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# The Factors Impacting Secondary School Teachers' Continuance Intention to Use Madrasati Platform in Saudi Arabia

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# ABSTRACT

During the rapid outbreak of the COVID-19 pandemic, most countries enforced stay-at-home policies, which led to an increase in distance working. Accordingly, e-learning was utilised to replace face-to-face education, with many educational organisations across the world switching to online teaching and learning. In Saudi Arabia (SA), the option for e-learning was not widely supported in public schools. The Ministry of Education (MoE) developed an online learning management system (LMS) named Madrasati to support the educational process during school closures. However, a large proportion of teachers chose to continue using Madrasati even after schools returned to face-to-face teaching, making it part of their post-pandemic approaches to teaching and learning. This study aims to investigate the reasons and motivations associated with the post-COVID-19 usage of Madrasati. This is of particular interest given that, internationally, LMSs such as Madrasati typically feature more prominently in further and higher education than they do in elementary and secondary school education.

To thoroughly address the research question, this study adopts an explanatory sequential mixed-methods approach, wherein both quantitative and qualitative data were gathered in an organised sequence. First, a proposed model for a continued use of e-learning platforms was developed, primarily informed by the Decomposed Theory of Planned Behaviour (DTPB) and other relevant e-learning studies. In the first phase, a large-scale survey was conducted with 304 secondary school teachers in SA, who completed an online questionnaire. At this stage, Structural Equation Modelling (SEM) was applied to evaluate the proposed model, utilising two main techniques: the measurement model and the structural model. In the second phase, follow-up interviews were undertaken with 19 secondary school teachers, with a reflexive thematic analytical approach used to clarify the quantitative findings and to gain a deeper understanding of the rationale behind their decisions regarding the continuance of Madrasati use.

The obtained results confirmed that the proposed model demonstrated a good fit with the quantitative data, verifying the validity and reliability of its instruments. The survey findings identified significant factors influencing teachers' intentions to continue using Madrasati, including learning content quality, perceived usefulness, social influence, and self-efficacy. Most teachers demonstrated favourable attitudes towards the platform, with social influence—particularly from peers and students—emerging as a strong predictor of

continuance intention. In contrast, qualitative data from the interviews revealed some concerns that could hinder the platform's continued use, such as insufficient professional training, limited technical support, and inadequate internet infrastructure, particularly in rural areas.

From an academic perspective, the proposed model may provide a useful tool for researchers in the field of technology adoption in education who wish to examine factors influencing the intention to adopt LMSs and technological platforms in diverse contexts. In addition, practical recommendations were presented to Saudi educational stakeholders and Madrasati's developers to implement methods that could increase teachers' motivation to continue using the platform.

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# Declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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# Definitions and Abbreviations

| | |
|---|---|
| COVID-19 | Coronavirus disease 2019 |
| SA | Saudi Arabia |
| MoE | Ministry of Education |
| GPGE | General Presidency for Girls' Education |
| MoK | Ministry of Knowledge |
| MoFA | Ministry of Foreign Affairs |
| MSA | Modern Standard Arabic |
| GAT | General Aptitude Test |
| SAAT | Standardised Achievement Admission test |
| ICT | Information and communication technology |
| GAET | General Administration for Education Technology |
| LMS | Learning management system |
| NELC | National E-Learning Center |
| NCA | National Centre for Assessment in Saudi Arabia |
| iEN | National Educational Portal |
| CEDA | Council of Economic and Development Affairs |
| TETCO | Tatweer Educational Technology Company |
| SEM | Structural Equation Modelling |
| QR | Quick response |
| FG | Future Gate initiative |
| NTS | National Transformation Stage |
| NTP | National Transformation Programme |
| CIC | Computer and information centre |
| DHH | Deaf and hard-of-hearing students |
| TPACK | Technological Pedagogical and Content Knowledge |
| TRA | Theory of Reasoned Action |
| TPB | Theory of Planned Behaviour |
| TAM | Technology Acceptance Model |
| UTAUT | Unified Theory of Acceptance and Use of Technology |
| DTPB | Decomposed Theory of Planned Behaviour |
| CIM | Continuance intention to use Madrasati |
| ATU | Attitude |
| PU | Perceived usefulness |
| PEU | Perceived ease of use |

| | |
|---|---|
| COM | Compatibility |
| LCQ | Learning content quality |
| SN | Subjective norm |
| LI | Leader influence |
| PI | Peer influence |
| SI | Student influence |
| PBC | Perceived behavioural control |
| RFC | Resources facilitating conditions |
| TS | Technical support |
| SE | Self-efficacy |
| PEE | Prior e-learning experience |
| SPSS | Statistical Package for the Social Sciences |
| AMOS | Analysis of Moment of Structures |
| CR | Composite reliability |
| SD | Standard deviations |
| CFA | Confirmatory factor analysis |
| AVE | Average variance extracted |
| GoF | Goodness of fit |
| $\beta$ | Standardised path coefficients |
| $X^2$ | Chi-squared |
| *Df* | Degrees of freedom |
| RMSEA | Root mean square error of approximation |
| CFI | Comparative fit index |

# Chapter 1 Introduction

## 1.1 Introduction

The concept of digital learning has emerged to address the growing demand for technological advancements in education and to cater to people's evolving interests and needs. It is a broad term that describes a collection of applications and processes that employ any available electronic environment to deliver learning content. E-learning has become increasingly prominent because of the various advantages arising from adopting it to support face-to-face instructional approaches. Unsurprisingly, the need for e-learning has increased globally, and it is anticipated to continue to grow as users become more reliant on these technologies and the efficiency they enable.[1]

During the rapid spread of the COVID-19 pandemic, the vast majority of affected countries enforced lockdowns and the stay-at-home policy, which resulted in a shift to distance working. The process of online education was adopted by many schools to replace face-to-face education. Therefore, educational organisations across the world switched to 100% online teaching and learning, at least temporarily. As reported by the Global Education Coalition (UNESCO, 2020a), roughly 1.57 billion students were taught remotely during the COVID-19 pandemic. Accordingly, e-learning was not considered a luxury option; it was an essential means to carry on with the educational process (Alshehri et al., 2020).

Saudi Arabia was one of the countries affected by the pandemic. Accordingly, the Ministry of Education (MoE) initiated a new platform named 'Madrasati' to continue the educational process online. The platform has served over six million students and more than 400,000 teachers of all ages and genders (MoE, 2021). However, e-learning was introduced suddenly and had not been effectively applied previously. Hence, based on my experience as a researcher, I consider it important to understand not only the impact of such rapid adoption on learners and educators, but also the instances of successful transition, and what learnings could be drawn from challenges in adoption. This is particularly important in the context of Saudi Arabia, as the government here offered teachers an option to integrate the elements of Madrasati in every-day learning and teaching. From the policy stance, it is also important to

[1] https://www.statista.com/statistics/1130331/e-learning-market-size-segment-worldwide/

study the factors that encourage teachers to make the decision to continue using the platform to support their teaching processes. In light of the challenges that many nations worldwide faced during the transition to online learning during the COVID-19 pandemic, my study will contribute to the educational and academic communities, providing insights into how school teachers perceive e-learning and the factors affecting their adoption of it. The findings will be especially useful for the educators and policymakers in Saudi Arabia, as this is a selected case study for this research. Accordingly, this study will examine the factors influencing teachers' intentions to continue using Madrasati in Saudi Arabian secondary schools.

This chapter introduces an overview of the research problem, explains the significance of the study, and clarifies the purpose through a review of the research objectives. It then concludes by outlining the structure of the thesis.

## 1.2 Research Problem

With the rapid spread of the COVID-19 pandemic, the Saudi government prevented students from going to school from March 2020 until January 2022 to combat the virus outbreak. Although many attempts had previously been made to adopt e-learning in schools, it had, however, not been applied effectively because of the challenges and barriers that have historically hindered successful e-learning implementation (Alasmari, 2022; Almalki & Williams, 2012; Zalah, 2016). These challenges include inadequate technological infrastructure, insufficient training for teachers, limited support, and lack of time. Therefore, online teaching and learning were revived in Saudi Arabia during the lockdown through the introduction of a new platform called Madrasati (Alsalim, 2021), and e-learning was subsequently implemented across all school levels from primary to secondary education.

As with any electronic platform aimed to facilitate learning, Madrasati cannot be fully integrated and used unless it proves useful for students' learning (Masmali & Alghamdi, 2021). Furthermore, success and long-term practicality of any new tool, are related to post-acceptance (continuous usage) rather than first-time use (Bhattacherjee, 2001; Limayenm et al., 2003). Given that the Minister of Education declared that teachers would be given the choice to continue using this platform to enhance face-to-face education once the pandemic ended (Alasmari, 2022), I observed that investigating the factors that motivate and encourage school teachers to continue using Madrasati is significant.

Madrasati has attracted scholars' attention since schools adopted it in 2020. Various studies have devoted efforts to examining the acceptance of the platform by teachers and students at different school levels, particularly at the time when it was established (Alasmari, 2022; Bakarman & Almezeini, 2021; Masmali & Alghamdi, 2021). Early findings indicate that Madrasati could be an effective complement to traditional education in future classrooms (Alasmari, 2022; Aldossry, 2021; Masmali & Alghamdi, 2021). Nevertheless, most existing studies have predominantly focused on short-term acceptance during the crisis period, providing limited theoretical understanding of teachers' long-term continuance decisions. Much of this research has drawn on adoption-focused models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which are effective for explaining the initial adoption of technology but insufficient for capturing the complexity of continuance behaviour. These frameworks emphasise behavioural intention, perceived ease of use, and usefulness, yet they underexplore post-adoption factors such as satisfaction, quality of learning content, social influence, infrastructure, and technical support that shape teachers' decisions to continue using digital platforms. Furthermore, little is known about how secondary school teachers—who play a critical role in preparing students for higher education and employment—experience and respond to the integration of Madrasati into their instructional practices in Saudi Arabia. As this research is among the first studies that investigate the continued use of Madrasati following the pandemic—after it became a strategic choice for teachers—it responds to these gaps by first extending the Decomposed Theory of Planned Behaviour (DTPB) and then exploring the factors influencing teachers' decisions to continue using the platform. More importantly, understanding why teachers, especially secondary school teachers, choose to continue using Madrasati, even after it was already decided, provides valuable insights into the factors that can support the platform's continued use and enhance its effectiveness, which could inform future efforts to encourage its ongoing adoption.

Currently, the ongoing use of Madrasati is optional and teachers in all school levels have the choice either to employ it or not. Although the Ministry of Education announced that teachers could keep using the platform through providing assignments, tests, resources, and learning activities for students (Okaz, 2021), some teachers are still hesitant to integrate Madrasati into their teaching processes. Moreover, several studies of Madrasati have shown conflict in the findings regarding teachers' acceptance of and satisfaction with the platform (Alkinani & Alzahrani, 2021; Masmali & Alghamdi, 2021; Shishah, 2021), which might affect their willingness to continue using it after the pandemic. Consequently, exploring the

factors that would shape the continued use of Madrasati would be significant for understanding teachers' perceptions and needs. Such findings would help administrators and stakeholders to understand teachers' tendencies and develop new strategies that would encourage teachers to continue using Madrasati effectively in their teaching. Most studies carried out in schools have primarily emphasised insufficient teacher training as a key factor hindering technology use in classrooms, without considering other aspects, including teachers' beliefs, motivations, and the perceived advantages of adopting technology. Therefore, it is vital to conduct research into the intentions of teachers towards continuing the use of Madrasati within the face-to-face school environments.

## 1.3 The Role of the Secondary School Stage

The Ministry of Education in Saudi Arabia places strong emphasis on fostering digital readiness as part of its broader efforts to achieve the goals of Vision 2030, which highlights the importance of preparing students with the skills needed for higher education and the labour market. The secondary school level represents a pivotal transitional phase in which students are equipped either for university studies or direct entry into the workforce. In this context, secondary school teachers play a critical role in shaping students' digital and academic competencies, and their perspectives therefore carry significant policy implications. Furthermore, secondary education encompasses more advanced and specialised subjects, such as mathematics, physics, chemistry, and digital learning, which pose unique instructional and assessment challenges. These challenges often necessitate more intensive use of e-learning tools, making teachers' perceptions of Madrasati particularly valuable. While previous research has frequently focused on other education levels or broader teacher populations (see Chapter 2, Table 2.3 and Table 2.4), my study provides targeted and contextually relevant insights into the use of digital learning platforms at a critical stage of schooling.

## 1.4 Research Significance

Considering the limited studies on technology adoption in Saudi secondary education, my research is one of the first to look into the factors that affect teachers' continuance intentions towards using a specific technology. Hence, the first goal of this study is to develop a model to outline the factors impacting teachers' willingness to continue using new technology, based on the case study of the Madrasati platform. The Decomposed Theory of Planned

Behaviour (DTPB) is extended, taking into consideration pedagogical, social, technological, and personal influences. Understanding these factors will help to identify what is needed for a successful adoption of online education platforms in Saudi secondary schools.

This is important in the context of Saudi Arabia, as using technology in school education is a major priority for the Saudi MoE, which has developed a bespoke education platform, and taken actions encouraging teachers to incorporate Madrasati into their teaching practices. Despite this, previous studies and informal discussions I conducted with some teachers indicate that it is unclear to what extent Madrasati is being used and accepted by school teachers. More broadly, it has been evidenced that technology in education is not used extensively, even in the richest countries around the world (UNESCO, 2023). During the school closures caused by COVID-19, most studies considered Madrasati as a temporary solution enabling them to continue the educational process during the crisis. Importantly, there are not enough studies examining how Madrasati is currently used in Saudi schools and the factors influencing teachers' intentions to continue using it within the traditional educational approach.

Hence, I anticipate that my study will contribute to the literature on the acceptance and continued use of technology within the educational context. It will also present a model that will be validated and tested to address the research questions and assess its applicability in the study context. Furthermore, my study will provide useful insights for future studies on Madrasati, especially for empowering distance teaching and learning in secondary education. Finally, it will establish implications and recommendations for stakeholders and policymakers in Saudi Arabia.

## 1.5 Research Objectives

My study primarily seeks to investigate the factors affecting teachers' intentions to continue using the Madrasati platform. To reach this goal, the following objectives will be achieved:

- Review the literature around online learning.
- Review the theories and prior studies that investigate users' behaviours and attitudes towards e-learning adoption.
- Develop a conceptual research model to include variables that drive secondary school teachers' intentions to continue using Madrasati in Saudi Arabia.

- Explore the factors that might impact teachers' intentions towards continuing the use of Madrasati in Saudi secondary schools.

## 1.6 Research Questions

My research seeks to identify and examine the key factors influencing teachers' intentions to continue using Madrasati, aiming to answer the following main research question:
What are the factors that influence secondary school teachers' intentions towards using the Madrasati e-learning platform beyond the pandemic?

As part of investigating the main research question, the following sub-questions will be addressed to facilitate answering the main question in this study:

1. What is the appropriate framework with which to investigate secondary school teachers' continuance intentions towards using the Madrasati platform?
2. To what extent and why do the factors in the model explain the variances in the continuance intention to use Madrasati among Saudi secondary school teachers?
3. What are the relationships between the factors that impact secondary school teachers' continuance intentions to use Madrasati?
4. What are the perceptions of Saudi secondary school teachers regarding the factors that impact the continuance of Madrasati usage?

## 1.7 Thesis Structure

My thesis comprises nine chapters, and it is organised in the following manner.

Chapter 1 presents an overview of the research problem, explaining the significance of this study. It also articulates the main aim of my research, outlining the study objectives, which are designed to address the research questions introduced in this chapter.

Chapter 2 provides a geo-political context for my study. It covers essential details on Saudi Arabia, such as geographic location, demographic information, language, religion, and gradual development of the country over several years. It also describes the education system, presenting its progress and summarising the stages of the general education. Several

projects and initiatives were also discussed in this chapter, shedding light on the critical role of technology adoption in the educational field. It also provides an overview of online learning in SA, highlighting the Madrasati platform, including its definition, features, and evaluations based on some previous studies during and after COVID-19.

A general background of e-learning is presented in Chapter 3. It starts by exploring the origins and definition of e-learning. It also explains how education systems reacted during the COVID-19 crisis, identifying key areas where e-learning succeeded and where it faced challenges. The chapter also introduces different forms of e-learning. Additionally, the Technological Pedagogical and Content Knowledge (TPACK) Framework and the concept of e-pedagogy are presented in this chapter. The chapter concludes with learning management systems (LMS) as an essential tool for digital education.

Chapter 4 explores the most significant models and theories that have been used to examine the factors influencing a user to accept and continue using technology. Furthermore, this chapter sets out the proposed conceptual model for this research, highlighting its development from the Decomposed Theory of Planned Behaviour (DTPB) and previous studies, while formulating hypotheses for each factor in order to examine teachers' continuance intentions regarding using Madrasati.

In Chapter 5, the research paradigms and methodology utilised to empirically validate the proposed model is described, offering a thorough explanation of the research design. My study employs a mixed sequential approach accomplished in three stages: develop a proposed model, conduct an online questionnaire, and undertake follow-up interviews.

Chapter 6 presents the quantitative phase of the research. It commences by detailing the survey structure and the pilot stages, afterwards proceeds to delve into the quantitative data statistical analysis through Structural Equation Modelling (SEM) and the subsequent discussion.

Chapter 7 outlines the structure, outcomes, and discussion of the concluding stage of this study, which involves qualitative data. It explains the design methodology for the follow-up interviews and the thematic analysis approach to analyse the obtained findings.

Chapter 8 synthesises the key findings from both phases to offer a deeper and more thorough understanding of the research question. Through triangulation, the proposed factors in the model were used to present combined findings, illustrating how teachers' interviews provided clear explanations for the survey responses.

Chapter 9 concludes the entire study by providing a comprehensive summary of the research, highlighting its key contributions, discussing its limitations, offering suggestions for future work, and presenting final remarks.

## 1.8 Chapter Summary

This chapter has discussed the rationale behind the Saudi MoE establishing the Madrasati e-learning platform and how it kept the teaching and learning processes ongoing during the crisis. Since the restrictions eased and full schools returned, teachers have the option to use Madrasati to supplement their teaching processes. Therefore, I noted the need for further investigation into the factors that might affect secondary school teachers' decisions to continue using Madrasati. The research problem was the lack of studies around secondary education in Saudi Arabia. Finally, several objectives have been established to address the study questions.

# Chapter 2 Context of the Study

The primary objective of this study is to explore the factors influencing decisions made by Saudi secondary school teachers to continue using Madrasati. Before delving into the study, I will provide a brief background on Saudi Arabia, accompanied by an overview of the evolution of its education system. This analysis of the geo-political context provides a useful rationale for the study. The unique situation, whereby following the lift of all the restrictions imposed during the COVID-19 pandemic, there is a continued use of some of the e-learning tools introduced initially, as emergency measures in response to the school closures. In order to understand and explore why such desire, motivation, and opportunities exist, it is useful to recognise the specificity of the educational system in Saudi Arabia. Additionally, I will present different school stages to introduce the characteristics of secondary education, which is the focus of this study. To facilitate a smooth transition to the Madrasati platform, which is the primary focus of this research, I will briefly explain several projects conducted by the Ministry of Education, highlighting how Madrasati emerged as an essential technological tool in advancing educational development in the country. Finally, I will present in this chapter previous studies on online learning within the Saudi context and a discussion of the pertinent literature on the use of Madrasati.

## 2.1 Background of Saudi Arabia

Saudi Arabia, which is also often known by its full official name, the Kingdom of Saudi Arabia, is a peninsula situated between two continents: Africa and mainland Asia. This place occupies a significant position, being the largest Middle Eastern country and the thirteenth-largest country globally. Geographically, Saudi Arabia (SA) shares borders with several neighbouring countries: Iraq and Jordan to the north; Bahrain, Kuwait, the United Arab Emirates, and Qatar to the east; and Oman and Yemen to the south. To the west, it has a long coastline along the Red Sea, while the Arabian Gulf lies to the northeast. Extending across a wide-ranging area of nearly 868,730 square miles (2,250,000 square kilometres), SA has different topographies, including the vast Arabian Desert named the Rub' al Khali, the mountain ranges of the Asir region, and the fertile coastal lands. Islam is the officially endorsed religion in SA, and it represents the source of economic, socio-political, and educational development.

Historically, the Founding King, King Abdul-Aziz Al Saud, is known for founding Saudi Arabia back in 1932. The kingdom is organised into 13 administrative regions, including several cities and small towns. These regions are Makkah, Almadinah, Tabuk, Aljouf, Alhodod Ashamaliyah, Hail, Alqassim, Arriyadh, Asharqiyah, Najran, Jazan, Asir, and Albaha. Riyadh, located in central SA, serves as the capital city of the country. Two out of the three holiest sites in the Muslim world – Makkah and Madinah – are situated in the western side of the kingdom. Makkah is a religious destination for pilgrims performing Umrah and Hajj. As this country is the location of two important mosques, observed the life and death of the Prophet Muhammad, and contains the spot where Muslims must face during their five daily prayers (Salah), Muslims all over the world attach great significance to and greatly appreciate the country. The map of Saudi Arabia is shown below (Figure 2.1).


*Figure 2.1 Map of Saudi Arabia (https://www.stats.gov.sa/en)*

Demographically, the total population was announced in 2023 as 32,175,224 (58.4% of them Saudi nationals and 41.6% of other origins). Around 48.8% of them are aged 29 or younger, and males make up approximately 61.2% of the total demographic.[2]

Arabic serves as the designated official language in SA. Different dialects can be spoken between Saudis in informal conversations such as Najdi, Hijazi, and southern Arabic, but the official dialect used in education, the press, government, and formal communications

[2] https://www.stats.gov.sa/en

(television and radio) is Modern Standard Arabic (MSA). The Arabic language has a rich literary history and unique regional traditions. It is written from right to left and has a complicated structure and grammar. Furthermore, it carries significant cultural meaning in Saudi Arabia since it is associated with various Islamic customs, and it is essential for religious rites and prayers. Although Arabic is mostly prevalent in SA, English is also commonly used as a secondary language in the country.

Saudi Arabia experienced a notable shift as a direct consequence of the 1938 oil discovery. It is now regarded as one of the top global producers of oil, holding the position of the largest exporter of oil worldwide (Alkhannani, 2016). Previously, SA had been known as a developing country that relied mostly on agricultural products and trade, but it then became one of the wealthiest nations worldwide. This transformation not only significantly improved the personal incomes of the people living there but also enabled the government to initiate a comprehensive development programme for the whole country. This ambitious programme, also known the National Transformation Programme 2020 (NTP), encompassed the establishment of the first national healthcare system, the urbanisation of most regions within the Kingdom, and the implementation of a comprehensive nationwide education programme.

