެ ތީސިސް (ޕީއެޗްޑީ ގެ ދިރާސާގެ ލިޔުމު) ގައި ހިމެނުމުގެ އިތުރުން އެހެނިހެން އިލްމީ ކޮންފަރެންސްތަކުގައި ވެސް ބޭނުންކުރެވިދާނެއެވެ. މިގޮތުން އިލްމީ މަޖައްލާތަކުގައި ޝާއިޢުކުރުމާއި، އެހެނިހެން ހަރަކާތްތަކުގައި ވެސް ބޭނުންކުރެވިދާނެއެވެ. ތިބާއަށް އަޅުގަނޑުގެ މިދިރާސާ، އުނިވަރސިޓީ އޮފް ވައިކާޓޯ ގެ ރިސަރޗް ކޮމިޓީގެ ބައިން ލިބޭނެ މަގު ވެސް އެނގޭނެއެވެ.

މި ދިރާސާއަށް ތިބާގެ ފަރާތުން ލިބިގެން ދިޔަ އެހީތެރިކަމާއި، އެއްބާރުލުމާއި އަގުހުރި ވަގުތަށް ނިހާޔަތަށް ޝުކުރުވެރިވަމެވެ. ޖުމުލަކޮށް، މި ދިރާސާގައި ތިބާގެ ހިއްސާއާ ގުޅޭ އެއްވެސް ސުވާލެއް އޮތް ނަމަ އަޅުގަނޑާ ގުޅައިގެން ސާފުކުރުމަށް އެދެމެވެ.

އަޅުގަނޑާ ނިއުޒީލޭންޑުން ގުޅޭނެ މައުލޫމާތު:
ޒަހުރާ މުހައްމަދު
ފެކަލްޓީ އޮފް އެޑިޔުކޭޝަން
ޔުނިވަރސިޓީ އޮފް ވައިކާޓޯ
ފޯނު: [redacted]

އަޅުގަނޑާ ދިވެހިރާއްޖެއިން ގުޅޭނެ މައުލޫމާތު:
ޒަހުރާ މުހައްމަދު
[redacted]
މާލެ، ދިވެހިރާއްޖެ
ފޯނު: [redacted]
އީމެއިލް: zahra·mohamed9907@gmail·com

އަޅުގަނޑުގެ ޗީފް ސުޕަވައިޒަރީ:
ޑރ. ލިން ޕަރމެންޓަރ
ސެންޓަރ ފޮރ ޓަރޝިއަރީ ޓީޗިންގ އެންޑް ލަރނިންގ
ޔުނިވަރސިޓީ އޮފް ވައިކާޓޯ
ފޯނު: [redacted]
އީމެއިލް: lynne·parmenter@waikato·ac·nz

އަޅުގަނޑުގެ ދެ ވަނަ ސުޕަވައިޒަރީ:
ޑރ. ޑިލާނީ ގެޑެރާ
ސެންޓަރ ފޮރ ޓަރޝިއަރީ ޓީޗިންގ އެންޑް ލަރނިންގ
ޔުނިވަރސިޓީ އޮފް ވައިކާޓޯ
ފޯނު: [redacted]
އީމެއިލް: dilani·gedera@waikato·ac·nz

މި ދިރާސާ ވަނީ، 12 ޖަނަވަރީ 2019 ގައި (ފާސްކުރި ނަމްބަރު: FEDU001/19) ޔުނިވަރސިޓީ އޮފް ވައިކާޓޯ ގެ ފެކަލްޓީ އޮފް އެޑިޔުކޭޝަންގެ އެތިކްސް ކޮމިޓީ އިން ފާސްކޮށްފައެވެ.

ބެލެނިވެރިޔާގެ ހުއްދައަށް އެދޭ ފޯމު

ތިރީގައިވާ މައުލޫމާތުތައް ފުރިހަމަކޮށް މި ފޯމުގައި ސޮއިކޮށްދިނުން އެދެމެވެ.

ޔުނިވަރސިޓީ އޮފް މޯލްޑިވްސްގައި ޕީއެޗްޑީ އަށް ކިޔަވަމުންދާ ޢަރުނާ މުޙައްމަދު ހަދަމުންދާ ދިރާސާގައި އަޅުގަނޑު..................

..................................(ނަން)ގެ ބެލެނިވެރިކަމުގެ ދަށުގައިވާ ދަރިފުޅު،..

....(ދަރިފުޅުގެ ނަން)، ....(ކްލާސް)، ....(ސްކޫލު)،

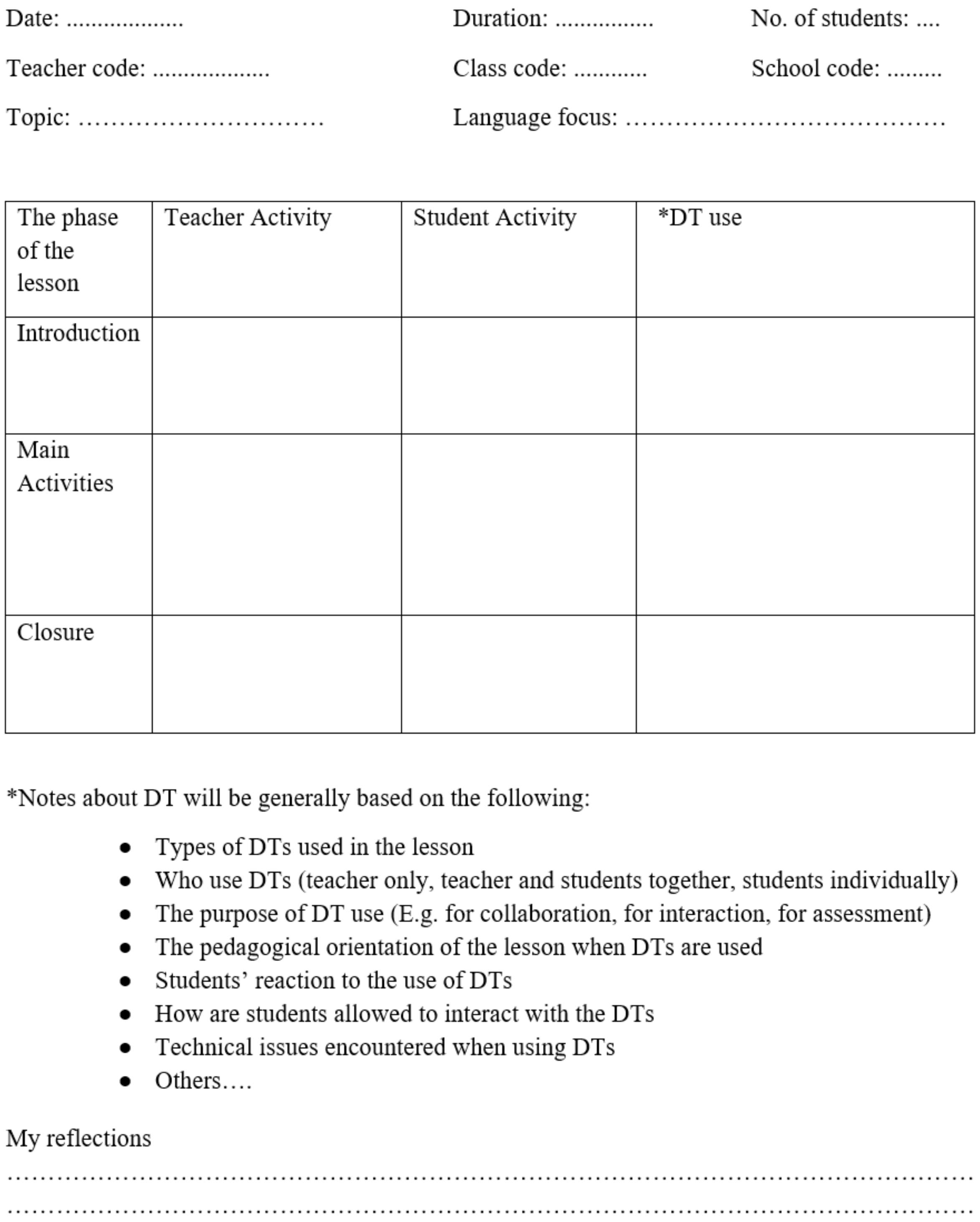
ބައިވެރިވުމުގެ ހުއްދަދެމެވެ.