Nonetheless, the United Nations still considers Saudi Arabia to be a developing country economically (United Nations, 2017). This classification emphasises the fact that the level of development of a country does not necessarily correlate with its national wealth. Furthermore, the government of SA has recognised that the source of oil production will eventually come to an end (Saudi Vision 2030, 2017). Addressing these concerns, Saudi Arabia initiated Saudi Vision 2030, led by Prince Mohammad bin Salman, the crown prince of Saudi Arabia, with the primary objective to facilitate the transformation of SA into an advanced country by diversifying its economic resources, instead of relying only on crude-oil supplies (Saudi Vision 2030, 2017).

The education sector represents a fundamental part of the focus within this vision, as it requires significant improvements to advance the overall development of the country. Furthermore, Saudi Vision 2030 seeks to enhance the digital infrastructure, aiming for 90% internet coverage in big cities and 66% coverage in medium and small towns by the year 2030 (Saudi Vision 2030, 2017). These targeted developments in education and digital infrastructure were key components of the successful implementation of Madrasati during the COVID-19 pandemic. While the MoE seeks to implement numerous developments to

enhance education, it is noteworthy that the integration of electronic platforms to improve teaching and learning processes is not explicitly addressed. However, the discussion on educational development primarily emphasises technologies in general, along with skills and resources.

## 2.2 The Education System

During the establishment of SA, the shortage of schools was evident, since there were only five public schools existing through the entire country. Back in 1925, the roots of the Saudi educational system were initiated with the establishment of the Directorate of Knowledge, primarily serving boys only. In 1929, the Shura Council, also identified as the councillors' council, formulated the initial Saudi education policy, outlining basic principles and components for the educational system. The main aspects of this policy were the incorporation of Islamic principles into education in Saudi Arabia, along with provisions that allowed students to participate in the development and progress of their community. 1959 marked the formation of the General Presidency for Girls' Education (GPGE) with girls' education administered by the GPGE at all school levels. A year later, only 15 primary schools and one intermediate school had been opened for both boys and girls (MoE, 2023b).

The initial policy was further refined by the Shura Council with the announcement of an additional education policy, a part of which highlighted the three classifications of general education: primary, intermediate, and secondary school levels. These levels are mandatory for all students to complete over a total of 12 years, starting at age 6 and ending at 18. Until 2002, when the Ministry of Knowledge (MoK) took responsibility for the GPGE, boys and girls had separate educational systems. One year later, following the efforts to improve the educational sector, the MoK was officially renamed as the MoE (MoE, 2023b).

Primarily, the Saudi educational system can be categorised into two principal types: general education and higher education. Generally, all public and private schools apply the same guidelines, educational programmes, curricula, and teaching strategies with Arabic and Islamic studies given a lot of attention in the curriculum. Other scientific and historical subjects are also taught in addition to the English language.

Based on the MoE policy, there are 47 educational departments strategically distributed across 13 regions in the country. These departments are authorised by the MoE to lead

general education in terms of administrating and supervising education and schools within their selected areas. Among them, 15 serve as general education departments, while the remaining 32 run as local educational administrations. These local departments are directed by the associated general educational departments in each region (MoE, 2023a).

With the aim of successfully modernising the country, the national development plans in SA were designed to achieve two principal goals. The first goal focused on improving the skills and knowledge of individuals through training and education, while the second emphasised the need to build a strong economic infrastructure. Accordingly, education has emerged as a highly consequential element within the national development of Saudi Arabia, being considered essential for social and economic improvement (Turay, 2009). The Embassy of Saudi Arabia (2022) notes that educational standards are continuously improved by the government through enhancing the quality of training programmes for teachers, refining the assessment standards of students, and increasing the adoption of technology into the school environment. Nowadays, with the implementation of Vision 2030, the education sector has become a key component in achieving these goals (Saudi Vision 2030, 2017). The vision promotes the plans to create educated generations who have skills in making decisions and assuming responsibility in the future.

## 2.3 Education Stages

In Saudi Arabia, the general educational consists of several levels. The earliest level, known as the pre-school level, includes nursery and kindergarten. At the age of 3, parents then have the option to enrol their children in the nursery, before children are expected to attend kindergarten at the age of 5. Both girls and boys receive preparatory education together from female teachers at this level. Students then move to the elementary level with students starting between the ages of 6 and 7 years, which is a compulsory stage within the Saudi educational system. This level of their education comprises a total of six school years with three semesters in each year, and students are required to pass an assessment each semester to move to the next level. With the exception of students in early primary levels (grades 1 and 2), who are regularly assessed during the academic year and required to achieve a minimum score of 75%, students in other grades (grades 3 to 6) are evaluated at the end of each semester. If students do not achieve a minimum grade of 50% in each subject or fail to attend the exams, they are required to repeat the same level again. Starting from the primary

4 level, schools are segregated by boys and girls, and there are six 45-minute lessons every day.

After the elementary level comes the intermediate level. At this stage, students are aged between 13 and 15, as students are not able to start intermediate schooling unless they have completed primary school. The intermediate stage consists of three academic years, and each year has three semesters with two weeks of exams at the end of each semester. Passing these examinations in every subject is essential for students to get to the subsequent level, and students who fail in any of these semesters are required to re-take other exams to become qualified to move on to the next level. After two attempts at the exams, students have to repeat the same level if they are unable to get the minimum grades required.

Secondary school, or high school, comes after the intermediate stage. Students start this level between the ages of 16 and 18. During this three-year level, students in the first year are prepared for different subjects that concern scientific and humanities fields. By the second year, students need to select a particular field that fits their interests and abilities from within the following tracks: general, health and life science, software engineering and computer science, business administration, and Shariah. Each track provides a different curriculum with its own subjects, requirements, and examinations, and all tracks are distributed into six terms that are delivered over two academic years. Likewise, students must successfully complete all provided assessments in each track to move onto the next level.

In order to complete the secondary level, students are required to reach grades of at least 60% in subject examinations to get an achievement certificate from that level. Getting this certificate enables students to apply for higher education courses, while others may decide to choose career opportunities instead. Those who choose to continue their education after secondary school at any university, college, or institution (such as military colleges) have to take two types of tests offered by the Qiyas assessment centre (NCA, 2022): the General Aptitude Test (GAT) and the Standardised Achievement Admission Test (SAAT). The GAT consists of two parts. The first part, commonly known as the verbal section, evaluates students' skills and abilities in written language, while the other part, namely the mathematical section, measures mathematical skills. The SAAT acts as a valuable standard for colleges and universities in SA, helping with the assessment of students' academic proficiency. This comprehensive exam evaluates students' skills in particular knowledge of areas including physics, biology, chemistry, and mathematics.

Higher education is the other stage of the Saudi Arabian education system. At this stage, most universities offer different levels of educational degrees, for instance, Bachelor, Master, and PhD levels. Higher education is tuition-free in public universities for all Saudi students.

Following statistical data from the Saudi MoE, Table 2.1 illustrates an incremental escalation in the number of school establishments and student enrolments over the past few years.

*Table 2.1 Schools and student population over recent years (MoE, 2021)*

| | 2014/2015 | 2015/2016 | 2016/1017 | 2017/2018 | 2018/2019 | 2021/2023 |
|---|---|---|---|---|---|---|
| **Schools** | 38,234 | 38,757 | 43,017 | 43,320 | 43,380 | 43,633 |
| **Students** | 6,215,587 | 6,238,916 | 6,275,125 | 6,338,193 | 6,343,366 | 6,348,848 |

## 2.4 Ministry of Education Projects

The education sector in SA has substantially improved since it was previously introduced by religious institutions such as mosques and places known as 'katatibe', as there were then no schools, universities, or colleges. At that time, only the most basic reading, writing, and maths were taught to learners, with more attention placed on learning the Quran. However, shortly after establishing the country in 1932, King Abdulaziz Al Saud prioritised and promoted education, encouraged citizens to further education and literacy rates, and constructed several new institutions in different cities across SA. Since that time, the Saudi government has certainly achieved significant progress in the development of the entire educational system. In the past few years, various development programmes have been launched in a number of educational institutions with the purpose of improving the educational system (Zalah, 2016), and teaching and learning quality has been improving across all schools with the introduction of information and communication technology (ICT) into the school environment. This improvement coincided with the founding of the General Administration for Educational Technology (GAET), through which modern technology has been consistently supplied to all school levels (Al-Sulaimani, 2010). Recently, Madrasati was introduced as one of the latest technology and digital platforms with the aim to support and enhance the educational process through the application of the learning management system (LMS) in public and private schools. In the following sections, I will briefly discuss

a number of projects aimed at developing education in Saudi Arabia, including the National E-Learning Center, the Tatweer project, the iEN platform, and the Future Gate initiative. These projects highlight the commitment of the Saudi government to integrating and using digital technology in the teaching and learning process.

### 2.4.1 The National E-Learning Center

The Saudi Arabian Council of Ministers established the National E-Learning Center (NELC) in 2005 as an independent organisation to provide trusted online learning across the whole country. Its primary objectives are to promote the integration of technology into education by introducing e-learning initiatives and programmes, ensuring constant access to e-learning content, and supporting sustainable usage of e-learning. Additionally, the centre assists academics and researchers in the realm of e-learning, aiming to improve existing practices in both public and private institutions that offer e-learning.

The centre contains various educational platforms, evaluates user satisfaction, and conducts several studies and research related to e-learning based on the highest standards. Furthermore, it offers qualification and training programmes to governmental organisations delivering e-learning programmes that align with the requirements and objectives of the centre.

The centre developed several platforms with the purpose of promoting e-learning that facilitates quick, easy, and up-to-date access to education content, and these platforms aim to provide society with free, open, and sustainable education opportunities. Moreover, the centre serves as a representative of SA in the field of digital learning on an international level, organising multiple conferences and inviting international organisations engaged in digital learning to discuss and create new methods while addressing relevant topics.

The COVID-19 pandemic caused several challenges across different sectors, resulting in an impact on the education process. In early 2020, schools were suspended, leading many education and training providers to immediately shift to distance learning instead of traditional face-to-face education. In response to this, a comprehensive national plan was initiated by the NELC to facilitate a rapid and effective shift towards e-learning. This plan was based on the Saudi government's decision, taking into account emergency situations and pandemics such as COVID-19, and developed by referring to expert interviews,

reviewing best practices from a 22-year period, conducting 17 case studies, and analysing the experiences of some countries (NELC, 2022). Additionally, the idea of this plan aimed to minimise risk and ensure the accessibility of high-quality education and training during periods of emergency and pandemic.

While the MoE is responsible for implementing and operating the Madrasati platform to educators, the NELC plays a supportive role by establishing high-quality standards and frameworks for e-learning initiatives in SA, such as those like Madrasati. This partnership ensures that online learning platforms operate according to the highest standards hoped by the Saudi government.

### 2.4.2 The Tatweer Project

The Tatweer Project, also known as the King Abdullah Project, represents an ambitious educational improvement initiative that was designed to improve the education system of the country. The project strategy focused on building a generation of creative, well-rounded young people capable of reaching their full potential and aware of their future positive impact on all levels. It was launched by the Saudi Council of Ministers in 2007 and scheduled to run for six years, from 2007 to 2013 (Tatweer, 2007). However, in 2014 it was decided it should continue for another five years in order to improve standards in Saudi public schools. The project mainly aimed to increase the standard of teaching and learning in SA, particularly within all schools' levels, in order to address the economic and social demands of the twenty-first century (Tatweer, 2007).

The plan for this project focused on five critical areas. First, it aimed to enhance the regular professional development programmes for Saudi teachers, ensuring they receive the training programmes they need to effectively improve their teaching strategies in the classrooms. Second, the project was intended to develop academic curricula that more successfully address students' social, emotional, psychological, and individual requirements. In order to motivate students and improve their academic performance, it also attempted to enhance the classroom environment in all public schools. Fourthly, the programme focused on applying ICT to enhance the implementation of technology in teaching and learning. Lastly, it aimed to support most activities that can be done outside of schools to develop students' creativity, self-confidence, and social skills.

The Tatweer project includes several programmes focused on enhancing the learning and teaching environment in the Saudi education system. The objective was to integrate ICT significantly into the Saudi curriculum with the goal of seamlessly integrating it into the Saudi education system (Alghamdi, 2022). It also aimed to improve the instructional strategies of teachers by delivering training classes on the integration of technology into the classroom (Tatweer, 2007). By implementing these objectives, the educational system can make progress in how technology is used, thereby developing students' and teachers' skills (Hakami, 2013). The project took place over two phases, each of which encountered different issues and challenges. For instance, training programmes intended for this project were not properly prepared for teachers. Moreover, several innovative projects were implemented with the Tatweer project at the same time, which distracted most teachers on this project (Alghamdi & Higgins, 2018). These challenges made the project difficult to successfully implement in all Saudi schools.

The basis for incorporating technology into education was established by this project, as it was essential throughout the pandemic-induced transition to online learning. The Madrasati platform was successfully implemented and used by both students and teachers during the crisis due to the introduction of ICT that was designed for the Tatweer project. This smooth transition ensured continuance of education and demonstrated the value of integrating technological improvements with educational changes.

### 2.4.3 The National Educational Portal – iEN

iEN is a national education portal launched by the MoE during the 2016 academic year. It operates as a free and safe digital portal supporting the use of digital education in SA. Through e-learning, iEN provides reliable digital learning content and educational solutions for all community members including students, teachers, and parents, and its main aim is to be used as an educational technology resource in order to increase the community's digital literacy and encourage people to access resources besides the school curriculum. It contains more than 42,000 pieces of free digital educational content that help students and teachers in an easy and accessible way.

iEN has approximately five million users and offers access to a database of more than 2,000 electronic books along with an extensive range of more than 22,000 different digital activities (iEN, 2023). Within a numerous range of resources, including TV channels and

YouTube videos, the iEN portal provides opportunities to expand the learning experience. The iEN TV channels comprise a total of 25 satellite TV channels, offering live or recorded broadcasts with comprehensive explanations and educational activities for all curriculum subjects (Madhesh, 2021). Moreover, with over 291,000 subscribers, the iEN YouTube channel provides both recorded lessons and live teaching sessions, giving students and teachers access to useful educational materials whenever and wherever they choose. Following the school closures during the COVID-19 crisis, the MoE declared that the iEN portals were well prepared to offer educational resources and live YouTube channels for all school grades, along with Madrasati, for those who have not had a chance to access the platform. Given the variety of content integrated into Madrasati, iEN serves as a reliable resource linked to the platform, supporting students in the current educational context who may want to get more explanations from multiple teachers of lessons taught in schools.

Despite the success of Madrasati in providing learning opportunities for millions of students, associated obstacles, such as a lack of devices, unavailability, or weak internet connection, presented other problems. The MoE's plan during the schools' closure was aimed at ensuring equitable learning opportunities for all students, and it is worth mentioning that iEN was established prior to the onset of the COVID-19 crisis, containing textbooks for all stages of general education with different digital content for male and female students. iEN also created visual channels on YouTube to enhance the quality of online and distance education and offer educational opportunities for students with disabilities through translated lessons in sign language.

It is worth noting that textbooks in Saudi curricula are provided with QR technology codes printed beside each lesson, which allow students to get access to educational enrichments within the lessons. The contents include educational videos for direct lesson explanations or dialogue, cartoon films, educational games, and short quizzes. By scanning the QR code via mobile devices, students are transferred to iEN websites for further resources (Alharbi & Al-Sawy, 2022).

iEN serves as a digital medium supported by the MoE, where students can obtain additional knowledge and information related to school subjects. Additionally, students from all school levels can catch up on any missed lessons in case they are absent from school, and iEN channels support teachers by enhancing their performance in both traditional and online classes.

Furthermore, iEN channels stand out for their many tools and electronic programmes that help the educational process in a variety of ways that could surpass Arabic and international educational channels:

- Ease of use of iEN channels and access to content through various means such as YouTube or live television broadcasts, as well as linking them to Madrasati.
- iEN channels focus on presenting lessons with key concepts in academic subjects and presenting them in a simplified format for easy understanding by students.
- iEN serving students with disabilities by supporting the presentation of lesson content in sign language.

Both initiatives, Madrasati and iEN, are part of the MoE's strategy for ensuring that students receive education under any circumstances. Madrasati provides an interactive learning environment, while the iEN channels offer visible educational content accessible to all educators. The platform and iEN operate together in a complementary manner within the current education context, allowing both teachers and students to access iEN through Madrasati to watch and review lessons from a reliable source.

### 2.4.4 Future Gate Initiative

As part of the transition towards digital learning, the MoE launched Future Gate (FG), which was an initial step towards accessing technology and e-learning in Saudi schools. The FG initiative was one of the ministry's plans within the National Transformation Stage 2020 (NTS), designed to fulfil the Kingdom's Vision 2030 objectives (Al Ohali et al., 2018; Sulaymani et al., 2022). This vision emphasised the integration of technology within the educational environment, and one of its aims was to transition towards a digital learning environment, leveraging modern educational methods to attract students and facilitate successful learning progress. Additionally, it guides learners towards the beneficial use of technology and improves learning processes, enabling students to obtain personal skills, and helping them prepare for the future (NELC, 2022).

The FG initiative involves LMS, including different applications and programmes such as Moodle, Classera, and ITWorx (Al Ohali et al., 2018). Primarily, FG operates as a digital platform that delivers collaborative learning materials, promotes active student interaction, and makes it possible to precisely evaluate student performance (TETCO, 2022). Teachers

and students can contact each other and access various pieces of educational content. Furthermore, teachers have the ability to send materials to students such as assignments, exercises, and short exams. Notwithstanding that FG was not designed to be an interactive platform, it facilitated a smooth transition into working on Madrasati at the beginning of the COVID-19 pandemic (Alharbi, 2024).

Students and teachers are the main users of FG. It is used to develop a technology-dependent educational environment designed to deliver knowledge to students and enhance their academic achievement. Through the enhancement of pedagogical methods and learning approaches, it also plays a role in supporting the educational development of teachers, expanding educational practices beyond the classroom and the school environment. Consequently, creating effective content and an enjoyable learning environment for students and teachers is one of the key objectives of this initiative (Al-Ohali et al., 2020).

The implementation of this programme began in 2017 with a first phase of 150 schools across three regions with the selected schools being equipped with wireless access points and high-speed internet. Then, in 2018, the project's second phase expanded to include 8931 schools in 13 regions. The third and final phase was planned to cover all Saudi Arabian schools by 2020, proceeding along the same path as the initial phase in designated schools.

The main beneficiaries of this programme are students, teachers, school leaders, educational supervisors, and parents. Both students and teachers have access to an extensive selection of interactive educational resources, specifically designed for their courses, and online interactive activities, such as workshops, tests, and assignments, can be easily used through the LMS. In addition, teachers are able to upload assignments, tests, questions, and exercises and are able to effectively communicate with students and their parents. Through the LMS, teachers are enabled to make weekly lessons plans, educational activities, and assignments which can be reviewed by school leaders and educational supervisors.

Future Gate automatically archives all interactive learning materials, which is one of its main benefits. This feature makes it possible for users to share these resources to plan new lessons in the future, including digital lessons, assignments, and e-quizzes. Notably, the platform has a mobile application that is accessible for several models of smartphones and seamlessly works across various tablet devices. After the platform launched, the application was created and made available in an attempt to move the education process beyond the traditional

education environment, indicating that students and teachers are free to use the app both whenever they want and wherever they like, including outside of classes. Furthermore, FG tries to take advantage of the desire of teachers and students to use modern technology by guiding them towards the proper usage of these programmes (FG, 2022).

Future Gate played a fundamental role in facilitating the MoE to swiftly transition to distance education at the beginning of the COVID-19 crisis (Masmali & Alghamdi, 2021). For some schools in some areas, in particular some intermediate and high schools that had used digital learning through FG, online learning through LMS was not a new educational tool. Nevertheless, according to the MoE's announcement in 2020, the implementation of Madrasati represents the first serious application of digital education in all Saudi public schools, regardless of the dedicated efforts of the Future Gate project (Alasmari, 2022).

It is worth noting that the implementation of FG was hindered by some barriers, and, consequently, the third phase of FG activations was not completed in all Saudi schools. The project aimed to equip all teachers and students with smart electronic devices by 2020. However, at that time, students relied on their own devices, and only some schools provided laptops to teachers. Therefore, the majority of schools lacked the necessary technological tools to initiate the project. Furthermore, in 2020, the COVID-19 crisis prompted the Saudi Arabian government to close all public and private schools, transitioning to distance learning. This shift was directly associated with the project's third phase of activation (Al-Samiri, 2021; Oraif & Elyas, 2021).

The COVID-19 crisis also impacted the successful completion of this project (FG), as well as other planned initiatives in Saudi Arabia. Initially intended to activate e-learning and enhance teaching and learning environments, FG fell short in facilitating continuous learning during school closures due to the lack of synchronous classes. Consequently, Madrasati was established to meet the increased demand for online learning environments during the lockdown. Madrasati is capable of providing visual communication with various features not available in FG, tailored to the requirements of both teachers and students during the pandemic and beyond.

## 2.5 Saudi Vision 2030

Vision 2030 was launched with the support and sponsorship of the Saudi government as a comprehensive plan in 2016, aiming to change and develop the economy and the infrastructure of the country. The project represents the ambitions of Saudi Arabia's Crown Prince, Mohammed bin Salman, for the future of the country in development and economic growth, making it the hub of the Arab and Islamic worlds (Neil & Sprusansky, 2017). The vision 'is built around three themes: a vibrant society, a thriving economy and an ambitious nation' (CEDA, 2016, p. 13). All government departments in SA have devoted significant attention to this vision, using all available resources to achieve these ambitions through short- and long-term objectives that mirror the country's abilities and strengths at the national, regional, and global levels.

The National Transformation Programme (NTP), which was introduced in June 2016 as a part of Vision 2030, seeks to involve all the public, private, and non-governmental organisations working in the development and business sectors. Its main aim is to build the needed infrastructure and develop an environment that would enable all sectors to achieve Vision 2030. This goal, according to NTP (2016), can be accomplished by achieving excellence in government performance, creating economic partnerships, supporting digital transformation, and promoting social development, all the while ensuring the preservation of essential resources for long-term sustainability. However, Saudi Vision 2030 is not only a developing programme focused on economic and public services but also a comprehensive national development project that aims to improve the quality of life by facilitating vital elements for community members in SA (Khan, 2016; Kinninmont, 2017; Saudi Vision 2030, 2017). This involves different goals: the improvement of towns and cities with better services, the increase of the power of the community members, the survival of historical culture, and the maintenance of the environment to be clean and healthier. In addition, the Kingdom intends to add more UNESCO-recognised monuments to its areas and increase the number of Umrah pilgrims that it can accept to 30 million people every year. Moreover, the SA government wants to invest more in entertainment and cultural activities, with the goal of enhancing well-being and potentially raising the current average lifespan from 74 to 80 years by the year 2030 (MoFA, 2017).

SA is working towards bridging the disparity between the skills needed by the job market and those taught in educational institutions. The government aims to have five universities

ranked within the top 200 globally by the year 2030, and the focus will be on exceeding educational standards defined by the national curriculum, particularly in reading, maths skills, and personal development. Progress will be monitored, and regular reports on achievements will be shared to highlight patterns of achievement each year, while collaboration with businesses will be a priority to ensure that higher education meets the requirements of the career market.

The Vision 2030 blueprint gives considerable attention to the importance of quality education and includes different objectives for developing educational levels across the whole country. It offers opportunities to enrich the school environment and promote enhanced educational outcomes for both students and teachers (Albiladi, 2022). One of its goals is to prioritise digital education in order to enhance students' progress and teachers' performance (NELC, 2022).

The Vision blueprint states that 'We want Saudi children, wherever they live, to enjoy higher quality, multifaceted education' (CEDA, 2016, p. 36). This can be seen to reflect a commitment by the government to improving digital infrastructure to enhance online learning and devote resources to the education of the next generation. Accordingly, Madrasati was launched by the MoE as a part of Vision 2030, with the hope of integrating technology to significantly improve public schools in Saudi Arabia (Alharbi et al., 2022c). The platform is designed to help students and teachers develop their knowledge, skills, and values so they can meet the requirements of modern technology and achieve the 2030 goals and vision for Saudi Arabia (Sulaymani et al., 2022). However, it is important to recognise that the platform may impact students and teachers in different ways, with different degrees of effectiveness based on individual needs, experience, and context.

The COVID-19 crisis has revealed the depth and breadth of digital tools that have the power to reshape teaching and learning processes in the future, while also highlighting the challenges and risks associated with online learning. It made the SA government accelerate its move to digital technology, which resulted in noticeable changes in the education system that might not have seen under normal circumstances. This supports the goal of Saudi Vision 2030 that the country would become an advanced country in terms of technology, particularly in the education sector. In other words, by leveraging digital technology, the vision aims to transform the country by 2030 into a diverse, leading, and innovative nation for the benefit of upcoming generations (Alghamdi, 2022).

## 2.6 Online Learning in Saudi Arabia

The utilisation of computers in SA expanded significantly during the 1990s, particularly following the introduction of the World Wide Web to the country (Almowanes, 2017). The MoE introduced the Computer and Information Centre (CIC) in 1996 with the aim of offering a range of services to public institutions and schools, while also providing training for both students and teachers in the integration of technology within the classroom, thereby emphasising its significance (Aljaber, 2018). A few years later, in 2000, the MoE launched an extensive computer initiative aimed at introducing new curricula and enhancing teacher and student capacities in using technology across all school levels (Al-Asmari & Rabb Khan, 2014).

By 2001, the MoE had established an e-library to support teachers in integrating technology into their classes. Then in 2006, computer science was introduced as a subject in all secondary schools, with one class scheduled per week. Subsequently, the government of Saudi Arabia launched the Tatweer project to reform the educational system (Tatweer, 2007). One of its goals was to expand the number of computer classes, which resulted in greater technology awareness and adoption.

This evolution of technology has positively influenced both students' learning outcomes and teachers' performance (Alwahoub et al., 2020). E-learning, according to Alwahoub et al. (2020), has improved students' abilities, inspiring them to learn more efficiently and providing them with more opportunities to access a range of resources. It has also helped teachers develop skills that improved the effectiveness of the teaching process, increasing their productivity and knowledge. While SA and other Gulf countries were making efforts to adopt e-learning in teaching practices (Robertson & Al-Zahrani, 2012), the integration of technology in pre-service teacher training remains slow, with insufficient preparation and training in using ICT (Alshammari et al., 2022). Although significant financial support was provided by the MoE, the adoption of e-learning in schools was unsatisfactory (Albugami et al., 2016). According to the authors, many teachers lacked access to essential resources, including internet access, electronic equipment in schools, and personal digital devices, which limited their ability to effectively integrate ICT into classroom practices. Another contributing factor was the absence of a clear educational policy and strategy to guide and support teachers in implementing ICT. Lack of support and training were also cited as the

most common barriers hindering the successful adoption of ICT in Saudi education. It could be argued that this limited implementation was also due to the lack of an official educational platform to systematically manage online content and activities within the educational environment and beyond.

Over the past decade, several studies in SA have explored the application of e-learning, and most of these studies identified common factors that limit the successful integration of e-learning. These factors, for instance, include inadequate infrastructure (Almaghlouth, 2008), a lack of training programmes (Al-Rashed, 2002), insufficient resources (Abuzaid, 2010), poor maintenance and technical support (Albugami & Ahmed, 2015), and an unclear policy framework to guide schools (Gamdi & Samarji, 2016; Hakami et al., 2013).

Recently, the use of technology in education has grown significantly, driven by the need for schools to adopt online education practices during the COVID-19 crisis (Alqahtani & Rajkhan, 2020). E-learning was the only viable option to sustain the educational process for most schools across the world during this period (Tartavulea et al., 2020). However, although most schools, teachers, and students in SA were not adequately prepared for e-learning (Mahyoob, 2020; Shishah, 2021), the learning process was successfully maintained during the pandemic (Saudi Gazette, 2021). After the decision to close schools during the crisis, different methods were introduced to Saudi education system to ensure the maintenance of education among students and teachers. These included live television broadcasts and lessons via YouTube channels. Additionally, soon after, the MoE launched Madrasati, a comprehensive learning platform that offers both synchronous and asynchronous learning experiences.

Most previous research on e-learning in SA has focused on higher education institutions, with majority of studies focusing on the adoption and challenges of e-learning within universities and colleges (Al-Asmari & Rabb Khan, 2014; Aljaber, 2018; Quadri et al., 2017). This is in spite of the fact that secondary school students are likely the generation best prepared to use technology effectively in their future jobs or post-secondary studies. Furthermore, some earlier studies have predominantly examined technology acceptance among students rather that teachers. While researchers often identify factors affecting the use of technology among students, often identifying the absence of infrastructure or resources, teachers could also be affected by these factors as well. Therefore, as Alzahrani

(2019) recommended, further studies are required to understand teachers' perceptions and needs of e-learning adoption in schools.

## 2.7 Education in Saudi Arabia During COVID-19

In response to the COVID-19 crisis, changes were introduced to the Saudi education system following the decision to close schools (Alshehri et al., 2020). All educational sectors across SA were unexpectedly suspended, and e-learning became the solution enabling the continuation of the educational process across all school levels during the 2020/2021 academic year (Alsadoon & Turkestani, 2020).

According to UNESCO (2020b), at the start of the transition, the Saudi MoE had implemented numerous alternative strategies to keep the teaching and learning process going despite the national lockdown. For instance, the iEN National e-portal channels, including 25 satellite channels, were used to broadcast live lessons and educational activities for most subjects. Future Gate was also utilised to offer asynchronous options and some online materials (UNESCO, 2020b). Oraif and Elyas (2021) also mentioned that the MoE transmitted educational content for all school stages through social media networks and TV channels, while around 127 teachers were selected to provide about 112 courses via TV channels (Oraif & Elyas, 2021). After several weeks, the MoE launched an online platform named Madrasati as a new method of distant education for all Saudi pupils.

It was a significant challenge to move all existing educational content for every subject to online platforms within a short timeframe. In addition, creating new online materials, planning lesson precisely, developing training programmes, and addressing technical issues were the greatest challenges facing the MoE (Khanfar, 2020). Importantly, the noticeable lack of online teaching skills stemmed from the fact that teachers had not been adequately prepared for this online approach (Shishah, 2021). Furthermore, the large number of beneficiaries of e-learning posed another challenge for the MoE. The primary target group consisted of public education students, particularly those in the early school years, who often lacked essential skills, such as self-directed learning. Additionally, there was an urgent need to train teachers, school leaders, and educational supervisors for this new online learning approach (MoE, 2020).

In the following sections, I will provide background about the Madrasati platform, including its definition, features, and some evaluating studies related to it.

## 2.8 The Madrasati Platform

The education system in SA was altered when the government decided to close all public and private schools in response to the COVID-19 crisis. The MoE set up a new online platform named Madrasati to keep the academic year 2020/2021 going through distant teaching and learning. Indeed, there was a need to establish new strategies to help students and teachers attend school digitally and safely from anywhere (Oraif & Elyas, 2021). This development of e-learning tools has been significantly successful in allowing more than six million students to continue their education, as noted in a declaration by Nathalie Fustier, the United Nations Resident Coordinator in SA (Saudi Gazette, 2021). Initially, the plan for using Madrasati was set for the first seven weeks. However, as the coronavirus outbreak persisted, the MoE declared that the platform should be used by all schools open-endedly until another announcement was issued (Shishah, 2021). Undeniably, the teaching process in SA was significantly impacted by COVID-19, and the e-learning offered a practical and feasible solution to mitigate it.

As the MoE reported in November 2020, over six million students, a total of around 99% of all grades, had accessed Madrasati, and a total of 4.8 billion visits were reported in just less than a year. Moreover, 63 million synchronous virtual class sessions were delivered, with more than 1.2 million class sessions carried out daily, and over 13 million tasks and tests were completed. In addition, the system made it possible for students to communicate with the teachers synchronously via chat rooms or asynchronously vie an e-mail service, in order to ask about activities and e-assessments assigned to them. Consequently, the number of messages sent to teachers was roughly 11 million (MoE, 2021).

### 2.8.1 Madrasati Definition

Madrasati is defined as a digital environment system that includes interactive tools and features to facilitate the learning and teaching process for all educational levels, from first to twelfth grade. It also provides synchronous and asynchronous learning systems (Madrasati, 2020).

Prior research has emphasised different features and assumptions of the Madrasati platform. Aldossry (2021) described Madrasati as a virtual learning environment that facilitates the digital sharing of knowledge between teachers and students from anywhere, while Shishah (2021) mentioned that Madrasati is a web-based application that assists teachers in adhering to lesson plans and meeting curriculum-established learning objectives. It is evident that Madrasati is designed to allow students to use specialised tools to develop skills, educational values, and new knowledge such as critical thinking, problem-solving, and creativity, in order to keep up with current and future digital requirements (Bakarman & Almezeini, 2021). Figure 2.2 shows a screenshot of the Madrasati home page.

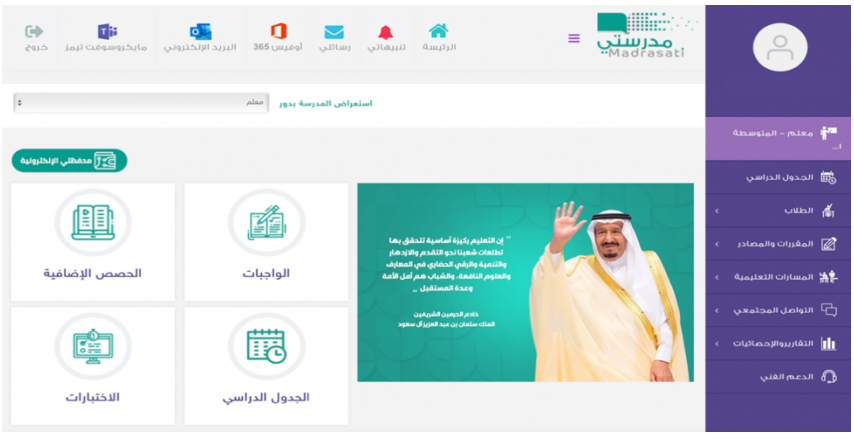


*Figure 2.2 Home page of Madrasati*

## 2.8.2 Madrasati Features

Despite the novelty of the Madrasati platform, it was professionally designed to meet all the educational requirements in an accessible manner. Moreover, it contains many features and characteristics of autonomous learning systems, such as synchronous virtual classes, e-books, test banks, virtual labs, reports, and statistics. It also incorporates Microsoft Office 365, which comprises Teams, an email client, and a variety of networks that support interaction and communication among teachers, students, and parents (Madrasati, 2020). In addition, Madrasati considers the individual differences among students by allowing them to engage with different levels of content in ways that align with their preferred learning styles. Therefore, The NELC in Saudi Arabia supports Madrasati with more than 45,000 learning materials, including books, interactive and engaging experiences, augmented reality, 3D models, visual and animated videos, educational games, and stories (NELC,

2022). Teachers can also design their courses and assessments by adopting supportive tools, including curriculum plans, discussion boards, question banks, assignments, and e-tests, where comments and feedback can be delivered to students (Alkinani & Alzahrani, 2021). Figure 2.3 shows a screenshot of a virtual classroom window from a teacher's screen.

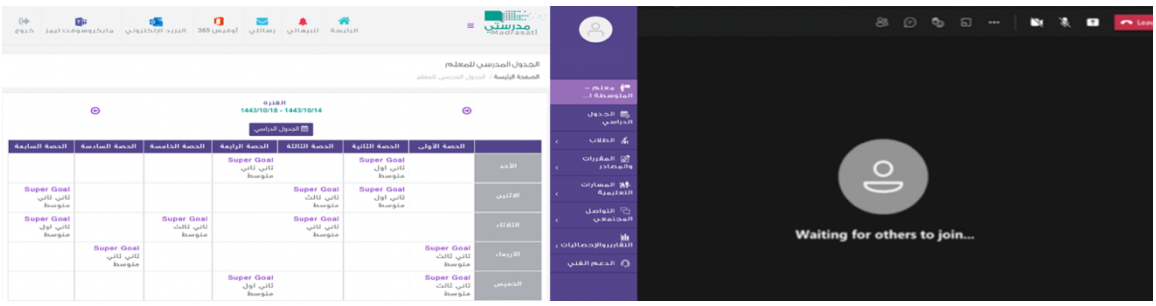


*Figure 2.3 Schedule and virtual classroom in Madrasati*

Madrasati is a fully integrated system that supports e-learning options, whether in synchronous or asynchronous learning environments. Furthermore, it provides virtual class sessions (visual interaction) that create an effective environment for teaching over the internet using the Microsoft Teams application. Students communicate with their teachers or peers digitally, discuss activities and assignments together, and can also ask any questions and receive immediate support and motivation (Alkinani & Alzahrani, 2021; Madrasati, 2020). Figure 2.4 briefly illustrates the entire process of a synchronous virtual classroom in Madrasati. According to Aldossry (2021), teachers found synchronous virtual classrooms in Madrasati more effective because they could evaluate and communicate with their students immediately. Synchronous learning, as stated by Kohnke and Moorhouse (2022), offers students immediate feedback, which increases their communication skills and encourages them to learn. However, the asynchronous virtual classroom is more flexible and convenient in terms of timing and allowing students to review at their own pace. This implies that students who cannot attend the virtual classes can follow up without any interruption.

Many studies remarked on some advantages from adopting Madrasati. Aldossry (2021) reported several positive aspects to embracing the platform, including ease of use, different online assessments, and digital delivery of results and feedback. The platform is also convenient in terms of time and effort, while increasing students' self-motivated learning. Additionally, Madrasati facilitates communication regardless of location or time (Alsalim, 2021). On the other hand, Madrasati demonstrates several drawbacks such as students

lacking full concentration, limited physical interaction between teachers and students, and technical issues (Aldossry, 2021).

According to the report published by the Online Learning Consortium (2021), compared to other countries that adopted regional platforms or commercial providers, Madrasati offers extensive tools for supporting teachers, delivering educational content, and engaging students, with capabilities that are comparable to those of top commercial LMS platforms. Despite this achievement, there is potential for further improvement in areas such as teacher preparation, internet access, and technical support. Globally, Madrasati has been praised as an unparalleled initiative that reflects Saudi Arabia's commitment to Vision 2030 and sets a benchmark for large-scale LMS adoption. Table 2.2 compares Madrasati with other commercial platforms.

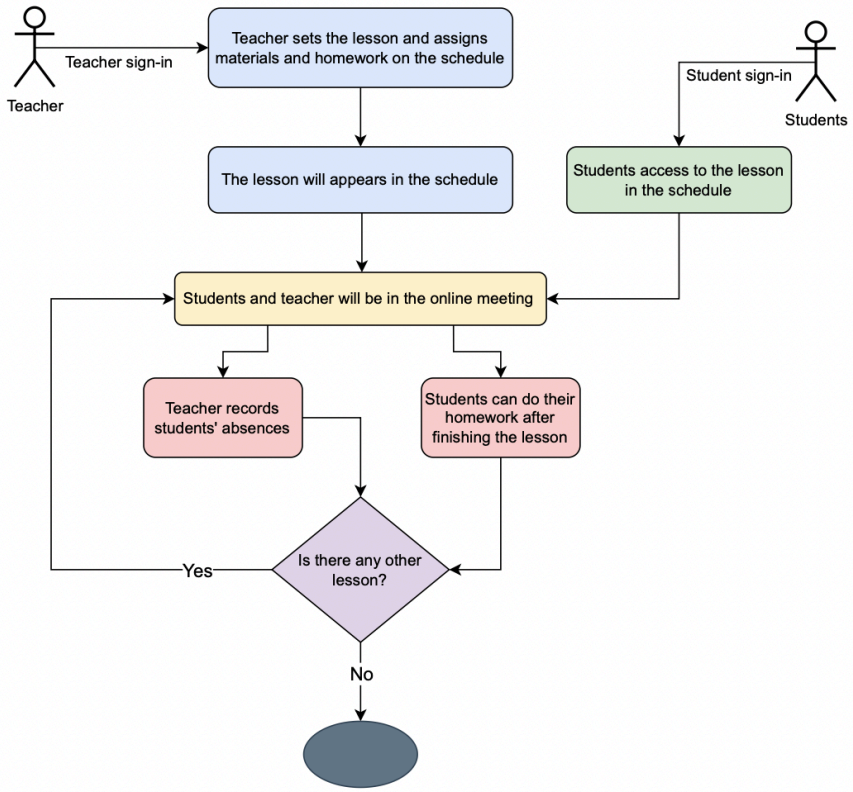


*Figure 2.4 Flow of a synchronous virtual classroom in Madrasati*

*Table 2.2 Comparison between Madrasati and other platforms (Online Learning Consortium, 2021)*

| Platform | Number of Beneficiaries | Start Year | Service Provider |
|---|---|---|---|
| Canvas | 30M around the world | 2011 | Commercial provider |
| Edmodo | 88M around the world | 2008 | Commercial provider |
| Google Classroom | More than 100M around the world | 2014 | Commercial provider: free integration with Google Suite Enterprise |
| Schoology | 20M around the world | 2009 | Commercial provider |
| Moodle | 249M around the world | 1999 | Commercial provider |
| Blackboard Classroom | 20M around the world | 2014 | Commercial provider |
| Bright Space (D2L) | 15M | 2011 | Commercial provider |
| Madrasati | 6M students and 400K teachers in Saudi Arabia | 2020 | Internally developed: free to all public and private schools |

### 2.8.3 Evaluation of Madrasati

Several researchers have attempted to evaluate Madrasati from various perspectives. The following section will discuss some studies on the platform, focusing on their key findings. These studies provide insights into usability, challenges, and broader implications for e-learning adoption in SA.

Generally, it is known that LMS platforms can only be successfully accepted and implemented if they have a high level of usability (Alkinani & Alzahrani, 2021). Since usability is one of the most important aspects of any newly introduced e-learning system, some studies have assessed the usability of Madrasati.

Shishah (2021) examined perceptions of Madrasati's usability among secondary school teachers, reporting that the interface is the most significant factor in forming a user's initial impression of newly introduced digital learning, as it impacts how they engage with new technology or systems. The findings show that Madrasati's usability is considered low and should be improved. Moreover, teachers reported a variety of usability concerns regarding Madrasati, including broken features, navigation issues, the platform's failure to avoid user errors, compatibility problems, message errors, and content accessibility issues for disabled users (Shishah, 2021). This could be partially explained by the time the study took place, as it was conducted soon after the launching of Madrasati. On the other hand, the platform was

in the early stages of development, and thus, teachers were not yet sufficiently familiar with it. This confirmed what Aldossry (2021) found in his study that, owing to the complicated registration procedure, teachers were hesitant to use the platform. Furthermore, Shisha (2021) indicated that usage might be improved when teachers became more familiar with the platform. Additionally, based on the testing of Madrasati, improvements could further enhance the platform's usage by teachers and students.

Alkinani and Alzahrani (2021) evaluated the implementation, usability, and effectiveness of Madrasati from teachers' perspectives in SA. They examined the key factors that affected the acceptance of Madrasati among 200 teachers randomly selected from different school levels. The findings showed that teachers were highly satisfied with Madrasati, which was deemed technically effective and well developed. The study also revealed that the platform is adequate and usable for teaching during the lockdown situation and demonstrated a beneficial impact on teaching quality. The difference in findings may be attributed to the timing of these studies; Shishah (2021) conducted their research during the platform's initial establishment, while Alkinani and Alzahrani (2021) evaluated it after further refinements and increased teacher familiarity. It can be said that the platform might have witnessed some improvement since its launch, as these studies were conducted at different times.

In addition, Aldhafeeri and Alhedabi (2023) investigated the usability of Madrasati by examining the perceptions of secondary school mathematics teachers in Riyadh, SA. Using a descriptive survey approach with a sample of 367 teachers, the study highlights the influence of perceived usefulness, ease of use, knowledge, and perseverance on user attitudes. The results reveal significant structural connections between these factors, offering recommendations to improve the platform's usability and effectiveness. These suggestions include that the MoE needs to provide a well-defined policy and plan of using Madrasati that considers teachers' perceptions. More support and programmes are needed to encourage teachers to use the platform. The study also stressed the level of ease of use and usefulness, as they can impact the acceptance of the platform among teachers.