ތަފްސީލު	[✓]
މަތީގައި ބަޔާންކޮށްފައިވާ ދިރާސާއާ ގުޅޭ މައުލޫމާތު ކިޔާފައި އަޅުގަނޑު ކިޔައިފީމެވެ.	
އަޅުގަނޑުގެ ދަރިފުޅު މި ދިރާސާގައި ބައިވެރިވުމަށް އަޅުގަނޑު ހުއްދަ މި ދޭނީ އަޅުގަނޑުގެ އިޚްތިޔާރުގައެވެ. އަދި މި ދިރާސާގެ ޑޭޓާ އެނަލައިޒްކުރުމުގެ ކުރިން، ކޮންމެ ވަގުތެއް ވެސް، އަޅުގަނޑުގެ ދަރިފުޅު ދިރާސާގެ ބައިވެރިވުން ހުއްޓާލެވިދާނެ ކަން އަޅުގަނޑަށް އެނގެއެވެ.	
މި ދިރާސާކުރާ ފަރާތުން، އަޅުގަނޑާއި އަޅުގަނޑުގެ ދަރިފުޅުގެ ހުއްދަހޯދައިގެން، ދަރިފުޅުގެ އިންޓަވިއު ކްލާސްތަކުގެ އޮބްޒާވްކުރުމާއި، ވީޑިއޯ ނަގައިގެން އަޅުގަނޑުގެ އިއްތިފާގާއެކު ނޫނެވެ.	.
މި ދިރާސާކުރާ ފަރާތުން، 15 މިނިޓްހާވަރު ދިގު ނޫން ނަމަވެސް ބައްދަލުވުންތަކެއް ބޭއްވުމަށް އަޅުގަނޑުގެ ދަރިފުޅުގެ އިސްކޫލު ކްލާސްތަކުގެ ގަޑިތަކުގައި ބުރަކުރިން ކަމެއް އަދި ވަގުތަކަށް ހުރަހަކަށް އަޅުގަނޑުގެ އިއްތިފާގާއެކުއެވެ.	
ދިރާސާކުރާ ފަރާތުން ބޭނުންވެއްޖެ ހިނދެއްގައި، ސްކޫލްގައި 10 މިނިޓްގެ ކުރިއަށް ގެންދާ، 8 ކުދި ސުވާލެއް، އަޅުގަނޑުގެ ދަރިފުޅު ބައިވެރިވުމުގައި އަޅުގަނޑުގެ އިއްތިފާގާއެކުއެވެ.	
މި ދިރާސާއަށް އަޅުގަނޑުގެ ދަރިފުޅު ދޭ މައުލޫމާތުތަކުގެ ސިއްރުކޮށް ފޯރުކޮށްދޭނެ ކަމަށް، ދަރިފުޅުގެ އެއްވެސް މައުލޫމާތެއް އެއްވެސް ފަރާތަކާ ހިއްސާނުކުރާނެކަމަށް، އަދި މައުލޫމާތުތައް ވަރަށް ރައްކާތެރިކޮށް ބަހައްޓާނެކަން ކަށަވަރު ކަން، ޔަގީންކުރަމެވެ.	
މި ދިރާސާއިން އަޅުގަނޑުގެ ދަރިފުޅު ގެއްލުމެއް ނުލިބޭނެ ގޮތަށް މައުލޫމާތު ބެލެހެއްޓުމުގައި މި ދިރާސާކުރާ ފަރާތުގެ ޒިންމާ ވިސްނުމުގެ އިތުރުން، އިޚްލާޤީ އަދި ދިރާސީ ބެލެނިވެރިކަމުގެ ގޮތުން ކަން ޔަގީންކުރަމެވެ.	

ސޮއި: ....   ތާރީޚު:.........................

މި ދިރާސާ ވަނީ، 12 ޖަނަވަރީ 2019 ގައި (ފާސްކުރި ނަމްބަރު: FEDU001/19) ޔުނިވަރސިޓީ އޮފް މޯލްޑިވްސް ގެ ފެކަލްޓީ އޮފް އެޑިއުކޭޝަންގެ އެތިކްސް ކޮމިޓީ އިން ފާސްކޮށްފައެވެ.

Appendix F: Lesson observation guide



Date: ....
Duration: ....
No. of students: ....
Teacher code: ....
Class code: ....
School code: ....
Topic: …………………………
Language focus: …………………………………

The phase of the lesson	Teacher Activity	Student Activity	*DT use
Introduction			
Main Activities			
Closure			

*Notes about DT will be generally based on the following:

- Types of DTs used in the lesson
- Who use DTs (teacher only, teacher and students together, students individually)
- The purpose of DT use (E.g. for collaboration, for interaction, for assessment)
- The pedagogical orientation of the lesson when DTs are used
- Students’ reaction to the use of DTs
- How are students allowed to interact with the DTs
- Technical issues encountered when using DTs
- Others….