Alabdulaziz and Alhammadi (2024) also explored the usability of Madrasati in supporting mathematics education, focusing on its role in acquiring mathematical concepts and enhancing student motivation. Drawing on the perspectives of 613 mathematics teachers through a descriptive survey approach, the findings revealed that teachers moderately agreed on the platform's overall impact. However, they strongly agreed on its effectiveness in

helping students grasp mathematical concepts and enhancing their learning motivation. The usability of Madrasati was further evidenced by the perceived connection between increased motivation and concept acquisition. These findings suggest the scope of the platform to improve teaching and learning processes, leading to a recommendation for its integration into regular mathematics instruction. The study highlighted that both teachers and students are recommended to continue using Madrasati in the current educational environment.

However, the sudden adoption of Madrasati as a replacement for face-to-face classes resulted in various challenges. Therefore, some studies investigated the major challenges encountered by teachers and students during the COVID-19 period and beyond. Teachers faced significant challenges in quickly adapting to this new mode of e-learning due to a lack of technical experience, skills, and preparation. For instance, Khanfar (2020) explored the major challenges faced by female teachers in SA during the crisis, finding that the most significant issues referred to were technical reasons and teachers' skills. More broadly, Lukas and Yunus (2021) examined the experiences and challenges faced by English teachers in Malaysia when using e-learning during the COVID-19 pandemic, identifying that teachers' preparation, limited internet access, and low student engagement were key issues. It seems that a lack of training opportunities has been reported in different contexts, which most teachers encountered when they started using e-learning.

Ghaban (2021) studied the impacts of distance learning via Madrasati on students and teachers in primary and high schools, indicating that teachers reported some technical difficulties such as failure to upload extra resources or assignments that did not appear for some students. Furthermore, both groups reported challenges such as lack of motivation, engagement, and communication with teachers and peers. To address these issues, teachers employed various tools and incorporated interactive activities and gamification into their lessons to enhance student motivation and engagement.

Alsalim (2021) examined the obstacles that have faced primary school teachers while using the Madrasati platform during the COVID-19 period. The results exposed that the main challenges were difficulties in implementing the platform for primary school students, specifically, as well as the weak internet connection. Furthermore, a lack of ability to deal with new technology was another barrier that prevent primary school teachers to use Madrasati effectively. The findings also revealed that most primary school teachers showed an unwillingness to continue using Madrasati, which suggests that secondary school teachers

may possess greater interest and skills, and may be willing to continue using e-learning in the future to support their teaching practices.

Alzahrani et al. (2023) explored teachers' perceptions of Madrasati in Jeddah during COVID-19, utilising a mixed-methods approach with quantitative surveys and qualitative content analysis of 523 teachers' responses. The findings revealed that while most teachers were new to the platform, they viewed its tools positively and used them regularly. However, challenges such as technical issues, internet access, and learner engagement were prevalent. Teachers suggested improvements to the system. They also highlighted some points generally, including providing training, increasing device availability, enhancing partnerships with families, and offering e-learning strategies to address these challenges.

Al Mahmud and Saqlain (2023) investigated the motivations of English language teachers using Madrasati, employing a mixed-methods approach. Quantitative data from 382 teachers and qualitative interviews with 10 participants revealed generally positive perceptions, with key motivational factors including flexibility, technology integration, and improved student attendance. However, challenges such as insufficient training, connectivity issues, and distractions were also identified.

Some of the studies mentioned above imply that some teachers did not attend the Madrasati induction training programme offered by the MoE in the initial months (Aldossry, 2021). This might be due to the timing of the training programmes at that time, which occurred during a stressful and busy period for teachers. Consequently, they were not fully aware of Madrasati's tools, in particular its features (Alsalim, 2021), and these findings concur with Alubthane (2021), who highlighted that training programmes are very important for preparing teachers to deliver successful e-learning. Shishah (2021) also emphasised that these teachers need further training to become confident and apply all the platform's features to assure the quality and diversity of e-learning activities delivery. Additionally, Mourlam et al. (2020) emphasised that professional development opportunities aimed at preparing teachers for online remote learning are essential for the effective implementation and use of online platforms, such as Seesaw, in teaching.

The early research on Madrasati revealed that teachers were not only stakeholders, who experienced significant challenges with transition to e-learning. During the pandemic, individuals and organisations relied on distance working, necessitating the purchase of a

separate digital devices, often for every family member. The use of mobile phones was essential to manage work activities and carry out commitments at that time. Low-income parents have struggled due to the high costs of purchasing electronic devices during the launch of Madrasati (Alqraini & Alasim, 2021; Khanfar, 2020). Khanfar (2020) highlighted that the initial significant challenge faced by families was purchasing a separate device to each child. Likewise, deaf and hard-of-hearing students' parents expressed the same issue, pointing to the high cost of purchasing electronic devices for each child (Alqraini & Alasim, 2021).

Despite the favourable perception of the platform by most teachers (Alenezi, 2024), it can be claimed that the culture of e-learning still presents a considerable challenge in public schools in Saudi Arabia. Students' parents, according to Alqraini and Alasim (2021), are not convinced that e-learning would be a reliable choice for the educational process. Therefore, the community's culture around the implementation of e-learning can impact how teachers shape their strategies to adopt e-learning in their teaching. These cultural attitudes could further hinder teachers' willingness to adopt and continue e-learning practices, compounding the usability and training challenges previously highlighted.

Building on the above discussion, Alasmari (2022) investigated teachers' opinions of e-learning in the context of the COVID-19 pandemic, highlighting specifically e-learning's benefits and limitations. Employing a quantitative methodology, data were collected from 202 English teachers at public schools via a Google Form questionnaire. The findings revealed that teachers had a largely neutral stance on e-learning, appreciating its advantages while holding neutral views towards its disadvantages, and Alasmari (2022) made recommendations for further research to enhance e-learning practices.

Similarly, Alqahtani (2022) investigated the perceptions of English language teachers on using Madrasati in intermediate and secondary schools during the COVID-19 crisis. Data collected from 24 teachers indicate that, although initial reactions to online learning were predominantly negative, their perceptions improved over time. Teachers identified several advantages, including fostering greater pupil independence and enabling more efficient homework management. The findings suggest that the platform promoted self-directed learning, learner autonomy, and improved communication, offering opportunities for both teachers and students to achieve personal and academic growth beyond traditional classrooms. Table 2.3 summarises some studies on Madrasati in SA.

*Table 2.3 Some studies on Madrasati*

| Author, Date | Measures | Context/Sample | Methods | Major Findings |
|---|---|---|---|---|
| Khanfar (2020) | - Teaching and learning challenges<br>-Infrastructure and skills of using Madrasati<br>- Possible solutions for facing distance-learning challenges | 375 female teachers in Jubail city (girls' school) | Quantitative (descriptive approach) | - Many teachers did not adequately prepare students for self-learning due to the sudden transition to online education.<br>- A significant challenge was the inability of families to provide each student with a device for online learning.<br>- Teachers in all specialties faced the same challenges in using the platform.<br>- Teachers' educational experience played a crucial role in overcoming these challenges. |
| Alubthane (2021) | - Evaluation of Madrasati from teachers' perspectives<br>- Evaluation of the technical skills among teachers | - 384 female teachers from public girls' school<br>- Five teachers participated in semi-structured interviews | Mixed-method approach (questionnaire, interviews) | - Madrasati and its tools are effective and appropriate.<br>- The most common challenges are technical problems, internet interruption, and difficulties with evaluating students. |
| Masmali & Alghamdi (2021) | Evaluation of teachers' acceptance of e-learning | 242 elementary school teachers from Al-Bahah city | Quantitative (survey) | - Teachers' perceptions, social influence, and available resources were crucial factors affecting whether teachers continue using e-learning after they used Madrasati during COVID-19.<br>- Effort expectancy did not impact teachers' intention to use online learning. |
| Ghaban (2021) | - Examining the effects of online learning on teachers and students using Madrasati<br>- Assessing user experiences, satisfaction, motivation, and engagement with the platform<br>- Exploring the use of games and | 40 teachers and 123 students | Quantitative (questionnaire) | - Both teachers and students found the platform acceptable.<br>- Motivation, engagement, and interaction were key limitations of the platform.<br>- Adding games and gamification enhanced student activity and engagement in their lessons. |

| | | | | |
|---|---|---|---|---|
| | gamification elements to improve motivation and engagement | | | |
| Al-Thumali (2021) | - Reality of using Madrasati for physical education lessons<br>- Teachers' satisfaction with the platform's effectiveness in teaching physical education<br>- Evaluation of Madrasati's role in teaching motor skills and providing training opportunities. | 100 primary school physical education teachers from Taif city | Quantitative (descriptive survey) | - Madrasati helped teachers use time more efficiently compared to traditional methods.<br>- Teachers felt satisfied with teaching physical education through Madrasati.<br>- The platform provided better teaching of motor skills than traditional methods.<br>- Training provided by the MoE helped teachers utilise Madrasati effectively.<br>- Students' interactions with the platform were less responsive compared to face-to-face teaching.<br>- Madrasati allowed flexibility in reviewing motor skills during physical education lessons. |
| Alsalim (2021) | - Obstacles hindering primary school teachers' use of Madrasati | 390 teachers from state primary schools in Riyadh city | Quantitative (descriptive survey) | - It is difficult to apply e-learning to primary students.<br>- Teachers were less concerned about students' reluctance to adopt new types of education.<br>- Statistically significant differences were found based on gender, with male teachers more probably to use Madrasati, while educational qualifications and pedagogical experience did not significantly affect the challenges faced. |
| Alkinani & Alzahrani (2021) | - Teachers' perceptions of Madrasati<br>- Teachers' satisfaction with Madrasati<br>- Usability of Madrasati<br>- Teachers' acceptance of Madrasati | 200 teachers from Saudi public schools using Madrasati during COVID-19 | Quantitative (questionnaire) | - Madrasati is technically well developed.<br>- Madrasati is easy to use.<br>- Madrasati has a positive effect on teaching.<br>- Teachers were satisfied with Madrasati.<br>- Teachers show a good level of technology awareness. |

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|---|---|---|---|---|
| Bakarman & Almezeini (2021) | - Students' acceptance of e-learning platforms<br>- Factors influencing acceptance, based on UTAUT | 802 students from different levels | Quantitative (questionnaire) | - Students' perceptions and social influence significantly affected the behavioural intentions to use e-learning.<br>- Available resources and intentions were found to influence students' actual usage of the platforms. |
| Aldossry (2021) | - Evaluation Madrasati based on teachers' opinions<br>- Exploring Madrasati's advantages and disadvantages | Three secondary school teachers with one year of experience using Madrasati | Qualitative (semi-structured interviews) | - Madrasati is well-designed to support online content delivery.<br>- Students mainly engage with synchronous virtual classrooms, neglecting asynchronous options.<br>- Teachers expressed intentions to continue using Madrasati post-COVID-19. |
| Alqraini & Alasim (2021) | - Challenges faced by (DHH) students during COVID-19<br>- Support mechanisms provided for DHH students during the COVID-19 crisis | 37 parents of DHH students | Qualitative approach (semi-structured interview) | - Significant challenges included limited accessibility to materials, lack of teacher preparation, and inadequate technological tools for DHH students.<br>- Effective supports included captioned videos, visual aids, and direct communication via sign language during lessons.<br>- Parents played a crucial role in bridging communication gaps and ensuring engagement. |
| Shishah (2021) | - Assessment of the usability of Madrasati<br>- Exploration of usability challenges faced by teachers | - 759 teachers participated in the survey<br>- 10 teachers in interviews | Mixed-methods approach | - Usability of Madrasati was found to be insufficient.<br>- Navigation challenges were frequently cited.<br>- Improvement was needed in the platform's design and functionality. |
| Oraif & Elyas (2021) | - Student engagement in online English | 379 female high-school students | Quantitative (questionnaire) | - Engagement levels among students were high despite challenges from the transition to online learning.<br>- The shift to online learning increased the need for enhancing EFL teaching practices.<br>- Significant variables were identified influencing |

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|---|---|---|---|---|
| | | | | engagement in online-learning environments. |

The data presented in the Table 2.3 indicate that most teachers and students encountered different challenges in adapting to online learning. These challenges include technical issues, internet disruption, device shortages, and limited engagement, particularly among younger students. On the other hand, usability problems, such as poor navigation and insufficient interactivity, hindered the effective use of the Madrasati platform. Teaching practical subjects like physical education showed improved time management and instructional outcomes, although student interaction remained limited. Social influence, available resources, and perceived usefulness played crucial roles in determining the continued use of Madrasati, while effort expectancy and pedagogical experience had less impact. Security concerns and unfamiliarity with digital platforms limited student adoption, while parental involvement and specialist tools were essential for supporting students with disabilities. Asynchronous content was underutilised during the COVID-19 crisis, while students preferred synchronous sessions. Overall, the findings highlight the importance of improving the platform design, enhancing teacher training programmes, addressing infrastructural barriers, and fostering family involvement to support effective online education.

In 2020, Alwahoub et al. (2020) conducted a study investigating the opinions of teachers and students regarding the adoption of e-learning in primary schools in SA. The findings revealed positive perceptions regarding e-learning as teachers pointed out that e-learning helped them improve their technological abilities and provided access to unlimited resources (Alwahoub et al., 2020). On the other hand, a few studies have uncovered negative impressions regarding the full adoption of e-learning. Khanfar (2020) found that female teachers in public schools reported that traditional education was more effective than distance learning. These teachers commented that e-learning should not replace traditional methods but could instead be used to support face-to-face learning (Khanfar, 2020). These interesting findings suggest that some teachers intend to continue using the platform after the COVID-19 crisis to enhance the educational process. Therefore, it could be argued that teachers' experience with online teaching during COVID-19 could impact their intentions to continue using e-learning to support traditional teaching methods. The following section will examine more recent studies on Madrasati conducted after 2021 to explore how teachers' and students' perceptions and experiences have evolved.

### 2.8.4 Evaluating Research on Madrasati After 2021

In the above section, previous studies carried out on Madrasati revealed discrepancies in teachers' perceptions and experiences regarding the use of e-learning in public schools (Alwahoub et al., 2020; Khanfar, 2020). It has been shown that negative attitudes towards certain technologies can negatively impact the implementation of e-learning in Saudi schools (Albugami & Ahmed, 2015). Therefore, it is important to conduct further studies to investigate this issue more thoroughly. Specifically, as e-learning is currently an optional choice for teachers, following the pandemic, it is crucial to explore the factors influencing teachers' intentions to continue using e-learning to enhance conventional teaching methods. This section will examine recent studies on Madrasati beyond 2021, after its adoption became optional, evaluating their methodological details and demonstrating how this research is unique.

Almaiah et al. (2022) examined the attitudes of students towards using Madrasati in SA during COVID-19. Through a quantitative online survey and an SEM approach involving roughly 3000 students, the study identified several key factors shaping the platform adoption. Higher system quality, service quality, content quality, technology infrastructure, awareness, management support, and training positively influenced students' use of the platform, whereas security concerns hindered its adoption. All investigated factors were found to significantly affect students' attitudes towards the platform, offering guidance for policymakers, developers, and educational institutions to enhance e-learning adoption among students. While the study examined students' adoption of the platform during the COVID-19 crisis through a large-scale quantitative survey, my study differs by focusing on teachers and exploring the continuance of the platform beyond the crisis. Furthermore, through an explanatory sequential mixed-methods approach, it incorporates both quantitative and qualitative insights in a single study, providing a deeper understanding of different factors and the relationships between them in a model. Importantly, Almaiah et al.'s (2022) study did not include social influence, which is addressed in the present study.

A study by Alhaythami (2022) aimed to investigate the level of satisfaction of public-school teachers with the use of Madrasati during the pandemic in Al-Qunfudhah governorate, Makkah region. The study employed a large-scale survey distributed to 300 male and female teachers across different school levels. The findings revealed high overall satisfaction with the platform's effectiveness in facilitating e-learning during the crisis. Additionally, the study

identified statistically significant differences in satisfaction levels based on gender and educational level, with female teachers reporting higher satisfaction scores. The need for improvement in technical support was highlighted in this study to enhance the e-learning experience. However, Alhaythami's (2022) study provided limited examination of specific factors, such as content quality, usefulness, ease of use, social influence, and infrastructure. Thus, my study explores these factors in more detail and investigates how they can encourage teachers to continue using the platform after the pandemic, as well as how these factors relate to overall satisfaction. Furthermore, this research employs a mixed-methods approach, combining surveys and interviews, which allows for a more comprehensive understanding of teachers' satisfaction with the platform.

Al-Ghamdi et al. (2022) investigated the perceptions and attitudes of public-school teachers in Al-Baha towards the use of Madrasati during the COVID-19 pandemic. The study also sought to examine whether differences existed across three variables: teaching stage, academic qualification, and gender. Data were collected through an online survey distributed to 97 public school teachers. The findings indicated that teachers generally held positive attitudes towards the platform. Moreover, statistically significant differences were found in relation to gender and academic qualification, whereas teaching stage did not show any significant variation among participants. Since Al-Ghamdi et al.'s (2022) study was conducted during the period of Madrasati's use in the COVID-19 context, teachers' perceptions may have changed after returning to regular face-to-face instruction. Furthermore, the study employed only a quantitative approach, focusing on numerical data and lacking teachers' expressions of their experiences with the platform during and after the pandemic. Therefore, my study is different, as it explores teachers' experiences and attitudes towards Madrasati both during and after the pandemic, employing a mixed-methods approach to gain a deeper understanding of their experiences and the motivators influencing them to use the platform in the post-pandemic context. While Al-Ghamdi et al.'s (2022) study examined specific factors influencing teachers in using Madrasati, teachers' technological abilities and self-confidence were not mentioned among these factors evaluating teachers' capabilities in using Madrasati. Also, the study employed one method, a qualitative approach, that examined the effect of several factors on teachers' behaviour intention to use the platform. Thus, the present study includes factors mentioned in Al-Ghamdi et al.'s (2022) study and other factors that might impact teachers' utilisation of the platform, adopting a mixed method approach, allowing participants to express their thoughts

about these factors to get a deeper understanding of Madrasati's utilisation among teachers in public schools.

Alharbi et al. (2023) investigated the extent to which Madrasati was used among public-school teachers in Riyadh. The study examined factors influencing teachers' utilisation of Madrasati, including attitude, effort expectancy, performance expectancy, social influence, facilitating conditions, competence, and behavioural intention. Based on an online survey of 374 teachers, the results indicated that most factors had a significant positive effect on teachers' acceptance and utilisation of the platform, except for attitudes, which showed no influence. The study concluded with recommendations for further research to explore additional factors not addressed, such as ease of use, flexibility, and interaction with the platform. However, teachers' technological abilities and self-confidence were not considered in this study. Furthermore, as Alharbi et al. (2023) relied only on a quantitative approach, the present research extends this work by incorporating the suggested factors and additional factors, employing a mixed-methods design. This approach allows participants to express their views in greater depth and provides a more comprehensive understanding of Madrasati's utilisation among teachers in public schools.

A study by Alenezi (2023b) examined the effect of using Madrasati among third-grade secondary school students on project-based learning (PBL), problem-solving, and attitudes towards a mathematics course in Arar city. The study employed an experimental design, utilising a pre-test and post-test approach to measure the students' critical thinking abilities before and after the intervention. The participants were 50 third-grade secondary students divided into two groups: 25 students engaged in PBL activities through the platform, and 25 students participated in traditional mathematics activities. The results revealed a significant improvement in the students' critical thinking skills, mathematics achievement, and attitudes following the PBL intervention. This suggests that integrating PBL through Madrasati can effectively enhance critical thinking among secondary school students in SA. The current study aims to understand teachers' intentions towards continuing to use Madrasati after the pandemic, providing insight into the long-term use of the platform in Saudi schools. While Alenezi (2023b) shows that PBL through Madrasati can improve student outcomes, these benefits depend on whether teachers continue to adopt the platform consistently in their teaching practices. If teachers do not plan to continue using the platform, student gains in mathematics courses, as well as in other subjects, may be short-lived. Furthermore, mixed-methods studies on teachers' intentions can explore both quantitative trends and qualitative

reasons, such as technical challenges, training needs, or attitudes towards digital learning. Alenezi (2023b) only measures student outcomes and does not capture why or how the platform is adopted, limiting actionable recommendations for using e-learning platforms in the Saudi education system.

Alhabeeb and Al-Kethiri (2023) investigated the perceptions of intermediate English language teachers regarding the use of Madrasati to teach English speaking skills in SA. A total of 75 teachers completed an online survey distributed through social media using a descriptive study design. The findings indicated that these teachers recognised several benefits of using the platform in English language courses, such as improved classroom management, access to diverse educational resources, ease of student assessment, opportunities for continuous learning, live chat features, and enhanced communication between teachers and students. The study also highlighted some drawbacks, including technical issues, limited student interaction, reduced speaking skill development, and a lack of immediate feedback. Although Alhabeeb and Al-Kethiri's (2023) study delivered insights into the advantages and disadvantages of adopting Madrasati to teach English language speaking skills, it differs from my research. The current study does not limit itself to a single school subject but includes teachers' opinions about using the platform in different subjects under two factors, namely perceived usefulness and educational content quality. Furthermore, while Alhabeeb and Al-Kethiri (2023) employed a descriptive design to explore teachers' perceptions, my study adopts a different methodological approach—a mixed-methods design—to investigate the factors influencing the continuance intention to use Madrasati, which is no longer mandatory, making the question of continuance particularly important.

Al-Adwani et al. (2024) investigated how primary school mathematics teachers in SA use enrichment activities via Madrasati to address higher-order thinking problems in the primary mathematics curriculum. The researchers adopted a descriptive survey design and administered a questionnaire to 302 mathematics teachers in Jeddah city. The findings indicated that teachers were increasingly embedding enrichment activities that promote higher-order thinking through the platform in their teaching practices. The study recommended incorporating higher-order thinking skills into mathematics teacher education programmes in SA and enhancing professional development opportunities to support teachers in planning and implementing such activities effectively. Unlike the current study, their research focused on teachers' existing practices in mathematics, showing how

enrichment activities are applied to develop higher-order thinking, whereas examining teachers' intentions would investigate the future use of the platform and the factors shaping sustained adoption in the current educational setting. Methodologically, the 2024 study employed a quantitative survey, while a mixed-methods approach would integrate surveys with interviews to capture both the breadth and depth of teachers' use of Madrasati. Furthermore, the former addresses present integration and training needs, while examining teachers' intentions would provide insights for policymakers to ensure the long-term practicality of the platform's use among teachers.

A study by Al-Qahtani (2024) examined how secondary school female students benefited from the features and tools offered by Madrasati. Using a descriptive-analytical approach, the research was conducted on a sample of 77 students. The findings revealed that students extensively benefited from the e-learning tools provided on Madrasati. The study also highlighted several suggestions to enhance student utilisation of these tools, such as integrating Madrasati's tools with regular face-to-face instruction. The researcher recommended employing these tools to assess student performance and support learning activities. Additionally, the study emphasises the importance of encouraging active participation, using artificial intelligence technologies, and creating interactive learning content tailored to each student's level of understanding. My research is distinguished by its focus on examining teachers' intentions to continue using Madrasati beyond the pandemic, which makes the subject crucial, as teachers on this platform are the primary facilitators of students' access to and effective use of Madrasati's tools. While Al-Qahtani (2024) shows that students can benefit from the platform, sustained student engagement and learning depend on teachers' continued adoption and integration of these tools into regular face-to-face instruction. Understanding teachers' intentions can, therefore, inform strategies to maintain and enhance students' long-term learning outcomes using these tools and others provided by the platform.

Another study by Asiri and Khadawardi (2024) explored English as a foreign language (EFL) teachers' opinions of electronic corrective feedback (e-feedback) in SA. The researchers also considered the effect of e-feedback on the development of students' writing. Conducted among 141 public secondary school teachers, the research employed a quantitative approach using a questionnaire. Findings indicate that teachers held favourable views towards e-feedback, particularly appreciating its benefits during COVID-19, when Madrasati became the primary tool for delivering feedback. Teachers highlighted that

description and explanation techniques were the most effective forms of correction. Additionally, the study revealed that participants believed e-feedback did not hinder their ability to deliver sufficient feedback to learners. This research contributes to understanding the changing role of educational technology within Saudi EFL education, providing guidance on improving feedback strategies to support improved student learning achievement. However, since this study focused on teachers' perceptions of e-feedback during the pandemic, the question of whether teachers will continue using Madrasati after the pandemic remains unexplored. Continued use of the platform is important, as teachers can continue to provide explanations and feedback to students when both groups use Madrasati. Moreover, Madrasati is not limited to English teachers; teachers from various school subjects also employ the platform for feedback purposes. Therefore, examining teachers' intentions to continue using Madrasati post-pandemic would provide valuable insights into how teachers can sustain the benefits of the platform, such as e-feedback, to improve teaching and learning practices. Furthermore, incorporating a variety of methods allows teachers to express themselves more fully and offer additional features that can enhance the learning experience for students.

Al-Abbadi (2025) conducted a study to investigate how Arabic language teachers at the intermediate school level in Taif city perceived the importance of using Madrasati, the extent to which they implemented it, and the challenges they encountered. A descriptive survey was employed with a sample of 218 randomly selected intermediate Arabic language teachers during the 2024 school year. The findings indicated that the participants perceived a high level of importance in employing the platform, and the degree of actual use was also high. However, several significant obstacles to using Madrasati were reported, including families assisting students with assignments, limited class time, and difficulties in managing online classes. Female teachers rated the importance of using Madrasati significantly higher than male teachers, but no significant differences were found in perceptions related to academic qualifications or years of experience. Similarly, no significant differences in actual implementation were observed across gender, qualification, or experience variables. While Al-Abbadi's (2025) study concentrated on one subject, the Arabic language course, exploring teachers' perceptions in other school subjects is still crucial. Furthermore, employing a mixed-methods approach would offer participants opportunities to provide in-depth details about the significance of adopting Madrasati, the actual use of the platform, and the challenges that might impact teachers' intentions to effectively use the platform in

their teaching practices. The following table, Table 2.4, summarises some research conducted on Madrasati between 2022 and 2025.

*Table 2.4 Some studies on Madrasati (2022-2025)*

| Author/Date | Focus Area | Context/Sample | Methods | Key Findings | Unique Contribution | Differences with My Study |
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| Almaiah et al. (2022) | - Students' perception towards Madrasati.<br>- Factors impacting Madrasati adoption. | 3000 students | An online quantitative survey | - System quality, service quality, and content quality had positive effects on students' attitudes toward Madrasati.<br>- Technology Infrastructure supported Madrasati adoption.<br>- Most students reported high satisfaction with content, system, and service quality.<br>- Security concerns negatively influenced the adoption of Madrasati.<br>- Awareness had a positive impact on the adoption of Madrasati. | - Developed a model integrating quality, infrastructure, human, and managerial factors.<br>- Highlighted the important factors such as system quality, service quality and content quality, technology infrastructure, awareness, management support, security concerns and training.<br>- Provided reconditions and suggestions for better Madrasati adoption. | - Examines teachers' intentions to continue using Madrasati post-pandemic, rather than students' adoption.<br>- Employs a mixed-methods approach, rather than only a quantitative survey.<br>- Conducts in specific region, the Asir region. |
| Alqahtani (2022) | Secondary and intermediate school teachers' views on using Madrasati. | 24 teachers | A questionnaire survey | - Teacher perceptions changed positively over time.<br>- Increased student independence and autonomy.<br>- Simplified homework marking and enhanced communication with stakeholders and students' parents.<br>- Enabled English learning outside traditional classrooms. | - A post-pandemic perspective, focusing the use of the platform beyond COVID-19.<br>- Centred on English teachers' experiences rather than students' experiences.<br>- Addressed the role of Madrasati in a specific subject area, English language education in Saudi schools. | - Conducts with secondary school teachers form different subjects.<br>- Employs a mixed-methods approach, rather than only a quantitative survey.<br>- The targeted sample size is over 300 teachers. |
| Alharbi et al. (2022b) | Examining the roles of behavioural intention, age, and gender in the adoption of Madrasati. | 413 teachers in Riyadh city | A questionnaire survey | - The relationships between performance expectancy, social influence, and facilitating conditions were mediated by behavioural intention.<br>- The relationship between effort expectancy and Madrasati usage was moderated by age, showing that younger teachers (≤40) had a | - Examined intermediate and secondary school teachers' behavioural intention to use Madrasati employing the UTAUT framework as a conceptual framework.<br>- Examined the mediating and moderating effects on teachers' use of Madrasati | - Explores the effect of gender and age as moderators on the relationships between the factors in the model.<br>- My study includes various factors in the model, such as attitude, usefulness, content quality, social influence, |

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| | | | | stronger positive effect, while older teachers (>40) showed no significant effect.<br>- The relationship between social influence and Madrasati usage was moderated by gender, indicating that female teachers are more influenced by social factors than male teachers.<br>- There was no moderating effect between behavioural intention and effort expectancy. | - Recommended that future studies consider additional factors not examined in this study. | infrastructure, and teachers' ability.<br>- Employs a mixed-methods approach, rather than only a quantitative survey |
| Alharbi et al. (2022a) | Examining the relationships between performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and competence towards using Madrasati in relation to teachers' behavioural intentions. | 374 teachers in Riyadh city | An online quantitative survey | - Performance Expectancy had a significant positive effect on teachers' behavioural intention to use the platform.<br>- Effort Expectancy showed a significant positive effect, indicating that ease of use influenced teachers' intention to use Madrasati.<br>- Social Influence: Positively affected behavioural intention.<br>- Facilitating Conditions significantly influenced behavioural intention, meaning that technical support encouraged the use of Madrasati.<br>- Attitude toward using Madrasati demonstrated an insignificant relationship with behavioural intention, indicating that teachers' evaluation of the platform did not significantly shape their intention to use it<br>- Teachers' competence in using Madrasati positively influenced | - Providing a conceptual framework containing factors from UTAUT and TAM.<br>- Providing empirical evidence to the body of research on the use of UTAUT. | - My study employs the DTPB and additional factors to examine teachers' intentions towards Madrasati.<br>- My study employs a mixed-methods approach, rather than only a quantitative survey.<br>- The current study uses SEM method to investigate the relationships between factors in the model.<br>- I target secondary school teachers in the Asir region. |

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| | | | | behavioural intention, indicating that teachers became competent in utilising the platform. | | |
| Al-Hader & Almutairy (2022) | Determine the challenges faced by secondary school students when using Madrasati during COVID-19. | 744 secondary school students in Riyadh city | A questionnaire survey | - Students did not encounter any practical and educational challenges when using the platform.<br>- Students faces technical issues when using Madrasati.<br>- Most teachers rely on the lecture-based method, a teacher-centred approach, in virtual learning classrooms.<br>- Students felt bored due to the long duration of online classes. | Improve technical support.<br>Provide training programmes for teachers on using the platform.<br>Encourage more studies to examine Madrasati beyond COVID-19. | - Examines teachers' intentions to continue using Madrasati post-pandemic, rather than students' adoption.<br>- The current study employs a mixed-methods approach, rather than only a quantitative survey.<br>- My study focuses on the use of the platform, including the benefits and challenges faced by teachers after COVID-19. |
| Alenezi (2023a) | Assessing the impact of Madrasati materials on teaching and learning behaviours. | - 25 teachers<br>- 75 students | Mixed methods approach: surveys, interviews, and observations | - Learning and teaching practices, as well as student motivation, are favourably correlated with Madrasati materials.<br>- There was no evidence to support any of the proposed mediating hypotheses. | - Providing empirical evidence on how Madrasati materials impact learning and teaching behaviour.<br>- Highlighting gaps in the implementation of Madrasati, which can inform Saudi policymakers for improving Madrasati adoption. | - My study examines Madrasati's use by teachers for long-term purposes, exploring their experiences with the platform and its materials.<br>- My study investigates how the platform is used by teachers to complement regular teaching and learning practices.<br>- The current study examines the impact of the accessibility of Madrasati on teaching and learning when used with the conventional approach. |
| Alzahrani et al. (2023) | Examining teachers' perception towards Madrasati. | 523 teachers in Jeddah city | Mixed methods approach | - 75% of teachers had not used Madrasati prior to the study investigation.<br>- Most teachers rated Madrasati tools as good or very good.<br>- Teachers viewed Madrasati as positively impacting learning. | - Examining teachers' perceptions of Madrasati during COVID-19.<br>- Identifying challenges faced by teachers in using the platform.<br>- Providing suggestions to Saudi policymakers to enhance Madrasati adoption. | - My study investigates Madrasati after COVID-19, identifying new insights to improve the platform.<br>- The current study focuses on the Asir region. |

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| | | | | - Some challenges were identified such as technical issues and internet access issues, limited access to devices, insufficient e-learning strategies, difficulty engaging students, particularly low parental involvement and weak technical skills among teachers. | | - Identifies other challenges when Madrasati is used post pandemic.<br>- Delivers new recommendations to enhance Madrasati with the conventional approach. |
| Al Mahmud & Saqlain (2023) | Investigating teachers' motivation to teach English language through Madrasati. | 382 English language teachers | Mixed methods approach | - General positive perceptions towards the platform.<br>- Teaching with technology and flexibility were identified as most motivational factors to use Madrasati.<br>- Insufficient training courses and inadequate internet access were emphasised as challenges faced by some teachers in using the platform. | - Understanding English language teachers' perceptions of using Madrasati.<br>- Providing empirical insights into the use of Madrasati among English language teachers in Saudi Arabia.<br>- Delivering insights to improve digital educational strategies in the Saudi Arabian context. | - My study aims to understand secondary school teachers' perceptions of using the platform across different school subjects.<br>- Using a mixed-methods approach, my study identifies the key factors influencing teachers' intentions to continue using Madrasati, complemented by teachers' interpretations to gain a deeper understanding of these factors.<br>- My study provides empirical insights through SEM. |
| Aljizani & Saleem (2023) | Investigating the impact of using Madrasati during COVID-19 on students, teachers, and parents using TAM. | 250 participants | Quantitative survey design | - Teachers, students, and parents indicated that Madrasati was an effective tool for continuing education during the pandemic.<br>- Madrasati's interface and features were found to be easy to use.<br>- Family support played a significant role in the acceptance and effective use of Madrasati.<br>- The study recommended that Madrasati should continue to be used in the post-pandemic period. | - Employing and validating TAM in the context of Saudi primary schools.<br>- Highlighting the importance of usefulness and ease of use in driving teachers, students, and parents to accept Madrasati.<br>- Providing practical recommendations for improving Madrasati in the post-pandemic era. | - My study employs the DTPB and other variables within a single model.<br>- Investigates the impact of using Madrasati in the post COVID-19 context.<br>- Employs a mixed-methods approach rather than relying on a quantitative survey.<br>- Delivers recommendations for policymakers and Madrasati's developers to enhance the platform in the post-pandemic period. |

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| Aldhafeeri & Alhedabi (2023) | Examining the usability of Madrasati among secondary school mathematics teachers. | 367 teachers in Riyadh | A questionnaire survey | - Significant structural relationships were found between perceived ease of use, perceived usefulness, knowledge, and perseverance in shaping teachers' attitudes towards using Madrasati. | - Providing empirical evidence on the use of Madrasati among secondary school mathematics teachers.<br>- Identifying factors influencing teachers' acceptance and use of Madrasati.<br>- Offering practical implications for improving the effectiveness and implementation of Madrasati in mathematics education. | - The current study investigates the usability of Madrasati among secondary school teachers from different school subject areas.<br>- My study employs the DTPB along with additional variables within a single model.<br>- Using a mixed-methods approach, my study identifies the key motivators influencing teachers' intentions to continue using Madrasati in the post-pandemic, complemented by teachers' interpretations to provide a deeper understanding of these factors.<br>- My study is conducted in a different region: the Asir region. |
| Alenezi (2024) | Examining the experiences and perceptions of using Madrasati among K-12 school teachers during COVID-19. | 315 teachers | Mixed methods approach | - Most teachers had positive perceptions towards using Madrasati.<br>- Most teachers used different tools provided by the platform to facilitate teaching, learning, and communication.<br>- The study implies the importance of professional development training to support teachers in using e-learning tools more effectively and enhance student motivation in virtual classes. | - Expanding the body of knowledge on the opportunities and difficulties of online instruction from the viewpoint of teachers.<br>- Providing suggestions and recommendations for improving educational instruction through the use of modern digital tools. | - My study explores secondary school teachers' perceptions and experiences of using Madrasati after COVID-19.<br>- The current study explores how teachers employ Madrasati's tools in their teaching practices.<br>- My study sheds light on the advantages and disadvantages of adopting the platform within conventional approaches. |
| Alibrahim (2024) | Investigating the perspectives of digital skills teachers regarding their experience | 15 digital skills teachers in Riyadh | A qualitative design, collecting data: an open-ended | - Most teachers used Madrasati for blended learning in their teaching practices.<br>- Most teachers used the platform for different teaching tasks, such | - Providing insights into digital skills teachers' perceptions of using Madrasati after COVID-19.<br>- Providing strategies on how digital skills teachers used the | - Investigates secondary school teachers' perspectives on using Madrasati across different school subjects. |

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| | using Madrasati after COVID-19. | | questionnaire and a focus group | as sending activities and homework to students, encouraging collaboration and discussion among students, and uploading enriching resources to the platform.<br>- Teachers' and students' digital skills improved after the experience of using online learning during the crisis. | platform alongside face-to-face instruction.<br>- Delivering suggestions for school administrators and policymakers to support the use of e-learning platforms. | - My study aims to reach over 300 teachers.<br>- The target region is Asir.<br>- The current study employs a mixed-methods approach, rather than only a qualitative design. |
| Alabdulaziz & Alhammadi (2024) | Examining how the Madrasati experience affects students' acquisition of mathematical concepts and enhances their learning motivation from the perspective of mathematics teachers. | 613 mathematics teachers | Quantitative survey design | - There was general agreement regarding the overall impact of using Madrasati.<br>- There was stronger agreement on the extent to which the platform facilitated students' acquisition of mathematical concepts.<br>- An agreement was observed among teachers that the use of the platform contributed to enhancing students' motivation to learn mathematics.<br>- Teachers perceived a highly significant link between increased motivation and improved acquisition of mathematical concepts. | - Theoretically, the study provides empirical evidence of how Madrasati positively impacts students' acquisition of mathematical concepts.<br>- Practically, the study offers guidance for policymakers and teachers on how to effectively use online learning platforms, such as Madrasati, to enhance student learning and motivation. | - Examining the effect of using Madrasati from the perspectives of secondary school teachers across different school subjects.<br>- My study examines why teachers are motivated to use Madrasati in their teaching practices, including reasons, benefits, and challenges.<br>- Provides a model that can clearly shows the key factors impacting teachers' intentions to continue using Madrasati after COVID-19. |
| Al-Qahtani (2024) | Investigating how female secondary school students obtained advantages from the e-learning resources offered by Madrasati. | 77 secondary school students | A paper-based survey | - Most students obtained benefits from using Madrasati.<br>- E-learning tools helped most students in learning process.<br>- Through assignments on Madrasati, most students found it easily to communicate with teachers. | - Expanding the body of knowledge on the experience of using Madrasati among female secondary school students.<br>- Identifying some challenges faced by female students, such as technical issues, lack of sufficient guidance, and other barriers to optimal utilisation. | - Examines teachers' intentions to continue using Madrasati post-pandemic, rather than students' adoption.<br>- It includes male and female secondary school teachers to investigate the use of Madrasati beyond the pandemic. |

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| | | | | - There was insufficient guidance from teachers to help students to use Madrasati effectively.<br>- Some students encountered some difficulties with the content integrated into the platform.<br>- Most students did not find enough time to use Madrasati. | - Providing practical recommendations to enhance the effectiveness of e-learning tools on Madrasati, aiming to improve the learning experience for high school female students. | - The study aims to reach over 300 teachers.<br>- The current study employs a mixed-methods approach, rather than only a survey design. |
| Al-Adwani et al. (2024) | Determining whether it is useful for primary school mathematics teachers to use enrichment activities integrated into Madrasati in solving higher-order thinking mathematics problems. | 302 primary school mathematics teachers in Jeddah city | A descriptive survey | - Most participants used enrichment activities integrated into the platform to solve higher-order thinking mathematics activities.<br>- Most teachers provided feedback to their students related mathematics assignments through the platform.<br>- Most teachers employed appropriate pedagogical approaches to help students solve higher-order thinking mathematics problems through Madrasati. | - Providing empirical evidence on how primary school mathematics teachers in Saudi Arabia use enrichment activities through Madrasati to teach higher-order thinking skills.<br>- Providing insights into the current usage of Madrasati among primary school teachers in Jeddah city.<br>- Delivering recommendations for policymakers in Saudi Arabia to increase and enhance mathematics enrichment activities integrated into the platform. | - Examining how Madrasati is useful for secondary school teachers in using the platform's content and tools for teaching and learning.<br>- My study includes teachers from different school subjects.<br>- Employs a mixed-methods approach rather than relying solely on a survey.<br>- It focuses on the Asir region.<br>- My study provides recommendations to enhance Madrasati in general. |
| Al-Quraishi & Alzahrani (2025) | Aiming to assess, using SCORM standards, the intermediate school computer and information technology content offered on Madrasati. | 9 computer and information technology courses offered through the platform | A descriptive methodology | - The courses on Madrasati mostly follow SCORM guidelines, but not perfectly. Most standards are included at a moderate level, so the courses are somewhat consistent with international e-learning standards.<br>- The only standard fully implemented is Durability, meaning the content lasts over time and can be reused without losing quality.<br>- Some standards need improvement. For instance, | - Providing insights into the alignment of digital educational content integrated into Madrasati with international standards.<br>- Delivering suggestions to enhance the middle school computer and information technology courses integrated into Madrasati. | - My study includes a factor, namely educational content quality, aiming to examine the effect this factor on teacher' use of Madrasati.<br>- My study examines the link between two factors: learning content and perceived usefulness.<br>- The current study examines teachers' perception of using Madrasati' tools and content across different school subjects. |

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| | | | | Accessibility, Adaptability, Affordability, Interoperability, and Reusability are only moderate, meaning there are gaps in making content easy to access, adapt, afford, share, or reuse.<br>- Compared to older studies, the content quality has improved. Some aspects are now better than before, reflecting updates to the platform and courses. | | - Employs a mixed-methods approach rather than relying on a single method. |
| Al-Omrani et al. (2025) | Examine the factors that may cause middle and secondary school students to be reluctant in using Madrasati. | 524 middle and secondary school students in Tabuk city | An online survey | - Most students reported an insufficient understanding of how to effectively use Madrasati.<br>- There were concerns when students logged in and out of the platform related to the security privacy.<br>- Time was considered one of the barriers for using Madrasati among students in this group.<br>- Most students agreed that conducting exams on the platform was not easy.<br>- There was a positive relationship between using Madrasati and students' academic achievement compared to the regular face-to-face approach. | - Providing empirical evidence on how middle and secondary school students use Madrasati in Tabuk city.<br>- Shedding light on some of the factors that cause students to not use the platform effectively.<br>- Offering recommendations that might increase students' motivation to use Madrasati and its tools. | - Examines secondary school teachers' intentions to continue using Madrasati post-pandemic, rather than students' adoption.<br>- Focuses only on secondary school stage.<br>- Employs a mixed-methods approach rather than relying on a quantitative survey.<br>- My study investigates key motivators that can encourage teachers to continue using Madrasati in post-pandemic.<br>- My study focuses on Asir. |
| Al-Abbadi (2025) | Investigating the perceptions of intermediate teachers on employing Madrasati to teach the Arabic language and the | 218 intermediate school teachers Taif city | A descriptive survey | - The importance of adopting Madrasati in teaching the Arabic language among teachers was highlighted.<br>- Most teachers were convinced about what Madrasati provides in teaching and learning processes. | - Providing empirical evidence on intermediate school teachers' perceptions towards the use of Madrasati in the city of Taif to teach the Arabic language course.<br>- Delivering insights to Saudi policymakers to continue improving the platform and | - My study investigates secondary school teachers' perceptions of adopting Madrasati across different school subjects.<br>- My study aims to reach over 300 teachers in the Asir region. |

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| | challenges they face in using the platform. | | | - The platform encourages most students to learn actively, which can help them achieve their objectives whether synchronous or asynchronous.<br>- Madrasati provides various materials related to the Arabic language course at the intermediate school level.<br>- There were differences in teachers' responses based on their gender regarding the importance of adopting Madrasati in their teaching practices.<br>- There were no differences in teachers' responses based on their gender, qualifications, and years of experience regarding employing Madrasati in teaching the Arabic language course at the intermediate school level. | enhance Madrasati adoption among Arabic language teachers. | - The current study explores how Madrasati is useful in terms of the factor, namely perceived usefulness.<br>- My study sheds light on challenges faced by secondary school teachers in Asir. |

While recent studies conducted between 2022 and 2025, as mentioned above, have provided valuable insights into Madrasati's role in supporting teaching and learning among students and teachers during COVID-19 and after, their focus has largely remained on evaluating the platform's functionality, adoption challenges, and broader impact on educational practices. Nevertheless, limited attention has been given to understanding the factors that shape teachers' intentions to continue using the platform once its use is no longer compulsory. By addressing this gap, my study offers a new perspective by examining teachers' continuance intentions within the post-pandemic context, thereby extending the existing body of knowledge on e-learning adoption in SA and underscoring implications for the long-term integration of digital platforms into the conventional education.