My reflections

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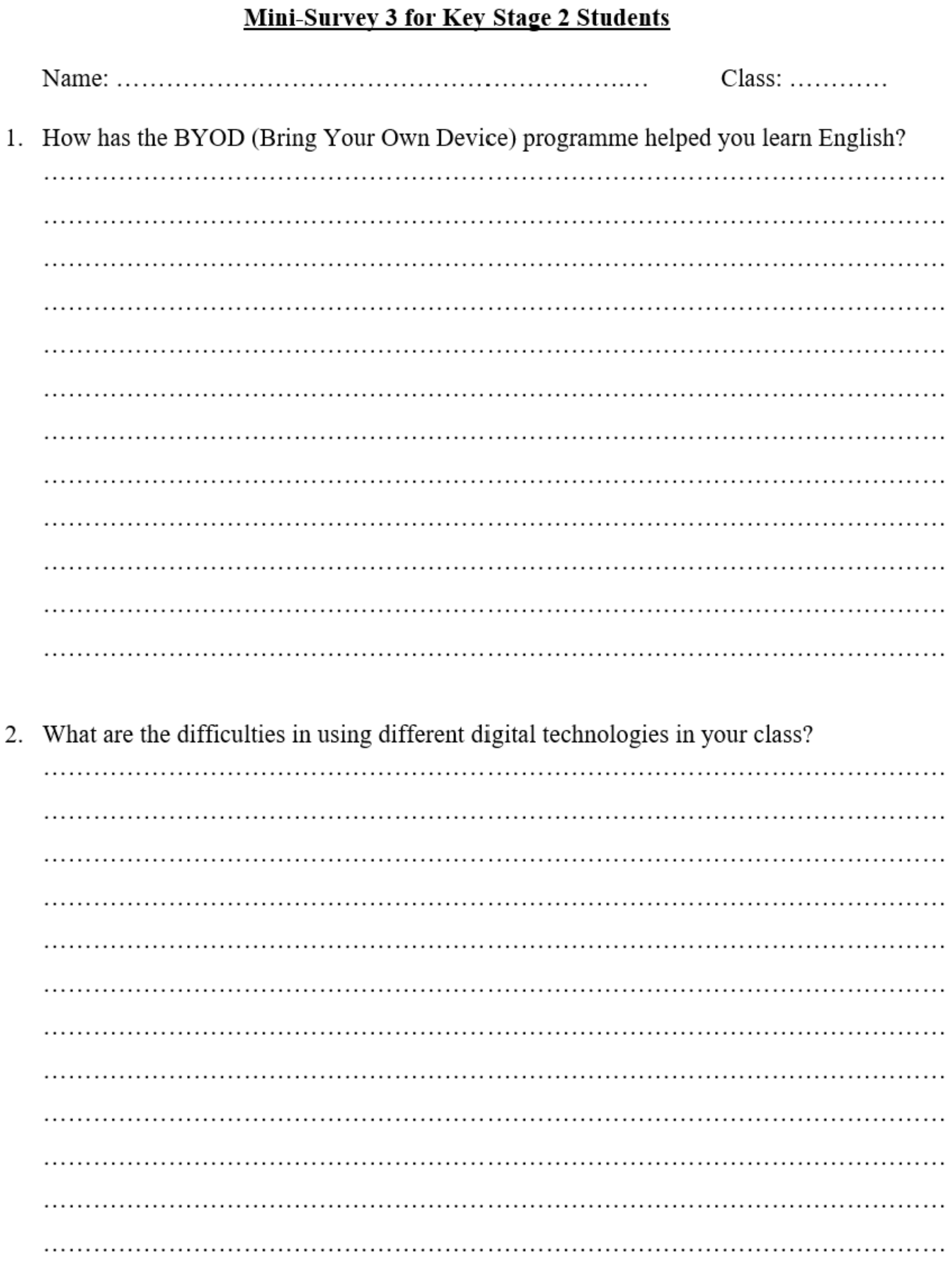
Appendix G: A sample mini survey



Mini-Survey 3 for Key Stage 2 Students

Name: ……………………………………………………….…   Class: …………

1. How has the BYOD (Bring Your Own Device) programme helped you learn English?

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2. What are the difficulties in using different digital technologies in your class?

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Appendix H: Teacher interview guide

1. Can you tell me what you think about using digital technology in education?
2. Can you share your very first experience of using digital technology for teaching?
3. Do you think digital technology use has influenced your teaching style? Why or why not?
4. What are the positive impacts that digital technology has brought to your teaching?
5. What negative influences has digital technology had on teaching and learning in your class?
6. What is your favourite technological tool? And why?
7. In your opinion, what are the benefits of using digital technologies in teaching English?
8. Can you tell me how you use different technological tools in your English class?
9. Which technological tool do you use most frequently in your English classes? Why?
10. In your opinion, what is the most effective technological tool you have used in teaching English? And why?
11. Which educational software/hardware would you like to try in your English class in the future? And why?
12. Are there specific software/hardware you prefer for specific activities in the English lessons?
13. How can digital technologies be used to assess students?
14. Do you encourage your students to use digital technology to improve their use of the English language outside the classroom? If yes, how? Why or why not?
15. What are the challenges in using technology in the teaching and learning process?
16. What kind of support do you require to use technological tools more meaningfully in teaching?
17. What are professional development opportunities available for teachers related to digital technology use? And how often are they offered?
18. How helpful is the new National Curriculum of the Maldives in providing the opportunity to use digital technology in teaching English?
19. Is there anything else you would like to say about using digital technologies in teaching English?