## 2.9 Chapter Summary

In this chapter, I presented a brief overview of Saudi Arabia. The chapter began with general information, covering the geographic location, historical establishment, demographic data, official language, and recent development plans. Additionally, I described the Saudi education system from the establishment of the country until now. Along with this, I provided an overview of the educational stages in general education. Several projects and initiatives were also mentioned in this chapter, shedding light on the critical role of technology adoption in the educational sector, with Madrasati being one of the most recent technological platforms in SA. Furthermore, a key part of the chapter focused on Madrasati, a platform for e-learning and engaging with students during the pandemic. This includes statistical data from the MoE's report published in November 2020 regarding its usage.

The chapter presented a definition of Madrasati and highlighted its features, as identified in relevant studies. It further discussed the platform's evaluation from various perspectives, focusing on usability, effectiveness, and teachers' overall experience of adopting Madrasati. The challenges encountered by both teachers and students during COVID-19 were addressed, with a particular emphasis on issues such as lack of infrastructure, technical requirements of the platform, limited training opportunities and preparation time, and teachers' limited familiarity with the platform's tools. The chapter concluded by identifying some advantages of Madrasati adoption, such as its ease of use, ease of communication, and virtual learning environment. Table 2.3 and Table 2.4 summarises most of the previous studies on Madrasati, examining various aspects of the platform. Based on my experience as

a researcher and my review of previous studies on Madrasati, I argue that further research is needed to examine the factors influencing teachers' intentions to continue using Madrasati.

# Chapter 3 Literature Review

This chapter provides a comprehensive overview of the background of e-learning, beginning with its definition and its development over the past years. The COVID-19 pandemic marked a turning point in educational delivery systems globally, disrupting traditional face-to-face learning and accelerating the widespread adoption of digital platforms. This chapter outlines how education systems responded to the disruption, identifying key areas where e-learning succeeded and where it faced challenges. Next, the chapter explores different forms of e-learning. After that, it briefly introduces the Technology Pedagogical and Content Knowledge (TPACK) framework and then discusses e-pedagogy by drawing connections between foundational educational theories and digital teaching practices. Special emphasis is placed on the shifting role of educators, who are no longer mere content deliverers but facilitators, community builders, and adaptive guides in the digital ecosystem. Finally, the chapter addresses the pivotal role of learning management systems (LMS) in structuring and managing digital education. It outlines their functionalities, usage trends during and after the pandemic, limitations, and future prospects.

## 3.1 E-Learning

Studies have used different terminologies to describe e-learning, including online learning, online education, e-education, distance learning, and open learning (Alqahtani & Rajkhan, 2020). In this research, the term ‘e-learning’ is predominantly used as it is the most widely recognised term for the aforementioned concepts in SA, where this investigation was conducted. Generally, most definitions state that e-learning is made accessible by the utilisation of multiple technology tools, including electronic multimedia and computer networks. E-learning could be defined as ‘the usage of new and modern information and communications technology with the help of networks of computers to provide learning materials, teaching, and information to stakeholders’ (Selim, 2007, p. 396). Stakeholders were referred to in this definition as students, teachers, technical supporters, headteachers, and higher authorities (Ozkan & Koseler, 2009). On the other hand, e-learning was also defined as a flexible method of communication between teachers and students that does not require a face-to-face meeting or physical attendance (Tayebinik & Puteh, 2013). These different definitions of e-learning suggest that is has many functions, ranging from resource availability, use of multi-media materials, and communication opportunities.

E-learning has become increasingly significant in recent years as it provides new, unique ways of engaging with educational content, and often make learning more accessible (Alwahoub et al., 2020). It can also contribute to diversifying the different methods of teaching by offering multiple resources and features compared to traditional classroom settings (Quadri et al., 2017). However, when there is insufficient preparation for this approach, online learning is often associated with lower academic performance and reduced student engagement, partly due to the lack of direct physical interaction between teachers and students (Akpen et al., 2024). In Saudi Arabia, many educational institutions have attempted to implement digital technology to enhance the educational process, given its potentials in achieving national goals (see Chapter 2) (Alabdulaziz & Alhammadi, 2024).

Before the mid-1980s, when computers were neither widely available nor commonly used in education, the teaching process primarily relied on traditional, teacher-led methods (Inoue, 2007). The progress, technical development, and decreasing cost of computing devices, which became more accessible during the period between 1980 and the early 1990s, are closely linked to the evolution of e-learning (Hubackova, 2015). The concept of electronic education, including computer-based training, began to take shape during that period (Eger & Egerová, 2013). At the same time, the growing prominence of the internet and the development of web-based systems began to emerge (Hubackova, 2015). Consequently, digital technologies and computers started to become more extensively integrated into educational settings, with aim of enhancing classroom instruction and learning experiences. With the accelerated development of browsers and the rising popularity of email, online learning is believed to have gained momentum throughout the 1990s, particularly in the middle to later years of the decade. (Hubackova, 2015). This technological progress enabled educational institutions to adopt new technological tools and online platforms with the aim of improving the way the process of instruction and education was delivered (Kocur & Košč, 2009).

With the brisk expansion of digital technologies and web-based tools, wireless network accessibility and e-learning tool adoption increased during the first half of the 2000s (Nicholson, 2007). As the internet expanded and became more accessible, the utilisation of e-learning and digital technology in education continued to advance rapidly between 2005 and 2010 (Nicholson, 2007). This period saw notable developments, including the release of e-books, cloud-based computing and storage, and digital instructional games (Harasim,

2006), and portable electronic devices like smartphones and tablets became available to students, who increasingly utilised them for peer interaction and communication with teachers (Cox, 2013).

The past ten years have witnessed considerable improvements in the functionality, availability, and accessibility of digital technologies and online learning tools. The widespread use of wireless technology allows for internet access nearly everywhere, enabling students and teachers to access content from any place while fostering virtual collaboration between teachers and students. The constant availability of digital technologies and internet access has become a central part of daily life, leading in changes to the ways individuals think, study, interact, and work together. The COVID-19 pandemic has significantly increased the global education system's reliance on e-learning over the past four years, primarily due to the sudden transition implemented as a preventive measure to limit the spread of the virus. This crisis has profoundly reshaped education worldwide, prompting institutions to adopt and expand the implementation of digital and online technological tools in educational practices (Amiti, 2020).

E-learning, which was not initially considered of prime importance, instantly became the principal mode of teaching and learning during the crisis. Meanwhile, this e-learning did expose numerous weaknesses, and it also showcased the growing capability of digital education tools. The following sections will examine the post pandemic evaluations of e-learning, along with identification of the successes and failures that this system presents in perspective to students and teachers.

## 3.2 E-Learning After COVID-19: Reflections and Realisations

In early 2020, the outbreak of COVID-19 pandemic caused the global disruptions, causing more harm to education systems. Within weeks, the schools, colleges, and universities across the globe were forced to shut their workings for indefinite time periods, with UNESCO reporting that more than 1.6 billion students out of the classroom (UNESCO, 2020c). To mitigate the damage caused by COVID-19, governments and educational institutions took the route of e-learning as the principal method of learning, instead of traditional classroom-based education. While the rapid pivot provided continuity in education, it also revealed multiple layers of complexity and challenges, including issues with digital accessibility and unprepared educational practices (Teräs et al., 2020).

The most accomplishment of e-learning was its proficiency in maintaining the perfect delivery of educational knowledge without any hurdles. The countries that had once invested in educational technologies, such as Finland and Malaysia, were able to transfer quickly into online space (Teräs et al., 2020). The Madrasati platform in SA was an example of a national-level deployment that facilitated the synchronous classes, digitalised evaluation system, and real-time interaction between students and teachers. Some research shows that student engagement and access were at an all-time high in e-learning, and this was further proved by stats generated by the Saudi's MoE (see Chapter 2, section 2.8). In the same way, platforms like Google Classroom, Microsoft Teams, and Zoom saw daily usage among teachers and students globally (Stecuła & Wolniak, 2022).

This is because e-learning not only offers a flexible way of teaching and learning but also helps in supporting educational practices in accordance with the online learning. Students have open access to pre-recorded lectures, known as asynchronous, allowing them to study the provided content at their own pace. Teachers would use multimedia as a tool to refer to different types of content, such as pictures or animations, to present lessons in an attractive manner for students' better understanding. Furthermore, some students with special needs benefited from using e-learning during the COVID-19 crisis, as it provided tailored support that addressed their unique needs (Al Hosni et al., 2023; Genc et al., 2021).

Regardless of the key benefits this system offered, the transition to e-learning was not without its challenges. E-learning's weaknesses were especially evident in low income and under-resourced communities. The global digital divide, representing the differences in internet access, devices available, and digital literacy, meant that many students were distanced from online learning in part or completely. For instance, in the Philippines, 41% of households have no access to the internet, which renders online education impossible for many students (Teräs et al., 2020). Even in countries with technological advancement, such as the United States, some students in less developed regions faced multiple challenges due to a lack of trusted networks (Asher, 2021).

In addition to the above, the transition significantly impacted both student outcomes and teachers' instructional performance. Research suggests that student learning outcomes were negatively affected, particularly in terms of academic achievement, cognitive engagement, and retention. The students experienced substantial learning losses in reading and

mathematics due to inconsistent access to structured instruction and diminished motivation in remote settings (Kuhfeld et al., 2020). A study estimated that students returned to school in Fall 2020 with approximately 63–68% of typical learning gains in reading and only 37–50% in mathematics (Kuhfeld et al., 2020). A meta-analysis by Betthäuser et al. (2023) confirmed that COVID-related school closures resulted in significant reductions in student learning, with disadvantaged students suffering greater academic setbacks. However, even in high-income countries, students reported difficulties concentrating, lower test scores, and reduced interaction with instructional content. Many learners, especially at the primary and secondary levels, struggled with learning without the structured environment of physical classrooms (Hammerstein et al., 2021).

Alongside students, teachers also encountered numerous professional challenges. The shift to digital platforms demanded immediate adaptation, placing a heavy burden on educators to redesign curricula, master digital tools, and maintain student engagement virtually. A survey by Kim and Asbury (2020) found that teachers experienced increased stress and uncertainty about their professional identity during the pandemic. Teachers frequently expressed concerns about their ability to deliver quality education, particularly to learners with special needs or those lacking digital fluency. Additionally, the need to simultaneously manage family responsibilities while conducting synchronous and asynchronous teaching led to professional burnout. According to Pressley (2021), with the increasing requirements for instruction and the concerns about the status of education during the pandemic's peak, teachers were under significant stress. The lack of sufficient digital training also contributed to reduced instructional confidence. A large-scale survey by König et al. (2020) highlighted that while many teachers possessed basic digital competencies, they lacked pedagogical strategies specific to online teaching, leading to lower perceived teaching effectiveness.

There were also teaching and learning implications associated with the institutional change, which were very concerning. Teachers, mostly those who were not trained in digital learning, were forced to turn their course content into online content and activities that would be helpful for students to learn, without any time to prepare. The urgent shift to online teaching during COVID-19 significantly increased university teachers' stress and workload, further increasing the pre-existing challenges in balancing teaching, research, and personal life (Rapanta et al., 2020). Students felt less socially active, were tired of using the screen, and participated less in activities, hence leading to their emotional and cognitive disengagement (Stecuła & Wolniak, 2022).

However, this pandemic phase was somehow considered the practical time for learning and adjustment. A few important realisations emerged. It starts with the recognition that education systems are now widely acknowledging the key benefits of e-learning, for example, UK higher education institutions have started to see the value of e-learning more evidently after the pandemic, using it not just as an extra option but as an important part of how they teach and support students (Walker & Voce, 2023). Digital skills are not just technical tools now; they are vital as they enable the capabilities of students and teachers to participate in modern learning systems. Furthermore, the limitations of adopting a solely online model encouraged the widespread support for blended learning models. This model combines the flexibility and resources provided through digital tools, with prompt feedback and in-person social interactions. Research has shown that blended learning can be appropriately designed for practical courses, while theoretical content can be conducted through face-to-face interactions, leading to positive outcomes in students' learning (Stecuła & Wolniak, 2022). Additionally, Boelens et al. (2017) state that when blended learning is planned well and includes ways for students to connect and interact, it can help them learn better and enjoy the learning process more.

In conclusion, although e-learning as a response to COVID-19 was a result of necessity, its implications are more long-term, showing the weak points and potential of education systems, and how institutions must rethink their readiness and adaptability to changing circumstances. To address future educational models, educational institutions should interweave technology with the educational context of learning, which is not regarded as an emergency response but a planned method of improving teaching and learning practices.

## 3.3 Types of E-Learning

The e-learning model consists of several learning modes, each associated with different contexts, purposes, and learner profiles. The different types of learning have achieved improved status and have wider applications in the wake of COVID-19. It is important for educators and policymakers to realise the significance of formal, informal, blended, online, synchronous, and asynchronous learning in planning flexible, inclusive, and educationally sound learning environments. This section takes a look at each of these learning types, based on research, and considers the characteristics associating them, both within and outside of e-learning frameworks.

### 3.3.1 Formal and Informal Learning

Formal learning is confined to structured educational delivery through institutions like schools, colleges, and universities. It is usually planned, follows a systematic approach to a prescribed curriculum that delivered by certified educators (Czerkawski, 2016). E-learning has adapted formal learning delivery by virtualising lectures, assessments, and certification of knowledge and skills. During the global pandemic COVID-19, formal institutions transitioned from classroom delivery to online formats almost overnight, in many instances formal institutions used LMS, including Moodle, Blackboard, and Canvas, to replicate classroom environments.

Informal learning, unlike formal learning where a certificate is given for completion, is the self-directed learning that takes place beyond formal education settings, including a wide range of methods and contexts (Czerkawski, 2016). For instance, reading something, watching a tutorial, participating in a discussion board, or learning something new through free online learning opportunities on platforms such as YouTube, Coursera, Duolingo, or social media tools is regarded informal learning (Kumar & Nanda, 2024). During the pandemic, informal learning became a choice for some students seeking to supplement their interrupted formal education. A study conducted by Temban et al. (2021) examined children aged 11 to 12 using YouTube Kids, showing that the platform engaged students with educational content outside the traditional classroom setting. However, the unstructured nature of informal learning could make things difficult for students. There could be concerns about the credibility of sources of information, a lack of pedagogical coherence, and no teacher support, which could make informal learning less effective.

### 3.3.2 Blended and Online Learning

Blended learning, also known as hybrid learning, is an educational approach that incorporates face-to-face instruction with online learning experiences (Hrastinski, 2019). Some higher education institutions often adopt a blended learning approach, a practice that has grown significantly as a result of the Covid-19 pandemic (Lakhal & Bélisle, 2020). Additionally, research has shown that students prefer blended programmes because they combine the advantages of in-person experience and online learning (Allen, 2016; Owston et al., 2013). Furthermore, Alibrahim's (2024) study has indicated that some teachers would

intend to combine using Madrasati with face-to-face instruction in SA as a blended learning approach. The implementation of blended learning requires institutional commitment, teacher training, and infrastructure investment. If improperly designed, blended courses can result in unsuccessful learning experiences that might confuse rather than support students.

Online learning describes all the processes of educational activities, such as teaching, learning, and assessment, that are conducted and provided solely online (Lakhal & Bélisle, 2020). This approach to learning allows students, who are not able to attend in-person lectures, the flexibility and accessibility to learn without interruptions. During the COVID-19 crisis, most educational institutions adopted online learning as an alternative to face-to-face instruction in order to support continued teaching and learning during the lockdown. Students were affected by school closures in many countries, and online learning became the only option at that time.

### 3.3.3 Synchronous and Asynchronous Learning

Synchronous and asynchronous e-learning are also two of the main types of e-learning. According to Amiti (2020), synchronous learning occurs when teaching and learning activities are conducted simultaneously in real time through a particular online platform for the purpose of lesson communication. This model attempts to reproduce traditional classrooms and typically uses Zoom, Google Meet, and Microsoft Teams for live sessions. In real time, both teachers and students are able to interact, exchange information, and offer feedback to one another instantaneously (Hrastinski, 2008; Skylar, 2009). Synchronous learning also increases access to educational materials by eliminating geographical boundaries, allowing students, regardless of their location, to obtain knowledge from any place (Amiti, 2020; Skylar, 2009). However, courses that are organised in a synchronous manner are typically conducted according to a predetermined timetable, which restricts students' flexibility regarding when they would like to study (Skylar, 2009).

Asynchronous learning allows learners to access educational materials at their convenience (Kocur & Košč, 2009). These resources include pre-recorded lectures, PowerPoint presentations, articles, and e-books, which can be accessed according to each student's timetable (Perveen, 2016). According to the author, this flexibility supports the development of critical thinking and problem-solving abilities among students by giving them the opportunity to carefully consider their answers instead of demanding instant response. Amiti

(2020) asserted that a combination of both styles, using synchronous and asynchronous e-learning, is a more effective pedagogical strategy than relying on only one approach. During the pandemic, Madrasati was employed in both modes. In the synchronous style, teachers and students met digitally through the Teams application provided on the platform, based on schools' timetable. At the same time, students had access to recorded lectures, e-books, assessments, and other resources, supporting an asynchronous learning approach (see Chapter 2, section 2.8.2). In the current educational context, teachers can still benefit from combining both approaches, which can support and enhance the teaching and learning process in the post-pandemic period.

## 3.4 Technological Pedagogical Content Knowledge (TPACK)

Incorporating technology in modern education is critically important but effective use of digital platforms requires more than just a technological familiarity. It solely depends on teachers' substantial knowledge of technology, content, pedagogy, and how it is integrated into planning lessons, instruction, and evaluation. The Technological Pedagogical and Content Knowledge model (TPACK) was introduced by Koehler and Mishra (2009), who gave an intellectual framework for considering integrated knowledge base. Expanding on Shulman's (1986) concept of pedagogical content knowledge, TPACK describes how teachers combine technology along with disciplinary concepts and instructional strategies to develop learning, that is effective and suitable for the given context (Niess, 2011). As defined, this framework shifted the focus from tool training to adaptive design and knowledge integration.

TPACK has shaped teacher education, the design of measurement tools, and look into the conditions that facilitate the use of technology since its beginning. Measurement work indicates that intersections of technological pedagogical knowledge and technological content knowledge are significant predictors of combined TPACK and are thus critical levers for professional development (Absari et al., 2020; Pamuk et al., 2015). Program level strategies, such as role modelling, methodical reflection, actual design work, and constant feedback, are associated with increased practical TPACK among preparatory teachers (Baran et al., 2019; Tondeur et al., 2020). These results suggest that investing in intersection-rich pedagogical designs are more effective than individual technical workshops.

The model has progressively evolved as a response to the emerging demands. A few suggestions have been made for a digitality centred model that describes epistemic and ethical aspects of digital learning (Thyssen et al., 2023), an AI precise edition that focuses on artificial intelligence related to technological and pedagogical knowledge (Ning et al., 2024), and a reconfigured model that incorporates contextual knowledge in an effort to respond to the influence of learners, institutions, policy, and time in design decisions (Petko et al., 2025). Across settings, studies consistently report that teachers' integrated knowledge relates to confidence and readiness to adopt platforms, while weak technological intersections and unsupportive school conditions constrain enactment (Roussinos & Jimoyiannis, 2019; Santos & Castro, 2021).

This review uses TPACK as the organising lens for a study of teachers' intentions to continue using the Madrasati platform along with the proposed model. It first outlines the framework and its components, then examines the intersections that enable integrated design, and finally synthesises evidence on how TPACK relates to intention and adoption. The goal is to position TPACK within a clear conceptual pathway that links teacher knowledge to platform integration in real classrooms. Figure 3.1 represents the TPACK framework (Koehler & Mishra, 2009).

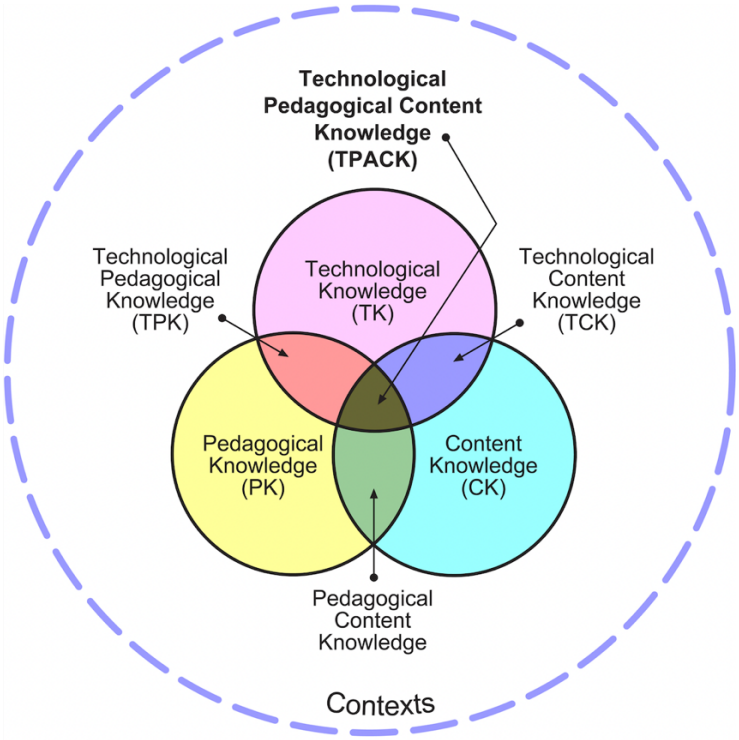


*Figure 3.1 Technological Pedagogical and Content Knowledge (TPACK) (Koehler & Mishra, 2009)*

### 3.4.1 Conceptual Foundations

The TPACK framework is a response to the problem that teaching with technology is complex, situated, and knowledge intensive. Koehler and Mishra (2009) extend Shulman's (1986) idea of pedagogical content knowledge by adding a technological dimension and by arguing that effective design with technology requires a coordinated synthesis of content knowledge, pedagogical knowledge, and technological knowledge. TPACK therefore represents the knowledge teachers use to select, represent, and sequence content with suitable pedagogical approaches while aligning these with the affordances and constraints of specific technologies. It is not a list of skills but a dynamic and context sensitive knowledge system that supports flexible decision making in real classrooms (Niess, 2011).

Within this system, the three core domains are content knowledge, pedagogical knowledge, and technological knowledge. Their pairwise intersections describe practice-oriented integrations. Pedagogical content knowledge captures content specific teaching strategies. Technological content knowledge concerns how technologies transform and represent disciplinary ideas. Technological pedagogical knowledge concerns how technology reshapes teaching and learning processes. At the centre, TPACK denotes the integrative knowledge that coordinates all three domains for a given topic, learner group, and context (Koehler & Mishra, 2009). This structure underscores that the quality of technology integration depends on how teachers align tools with disciplinary meaning and pedagogical intent rather than on tool familiarity alone (Niess, 2011).

Subsequent scholarship has operationalised and tested the framework. Survey based models show that the intersections technological pedagogical knowledge and technological content knowledge are strong predictors of integrated TPACK, with core domains exerting their influence largely through these intersections (Absari et al., 2020; Pamuk et al., 2015). Performance assessments built from authentic design artefacts provide convergent evidence that integrated factors emerge in practice, and that self-reports can overestimate enactable knowledge (Akyuz, 2018). Rubric work has articulated developmental levels from recognising to advancing and has linked higher levels to tasks with greater cognitive demand and inquiry orientation (Lyublinskaya & Kaplon-Schilis, 2022). Together these strands position TPACK as a measurable and developable knowledge base for professional learning.

The framework has also evolved to address new conditions in digital learning. A digitality oriented account argues that technology should be treated as an embedded cultural and epistemic condition rather than as external tools, and proposes DPACK to foreground digital practices and ethics in subject teaching (Thyssen et al., 2023). AI focused adaptations specify AI related technological knowledge and emphasise technological pedagogical pathways as key channels to integrated AI TPACK (Ning et al., 2024). An updated model highlights contextual knowledge as an explanatory lens for variation across learners, schools, policies, and time, and shows how contextual sensitivity shapes intersectional design decisions (Petko et al., 2025). Ethical extensions similarly link teachers' capacity to evaluate fairness, transparency, and accountability to stronger pedagogical use of intelligent tools (Celik, 2023). These refinements preserve the core idea of knowledge integration while sharpening how TPACK explains teacher judgment under contemporary technological and institutional conditions.

### 3.4.2 Core Components of TPACK

**Technological Knowledge (TK):** Technological knowledge refers to teachers' understanding of how to use and adapt technologies for teaching and learning. It includes operational competence with digital devices, software, and platforms, and awareness of their affordances and limitations. Studies show that TK is the most variable domain across teachers and often the limiting factor in technology integration. In several Saudi and international studies, low TK scores reflect a gap between access to devices and the capacity to use them for pedagogical purposes (Alharbi, 2020; Bingimlas, 2018). Research on pre-service teachers demonstrates that structured exposure to technology enhanced design tasks, modelling, and peer collaboration are effective strategies for building TK and its intersections (Lachner et al., 2021; Tondeur et al., 2020). In adaptive online training, TK tends to show the largest gains because digital practice opportunities and immediate feedback allow participants to experiment safely (Elmaadaway & Abouelenein, 2023). However, weak institutional support and limited professional development can still restrict TK growth even where motivation is high (Aldossry & Lally, 2019; Aljohani, 2021). Overall, TK provides the functional foundation for technology use but must be connected with pedagogy and content to produce sustainable integration.

**Pedagogical Knowledge (PK):** Pedagogical knowledge represents teachers' understanding of teaching methods, learning processes, assessment, and classroom management. It forms

the basis for designing instruction that is coherent, engaging, and adaptive to learners' needs. Across contexts, PK remains the strongest domain because it develops through both preservice education and practical experience. Studies of EFL and STEM teachers show consistently high PK scores, reflecting confidence in traditional instructional design and evaluation (Alharbi, 2020; Mansour et al., 2024). PK also underpins teachers' ability to transfer learning across modes, as seen in hybrid and online teaching during the COVID-19 pandemic, where experienced teachers used pedagogical principles to sustain student engagement even when technology skills were initially limited (Basaffar, 2021). However, high PK alone does not guarantee effective technology use. Without technological mediation, pedagogical strategies may remain conventional and fail to exploit digital affordances (Ismaeel & Al Mulhim, 2022). Professional development that explicitly connects PK with technology design decisions, reflection, and iterative practice therefore remains essential.

**Content Knowledge (CK):** Content knowledge denotes mastery of subject matter and the ability to organise and represent disciplinary concepts accurately and meaningfully. CK ensures that teachers' use of technology supports conceptual understanding rather than superficial activity. In mathematics and science education, strong CK allows teachers to select or design technological representations that reveal underlying structures and relationships (Aldossry & Lally, 2019; Alqahtani & Alibraheim, 2025; Mansour et al., 2024). Studies show that CK levels are generally stable across demographic groups but influence intersections indirectly by enabling teachers to recognise which aspects of content benefit from technological enhancement. In EFL and humanities contexts, CK interrelates with digital literacy in shaping task authenticity and alignment with communicative purposes (Alharbi, 2020; Basaffar, 2021). Even though CK is less likely to vary compared to TK or PK, its interaction with technology shapes integration quality; teachers with substantial disciplinary knowledge can better reflect on whether a tool truly supports learning or merely adds novelty.

### 3.4.3 Intersections within TPACK

**Pedagogical Content Knowledge (PCK):** Pedagogical content knowledge refers to teachers' capability to transform disciplinary content into teachable and learnable forms. It denotes how teachers represent major ideas, deal with misapprehensions, and become accustomed to instruction given to students' pre-existing knowledge. Irrespective of the

technology, PCK remains pivotal in TPACK because it binds pedagogy and content. In mathematics and EFL approach, teachers with convincing PCK uses appropriate examples, framework, and questioning techniques that facilitate conceptual understanding (Aldossry & Lally, 2019; Alharbi, 2020). Research on Saudi and Qatari teachers indicates that PCK is constantly the most highly rated intersections, suggesting that teachers were assured in content delivery but sometimes preferred using the traditional pedagogic methods (Alqahtani & Alibraheim, 2025; Mansour et al., 2024). Throughout pandemic-driven online teaching, PCK facilitated teachers to maintain rationality in learning objective and assessment even when there were significant technological disruptions (Basaffar, 2021; Ismaeel & Al Mulhim, 2022). Therefore, fortifying PCK provides a secure and reliable foundation for subject-specific technology integration.

**Technological Content Knowledge (TCK):** Technological content knowledge involves how technology might signify, reorganise, and strengthen disciplinary ideas. Efficient TCK teachers can decide which digital tools or simulations brings out patterns which otherwise remain obscured or intangible. The research suggests that TCK generally tends to be the inconclusive intersection, particularly where there is scarcity of subject-based digital tools or modelling practice (Aljohani, 2021; Alqahtani & Alibraheim, 2025; Bingimlas, 2018). Math and science teachers, on the other hand, are more likely to show more robust TCK compared to language or humanities teachers owing to greater exposure to content-specific technology (Lachner et al., 2021; Mansour et al., 2024). Developmental studies also highlight that modelling software and authentic design projects can directly enhance TCK through bridging theoretical material with interactive digital tasks (Baran et al., 2019; Elmaadaway & Abouelenein, 2023). Enhancing TCK remains a pivotal concern for integrating platforms, as it facilitates teachers to bridge tools with discipline-specific goals rather than generic technical engagement.

**Technological Pedagogical Knowledge (TPK):** Technological pedagogical knowledge encompasses the ability to be aware of how technology changes teaching activities, students' evaluation and communication in classrooms. It encourages the decision of using digital tools in facilitating collaborations, differentiation, and feedback. Time after time, TPK emerged as a significant predictor of teachers' intention and readiness to adopt platforms (Pamuk et al., 2015; Tondeur et al., 2020). Experimental and adaptive-learning studies show that guided reflection, modelling, and shared lessons considerably enhances TPK, particularly when training underlines pedagogical goals rather than tool mastery

(Elmaadaway & Abouelenein, 2023; Lachner et al., 2021). Conversely, low TPK correlates with weak confidence and superficial integration, as seen among teachers who rely on technology for presentation rather than interaction (Aljohani, 2021). Strengthening TPK helps teachers plan learner-centred digital lessons and anticipate how technology affects participation, feedback, and assessment.

**Integrated Technological Pedagogical Content Knowledge (TPACK):** Integrated TPACK represents the synthesis of all domains and intersections into a coherent capacity for technology-enhanced teaching. Teachers with high TPACK can flexibly combine disciplinary expertise, pedagogical strategies, and technological affordances to design effective digital learning experiences. Studies across pre-service, in-service, and higher education settings confirm that TPACK is an integrated construct rather than a simple sum of its parts (Koehler & Mishra, 2009; Niess, 2011). Intervention-based research exhibit significant TPACK is followed by structured, subject matter specific professional development (Elmaadaway & Abouelenein, 2023; Lachner et al., 2021), and large-scale surveys conducted in SA and Gulf contexts indicates that perceived TPACK is strongly related to teaching self-efficacy and readiness for platform adoption (Alghamdi, 2023; Basaffar, 2021). Qualitative work indicates that teachers perceive TPACK as both knowledge and belief—confidence in aligning tools with content and pedagogy—highlighting the importance of self-efficacy and institutional support (Aldossry & Lally, 2019; Voithofer et al., 2019). Overall, integrated TPACK encapsulates the cognitive, affective, and contextual dimensions that together determine how teachers translate technological knowledge into sustained, meaningful educational practice.

### 3.4.4 TPACK and Teachers' Intentions to Integrate Technology Platforms

Teachers' intentions to integrate technology platforms are shaped not only by access to resources but by their confidence in coordinating technology, pedagogy, and content. Across studies, higher self-efficacy in TPACK consistently predicts stronger adoption intentions, whereas weak intersections or lack of contextual support reduce actual implementation. Quantitative evidence from higher education and school contexts in SA demonstrates that teachers with higher perceived TPACK report greater readiness to employ digital platforms such as Blackboard for instruction, assessment, and collaboration (Alghamdi, 2023; Basaffar, 2021). Conversely, when teachers' technological content and pedagogical

knowledge remain underdeveloped, intentions are constrained despite positive attitudes towards technology (Alharbi, 2020). This suggests that motivation alone is insufficient; integrated competence across domains is required to transform positive attitudes into practical platform use.

Self-efficacy plays a mediating role between knowledge and behavioural intention. Teachers with strong confidence in their ability to use technology for content delivery and student-centred pedagogy are more willing to experiment with new tools and adapt to institutional innovations (Elmaadaway & Abouelenein, 2023; Mansour et al., 2024). Additionally, intervention studies shows that when professional learning aims towards reflective design, modelling, and genuine project work, teachers' TPACK and self-efficacy both increases, leading to greater willingness to adopt platforms (Lachner et al., 2021; Tondeur et al., 2020). Adaptive training environments that individualise learning pathways and offer instant feedback are especially effective at shoring up the intersections TPK, TCK, and TPACK, that predict integration intentions (Elmaadaway & Abouelenein, 2023). In comparison, general technology workshops with no pedagogical focus shows minimal effect on TPACK development or adoption behaviour (Aljohani, 2021; Bingimlas, 2018).

Qualitative findings illustrate that context barriers such as lack of infrastructure, institutional policy vacuum, or restricted access to professional networks undermine teachers' tendency to use platforms even when individuals TPACK is convincing (Aldossry & Lally, 2019; Aljohani, 2021). Teachers typically express enthusiasm but stumble in sustaining technology use due to workload pressures or lack of expectations (Roussinos & Jimoyiannis, 2019). Furthermore, the studies on comparative and mixed-methods approaches validate that successful adoption is achieved when TPACK development is paired with supportive organisational culture, peer support, and leadership encouragement (Baran et al., 2019; Voithofer et al., 2019). In emerging AI-enhanced learning environments, critical and ethical dimensions of TPACK, mounted as Intelligent-TPACK or AI-TPACK affect teachers' perceived readiness to use intelligent tools in transparent and responsible manners (Celik, 2023; Ning et al., 2024). Such extensions emphasise that technological integration now not only covers functionality but also analytical and ethical judgment.

Overall, the relationship between TPACK and integration intention is reciprocal. Knowledge integration strengthens confidence and adoption, while actual platform use reinforces and refines TPACK through reflective practice. The reviewed evidence underscores that

interventions aimed at enhancing teachers' intentions must go beyond training in isolated tools to promote holistic professional learning where TPACK development is continuous, contextually grounded, and institutionally supported.

In conclusion, the reviewed literature demonstrates that the TPACK framework provides a robust theoretical and empirical basis for understanding teachers' intentions to integrate technology platforms. TPACK captures the dynamic synthesis of technological, pedagogical, and content domains that underpins teachers' capacity to plan, implement, and evaluate technology-enhanced learning. Across diverse studies, the framework consistently explains variance in teachers' readiness, confidence, and adoption behaviour better than any single domain considered separately. Research has shown that technological pedagogical knowledge and technological content knowledge act as bridges linking fundamental teaching knowledge to integrated TPACK, making them pivotal in translating awareness into actionable design.

## 3.5 E-Pedagogy: Integrating Pedagogy into E-Learning

E-pedagogy is a phrase referred to describe the pedagogical methods, techniques, and methodologies used in digital teaching and learning settings. It is different from traditional face-to-face teaching as it encourages the use of digital tools to facilitate learning, student engagement, and collaborative experiences (Mehanna, 2004). E-pedagogy also allows educators to use multimedia materials, online discussions, quizzes, and simulations to promote student engagement and achieve higher learning outcomes.

In modern times, e-pedagogy, the connection of technology and pedagogy, is considered an integral part of current education system, especially following the effects of the COVID-19 pandemic. Even though e-learning and digital e-tools can moderately assist in managing logistics of the online education, it also helps in adopting the greater benefits of teaching experience in terms of quality, equity, and efficiency. According to McQuiggan (2012), preparing to teach online offers faculty an opportunity to critically reconsider their teaching assumptions and beliefs, highlighting the importance of recognising them as adult learners whose professional development should align with adult learning principles.

Effective e-pedagogy is grounded in established learning theories such as constructivism and connectivism. Constructivist approaches posit that learners actively construct knowledge

through social interaction, reflection on experiences, and engagement with authentic, context-rich tasks. This interaction is facilitated by collaborative components, discussion boards, problem-based assignments, and multimedia that expand the boundaries of knowledge construction. Constructivism also applies to the e-pedagogical space through collaborative group projects, peer assessments, and synchronous virtual discussions.

Connectivism, a theory mainly related to digital educational context, acknowledges that learning happens among people and digital nodes, within a network. In this model, educator's role is more facilitative, as they help students navigate and process their thinking, assess, and construct meaning from digital or online sources. Things like blogs, wikis, online databases, and live documents are some examples of connectivist pedagogy. Connectivism is quite consistent with 21st-century skills, such as critical thinking, information fluency, and self-directed inquiry (Siemens, 2005).

In the context of e-learning, the teacher's role expands beyond simply delivering instruction. Educators are increasingly required to serve as enhancers, curators, filters, and guides of community-driven learning, facilitating continuous presence and engagement in the digital learning environment (Skrypnyk et al., 2015). Nonetheless, many educators were unprepared for the transition to distance education during the COVID-19 pandemic, lacking both the necessary training and technological support (Sari & Nayır, 2020). A lack of professional development in digital pedagogy resulted in a considerable amount of displacement and inconsistent adaptation, where educators reverted to simply delivering content to students in a passive manner. To facilitate the shift, educational institutions must invest capital and provide teachers with continuing, practice-based training where teachers develop both technical and pedagogical aspects designed for online environments. Furthermore, training should be discipline-specific since the pedagogical demands in literature course are different from that of mathematics or laboratory-based science.

The role of interaction in online learning is multifaceted, offering both opportunities and limitations. On the one hand, online learning environments enable greater flexibility through synchronous and asynchronous interaction modes. Synchronous learning refers to situations where instructors and students engage simultaneously in a shared virtual environment, enabling real-time interaction and communication. Asynchronous tools, whereas, allow learners to engage at their own pace, supporting reflection and autonomy (Greenhow et al., 2022). However, research suggests that interaction in e-learning is often underutilised or of

low quality. Greenhow et al. (2022) explain that online learning often focuses more on students interacting with the content than with their teachers or classmates. Jeong and Hmelo-Silver (2016) observe that asynchronous communication technologies offer learners flexibility and opportunities for reflection, but also note that they are more frequently used than synchronous tools, potentially due to practical constraints rather than pedagogical considerations, which may influence the quality and nature of collaborative interactions. Moreover, students in asynchronous and individual learning environments often experience different types of interaction compared to those in face-to-face, teacher-led, synchronous settings (Al Mamun & Lawrie, 2023).

Regarding Madrasati, teachers report valuing features that facilitate lesson planning, content delivery, and monitoring student engagement. Its built-in tools for video conferencing, resource sharing, and assignment tracking align with teachers' desire for efficient classroom management in virtual settings. Yet, some teachers note challenges in sustaining meaningful interaction due to limited student participation and technological constraints. This duality underscores the need for targeted professional development that not only trains educators in using digital tools, but also fosters pedagogical strategies to enhance interactivity in diverse modalities (see Chapter 2, section 2.8.3).

E-pedagogy is not solely about using digital tools but to reconceptualise the teaching and learning processes in accordance with changing needs to stay connected to the latest teaching trends. It encourages educators to be more adaptive, contemplative, and student-focused, and demands that all institutes fully accommodate teachers in providing the necessary support to their students. By rooting technological integration in sound pedagogical theory, e-pedagogy can drive more meaningful, inclusive, and effective educational experiences in the post-COVID era.

## 3.6 Learning Management Systems (LMS)

Learning management systems (LMS) have become essential components of digital education infrastructure, serving to plan, implement, evaluate, and manage e-learning processes while promoting interaction, communication, and learner engagement (Oliveira et al., 2016). LMS can be broadly identified as software application or its implementation of web-based technology that can be used to plan, initiate, and assess a specific learning process. These systems have been instrumental in transitioning traditional education into

digital formats, especially during and after the COVID-19 pandemic. According to a report by Fortune Business Insights, the global LMS sector, estimated at approximately USD 14.43 billion in 2021, is expected to exceed USD 40.95 billion by 2029, reflecting its escalating importance in contemporary education.[3]

The underlying potential of LMS platform lies in offering tools for content delivery, learners' registration and enrolment, communication, assessment, reporting, and grading. Popular LMS platforms like Moodle, Blackboard, Canvas, and Google Classroom have become common names in educational institutions across the globe. Most LMSs will allow educators to upload lecture materials, create quizzes and assignments, as well as keeping track of attendance and provide avenues for communicating with students via announcements or a discussion forum. For students, LMS platforms provide a centralised interface that allows them to access resources, monitor their progress, submit assignments, and receive feedback (Oliveira et al., 2016).

### 3.6.1 Role of LMS During and After COVID-19

The onset of the pandemic compelled nearly all educational institutions to adopt or upscale LMS usage. In many cases, LMSs became the primary medium for educational continuity. In Saudi Arabia, the Madrasati platform supported synchronous and asynchronous classes across all levels of education. Similarly, global platforms saw exponential user growth. For instance, Google Classroom reached over 150 million users worldwide by the end of 2021 (Kerssens et al., 2024).

Post-COVID, the role of LMSs has not diminished; rather, it has been redefined. Institutions now view LMS not as a temporary solution but as a permanent fixture of instructional delivery. Blended learning models heavily depend on LMS platforms to coordinate in-person and online components. The pandemic accelerated the shift towards learner-centric digital systems. In response, LMSs have evolved with enhanced analytics, customisation features, and increased accessibility to support flexible and effective online education (Sharma et al., 2024).

[3] https://www.globenewswire.com/news-release/2022/10/31/2544353/0/en/With-14-2-CAGR-Learning-Management-System-LMS-Market-Size-to-Reach-USD-40-95-Billion-2022-2029.html

### 3.6.2 Challenges and Considerations

Regardless of the value and effectiveness of LMSs, these platforms have their drawbacks. Usability is the recurrent problem cited by many researchers; complex language, incoherent navigation, and complex navigational specifications can hinder both the instructors and learners, especially those with inadequate digital literacy. Often one-size-fits-all methodology fails to meet the required criteria of different subject areas. For instance, teaching performing arts or laboratory sciences online through an LMS poses substantial barriers to completion that can often not be resolved through traditional precursory digital tools.

Moreover, institutional readiness is another factor in LMS. The effectiveness of an LMS largely depends on its strategic integration within well-planned educational programmes that leverage innovative teaching methodologies to enhance the quality and impact of e-learning (Oliveira et al., 2016). This requires from ensuring faculty commitment, offering sufficient training, providing technical assistance, using LMS in a way that perfectly aligns with the suggested curriculum long term goals. Without strategic measures and constant feedback, converting to LMS can simply be, at best, a sometime activity and underutilised.

The future of LMS development purely depends upon enhanced personalisation, interoperability, and inclusivity. These systems are adaptive, they can impeccably connect to third-party software; and be user friendly for individuals with special needs. Even more, there is also a push towards open-source LMS platforms that enable institutions to tailor their distinctive features according to the custom needs of commercial vendors. In conclusion, LMSs are more than just technology meant to serve as strategic tools to produce better educational outcomes, assessments, and advancement. To reach the full potential of LMS, institutions must not only invest in technological innovation but also in pedagogical integration, and an independent, robust, digital system for education.

## 3.7 Chapter Summary

This chapter explored the evolution and impact of e-learning, particularly in light of the COVID-19 pandemic. It began by defining e-learning and tracing its development from early digital education tools in the 1980s to more complex online systems in the 2000s. The global health crisis accelerated this digital shift, with e-learning becoming a primary method of

instruction. The chapter critically examined how countries adapted to online learning, highlighting both successes and limitations.

Key e-learning formats—formal, informal, blended, online, synchronous, and asynchronous—were discussed in detail. I evaluated each mode for its role in delivering flexible, accessible, and learner-centred education. Additionally, the TPACK framework was briefly presented. Besides, this chapter introduced e-pedagogy, which combines pedagogical theories with digital tools. It stressed the evolving role of educators as facilitators, not just content providers, and underscores the need for professional development to ensure effective digital teaching. Interaction in online learning, while beneficial, is often underutilised, and future strategies must focus on increasing meaningful engagement.

I presented LMSs as an essential tool for digital education. Their features, roles during the pandemic, and long-term importance were analysed. Challenges, such as usability and institutional readiness, were addressed, along with future directions towards personalised, inclusive learning environments.

# Chapter 4 Review of Models, Theories, and Proposed Framework

This chapter presents significant models and theories used to examine the factors that influence a user's decision to accept and continue using technology. These also provide the foundation for designing the proposed model for this study.

Madrasati is a new technology that was suddenly introduced to public schools in Saudi Arabia during the COVID-19 period. Therefore, models and theories that examine human behaviour, particularly in relation to technology adoption, can help predict factors influencing teachers' continuing use of e-learning. Numerous studies sought to explain and present theoretical models on technology adoption among users. These frameworks include, for instance, the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (Ajzen, 1985), Technology Acceptance Model (Davis, 1985), and Decomposed Theory of Planned Behaviour (Taylor & Todd, 1995a). Since users' decisions to accept and continue using technology are influenced by specific factors that impact individual behaviour, all these theories focus on individual behaviour.

## 4.1 Theory of Reasoned Action (TRA)

The TRA, introduced by Fishbein and Ajzen (1975), originally developed to predict health-related change in behaviours, focuses on the behavioural intention of the individual. The core aim of this theory is to clarify the reasons behind a decision of an individual to participate in or refrain from a particular behaviour (Ahmed, 2014). Based on the TRA, an individual's behaviour intentions are primarily influenced by two main factors: attitude and subjective norm (Figure 4.1). The individual's general evaluation of performing a specific behaviour, whether positively or negatively, reflects their attitude, while the social pressure they perceive, which impacts their decision to engage in or avoid that behaviour, refers to subjective norm (Fishbein & Ajzen, 1975). The theory has proven to be suitable for diverse contexts, and has since been used by researchers in different domains, including education and technology adoption (Davis, 1989). Some studies, such as Conner and Armitage (1998), have developed this theory by adding factors like self-identity despite the fact the original theory did not include them. Table 4.1 presents the definitions of each variable of the TRA.

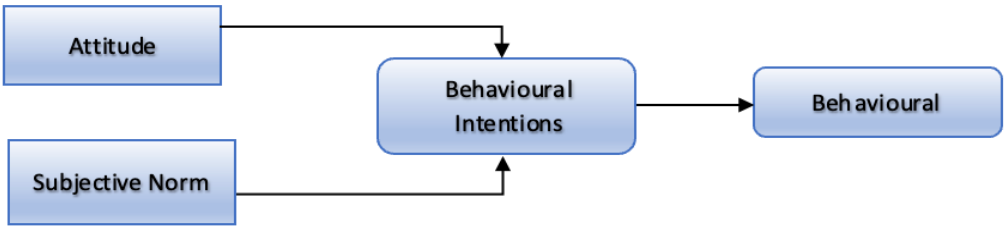


*Figure 4.1 Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975)*

*Table 4.1 TRA variables and corresponding definitions*

| Variables | Definition |
|---|---|
| Behaviour intention | The readiness or motivation of an individual to perform a particular behaviour (Ajzen, 1991). |
| Attitude towards the behaviour | '*The degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question*'(Ajzen, 1991, p. 188). |
| Subjective norm | '*Individual's perceived social pressure to perform or not perform a target behaviour'* (Ajzen, 1991, p. 188). |

Certain elements of the TRA have been criticised by some researchers. These include, for instance, the model's requirement for a strict correspondence between intention and behaviour (Ajzen, 1985), its focus on volitional behaviours while overlooking external factors such as time and financial constraints (Yousafzai et al., 2010), and its inability to account for habitual or irrational actions (Samaradiwakara & Gunawardena, 2014).

## 4.2 Theory of Planned Behaviour (TPB)

The TPB was developed by Ajzen (1991) as an attempt at solving the limitations of the TRA. Attitude, subjective norm, and perceived behavioural control are the three predictors of intention according to the TPB (Figure 4.2), with the concept of perceived behaviour control (PBC) referring to 'the sense of self-efficacy or ability to perform the behaviour of interest' (Ajzen, 2005, p. 118). According to Ajzen (2011), the TPB has garnered significant attention from scholars and is recognised as one of the most widely adopted frameworks for predicting and understanding individual behaviour. Nevertheless, the TPB was criticised by some academics, such as Taylor and Todd (1995a), who claimed that this theory lacks clarity regarding how individuals decide to participate in specific behaviours.

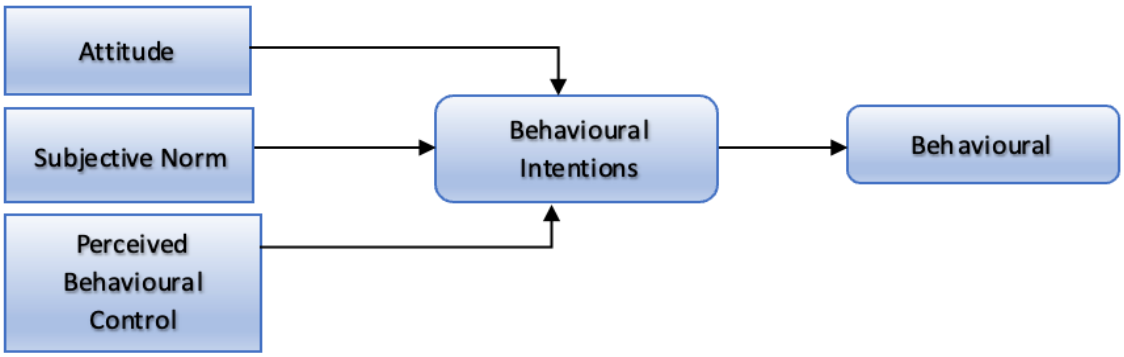


*Figure 4.2 Theory of Planned Behaviour (TPB) (Ajzen, 1991)*

In recent years, there has been a debate over the TPB. Ajzen (1991) emphasised that the TPB is receptive to integrating additional factors that may explain variations in intention or behaviour. Based on previous empirical studies, Al-Aulamie (2013) noted that the TPB accounted for only approximately 40% of the variance in behaviour of individuals. A further criticism made by Taylor and Todd (1995a) was related to the approach of combining all external factors beyond individual control that influence behaviour into a single construct, perceived behavioural control.

## 4.3 Technology Acceptance Model (TAM)

In spite of the fact that both theories mentioned above, the TRA and TPB, have been widely used in studies related to technology acceptance, their original development was not intended for this specific purpose. Therefore, Davis (1989) created the TAM on the basis of the TRA to anticipate and clarify how individuals come to accept and adopt technological tools. Similar to the TRA, the TAM seeks to predict behaviour intention, but it excludes subjective norm as a factor in doing so (Ahmed, 2014). As shown in Figure 4.3, behavioural intention is shaped by an individual's attitude, which is influenced by two main constructs: perceived ease of use and perceived usefulness (Davis, 1989). The detailed explanation of the TAM variables can be found in Table 4.2.

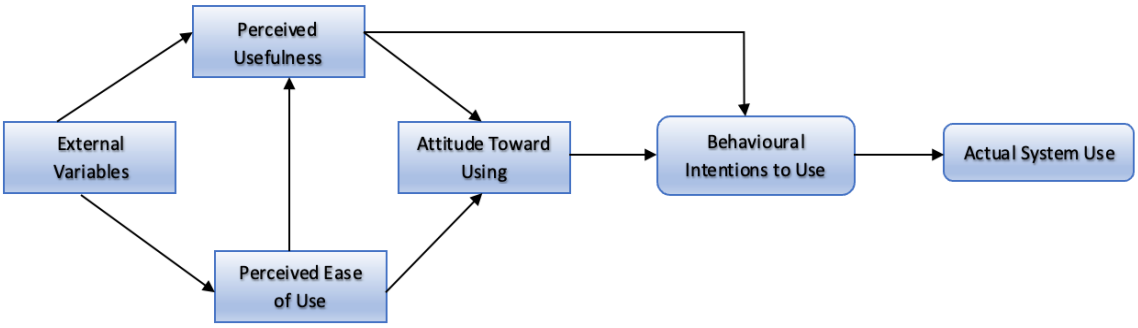


*Figure 4.3 Technology Acceptance Model (TAM) (Davis, 1989)*

*Table 4.2 TAM variables and corresponding definitions*

| Variables | Definition |
|---|---|
| Perceived usefulness | '*The degree to which a person believes that using a particular system would enhance his or her job performance*' (Davis, 1989, p. 320). |
| Perceived ease of use | '*The degree to which a person believes that using a particular system would be free from efforts*' (Davis, 1989, p. 320). |

The TAM has been applied in studies on many topics, including those examining the implementation of mobile-based education in higher education institutions (Park et al., 2012), or to examine how users interact with technology more broadly (Ahmed, 2014). Furthermore, this model was by far the second most widely utilised theory in prior works on individuals' intentions to continue using technology (Nabavi et al., 2016). Nevertheless, Legris et al. (2003) criticised this model, claiming that the elements of TAM—perceived usefulness and perceived ease of use—are inadequate for anticipating users' intentions to use technology, particularly because the model ignored other elements, such as social, organisational, and contextual factors, that also influence user behaviour. In response, Venkatesh and Davis (2000) developed TAM2, as extension of the TAM, by including an additional construct, namely, a social influence.

## 4.4 Decomposed Theory of Planned Behaviour (DTPB)

When it comes to predicting a user's intention to adopt technology, both the DTPB and the TAM are used for that purpose. The DTPB is a comprehensive theory developed by Taylor and Todd (1995b) as an extension of the TPB, specifically designed to address its limitations in explaining technology adoption behaviour. Building on the TPB, the DTPB retains the three core determinants of behavioural intention: attitude, subjective norm, and perceived behavioural control (see Figure 4.4). The construct of attitude is further broken down into

three lower-level components: perceived usefulness, perceived ease of use, and compatibility. In This model, Taylor and Todd included the same constructs from the TAM as identified by Davis (1989), with an additional element, namely, compatibility.

In addition, the subjective norm variable is composed of two main components: peer influence and superior influence. This split was justified by clarifying that peers and superiors might guide a user's decision to use a certain technology (Taylor & Todd, 1995b).

It has been found that a user is more inclined to engage in a certain behaviour when facilitating conditions exist, meet the user's needs, and are accompanied by a strong sense of self-efficacy (Ahmed, 2014). This led to the decomposition of perceived behaviour control into three lower-level components: technology facilitating conditions, resource facilitating conditions, and self-efficacy (Taylor & Todd, 1995b). Specifically, time, money, and technology concerns were identified as key elements of resource facilitating conditions (Taylor & Todd, 1995b).

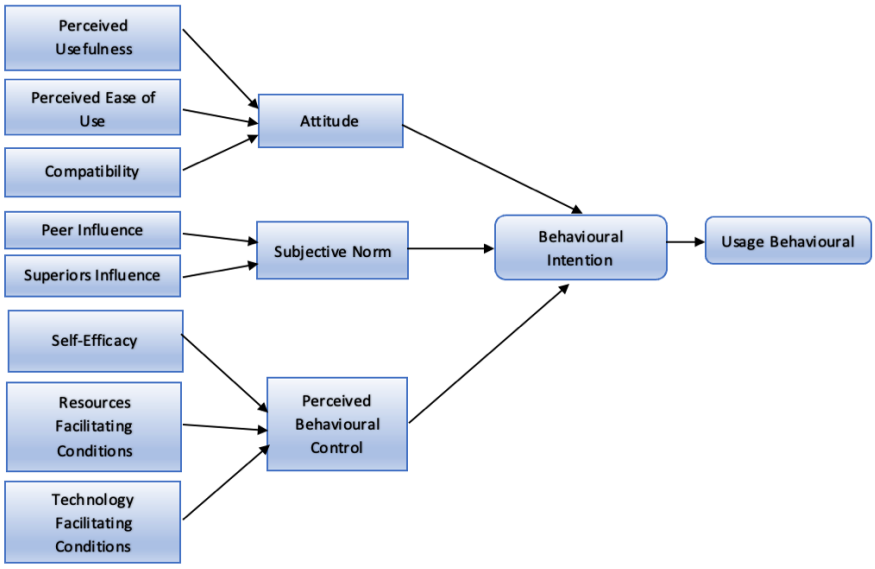


*Figure 4.4 Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd, 1995)*

There have been numerous applications of the DTPB across various studies, such as in business, finance, and education (Ahmed, 2014). Furthermore, the DTPB has been used in the field of education to examine teachers' intentions to incorporate a certain technology, for instance Chien et al. (2014) in exploring teachers' beliefs regarding factors to use technology-based assessment; Sadaf and Gezer (2020) in examining factors influencing teachers' intentions to adopt digital literacy; and Teo et al. (2016) in investigating teachers'

intentions to use technology. This implies that the DTPB is a comprehensive model which appears to combine the robust constructs of the TPB and the TAM (Mathieson et al., 2001) and comprises the most crucial elements that might influence a user's behavioural intention towards using e-learning. Figure 4.5 and Table 4.3 depict the three models (TPB, TAM, and DTPB), as well as showing how the DTPB model incorporates all the core elements of the TPB and the TAM models.

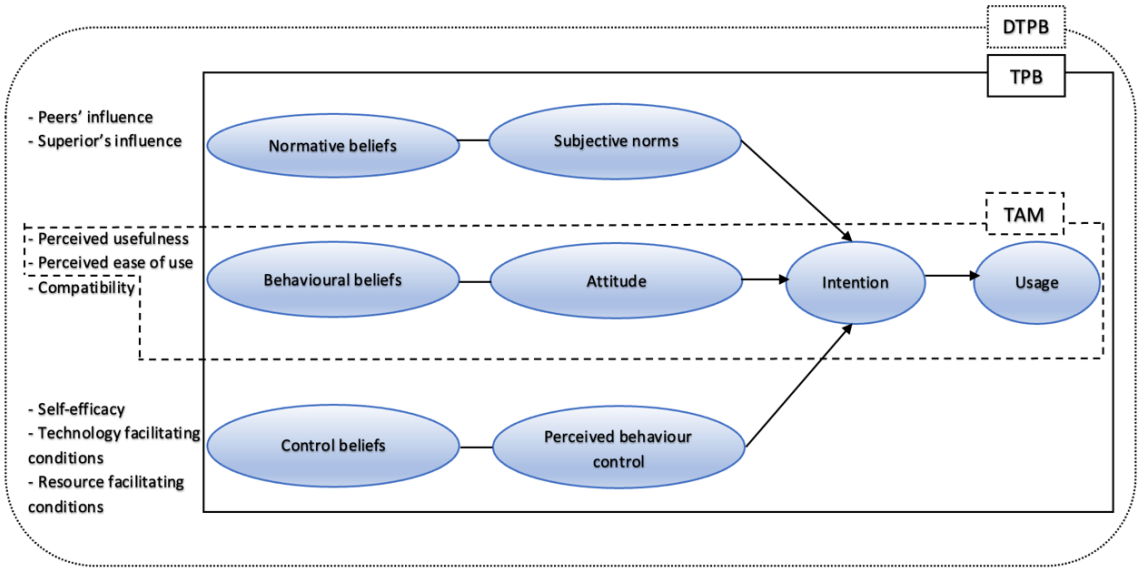


*Figure 4.5 TAM, TPB, and DTPB models*

*Table 4.3 The incorporation of all factors from three models within the DTPB*

| **Factors/ Models** | | TRA | TPB | TAM | DTPB |
|---|---|---|---|---|---|
| **Attitude** | Attitude | ✓ | ✓ | ✓ | ✓ |
| | Usefulness | × | × | ✓ | ✓ |
| | Ease of use | × | × | ✓ | ✓ |
| | Compatibility | × | × | × | ✓ |
| **Subjective Norm** | Subjective norm | ✓ | ✓ | × | ✓ |
| | Peer influence | × | × | × | ✓ |
| | Superior influence | × | × | × | ✓ |
| **Perceived Behaviour Control** | Perceived behavioural control | × | ✓ | × | ✓ |
| | Self-efficacy | × | × | × | ✓ |
| | Resource facilitating conditions | × | × | × | ✓ |
| | Technology facilitating conditions | × | × | × | ✓ |

Among all the theories mentioned above, it is essential to indicate that the DTPB model possesses all the significant elements that may impact teachers' intentions to continue using Madrasati in the secondary school context in SA. DTPB, however, does not account for other 'pedagogical factors', such as learning content, student engagement, and prior adoption of technology in classrooms, that could influence how users perceive technology use in the education context. This gap is therefore addressed in my study by first developing a model and proposing factors and sub-factors that might be appropriate on the context of e-learning adoption, and then testing the model empirically. In the next section, I will discuss the proposed framework based on the DTPB model and other factors.

## 4.5 Proposed Framework for the Study

A theoretical model has been proposed based on technological acceptance/continuance theories and prior studies on Madrasati. This section presents the proposed framework and provides a brief explanation of each factor, along with associated hypotheses.

As the Madrasati platform is identified as an end-to-end electronic LMS, where ICT is utilised for the entire e-learning process (Madrasati, 2020), teaching and learning through Madrasati is facilitated by technology. Consequently, the models and theories that examine users' attitudes and behaviour towards ICT can predict the factors that may impact teachers' intentions to continue using e-learning in secondary schools. The proposed theoretical model has been developed by integrating significant factors that have a substantial impact on e-learning, informed by theories that investigate human behaviour, specifically technology adoption, as well as insights from other studies. To improve the predictability of the proposed model, the DTPB was modified, and elements relevant to teachers' intentions to continue using Madrasati were incorporated. The purpose of this modification was to provide a comprehensive model to determine the relevant factors influencing teachers' intentions to continue using Madrasati in SA. The following outlines the factors and sub-factors derived from users' behaviour in ICT models and other literature.

The proposed model comprises the attitude (ATU) factor and its associated sub-factors: perceived ease of use (PEU), perceived usefulness (PU), and compatibility (COM). However, learning content quality (LCQ) was placed under the term perceived usefulness. The subjective norm (SN) factor, along with its variables, was used to examine the social

impact factors: leader influence (LI), peer influence (PI), and student influence (SI). Moreover, the perceived behavioural control (PBC) factor includes resource facilitating conditions (RFC), technical support (TS), self-efficacy (SE), and prior e-learning experience (PEE). Due to the fact that technology is one of the facilitating resources (Taylor & Todd, 1995a), a construct named technology facilitating conditions was incorporated as a sub-factor under the resource facilitating conditions. TS was also included under the PBC as a factor because some studies have highlighted the value of technical services to help students and teachers while using Madrasati (Aldossry, 2021; Alkinani & Alzahrani, 2021; Legris et al., 2003). Because of the mandatory use of Madrasati during COVID-19, which enforced teachers to use the platform, PEE has been included as a sub-factor under SE. The following sections describe each construct and the rationale for its inclusion in this study.

**Continuance Intention (CIM)**

Behavioural intention is defined as the degree to which a user performs or does not perform a certain behaviour (Ajzen, 1991; Davis, 1989; Taylor & Todd, 1995a). Many studies have used this construct to examine a user's intention to accept technology such as Icek Ajzen's (1991) 'Theory of Planned Behaviour'; Fred Davis's (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of information technology'; or Shirley Taylor and Peter Todd's (1995) 'Decomposition and crossover effects in the Theory of Planned Behaviour: A study of consumer adoption intentions'. According to Moore and Benbasat (1991), behavioural intention is an instrument that might be used to examine a user's acceptance of a certain technology, and various studies have measured a user's acceptance/continuance by this indicator (Cheon et al., 2012; Lee, 2010; Terzis & Economides, 2011). It is worth mentioning that some recent studies have indicated that users' continuance decisions are the same as acceptance decisions (Hong et al., 2006; Hsu et al., 2006). In the current study, behavioural intention is consequently considered as an indicator of teachers' continuance intention regarding using the Madrasati platform.

Continuance intention might be impacted by three factors: attitude, subjective norm, and perceived behavioural control.

1. **Attitude (ATU)**

Attitude is defined as the positive or negative assessment indicated by a user on whether to engage in a certain behaviour (Ajzen, 1991; Davis, 1989; Taylor & Todd, 1995a). The majority of studies that examine users' acceptance/continued use of ICT have included

attitude as a factor in their models (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975; Taylor & Todd, 1995a). According to Ajjan and Hartshorne (2008), attitude is a very important element affecting the use of the internet. Similarly, Teo (2011) discovered that teachers' attitudes towards using computers have a significantly positive impact on their behavioural intentions. Furthermore, Alkinani and Alzahrani (2021) found that teachers have a substantially positive attitude regarding Madrasati. Thus, the attitude factor is particularly important when examining teachers' intentions to continue using Madrasati. Attitude refers in this study to the perceived beliefs of teachers about continuing to use Madrasati to support conventional education. Therefore, it is expected that teachers' favourable attitudes towards continuing to use Madrasati will positively influence their intentions to use it. Based on this, the following hypothesis was developed for this study:

**Hypothesis 1:** The attitude of teachers positively affects the continuance intention to use Madrasati.

Attitude is divided into three elements:

2. **Perceived Usefulness (PU)**

This is the extent to which a user believes that using a certain system will improve his/her job performance (Davis, 1989; Taylor & Todd, 1995a). PU is one of the most significant and widely used constructs in the acceptance and adoption of a new technology (Chavoshi & Hamidi, 2019). For the purpose of this study, it can be interpreted as the degree to which teachers believe that continuing to use Madrasati adds value to their and their students learning experience. It was anticipated that if teachers find Madrasati useful for teaching and learning, they are likely to use it. Consequently, the following hypothesis was proposed based on the previous studies:

**Hypothesis 2:** Perceived usefulness positively affects the attitude towards the continuance intention to use Madrasati.

3. **Perceived Ease of Use (PEU)**

This is the extent to which a person believes that using a certain system will not require an extensive effort (Davis, 1989; Taylor & Todd, 1995a). It refers in this study to the degree to which teachers believe that using Madrasati tools would require little additional effort. Previous studies indicate the impact of perceived usefulness (Smarkola, 2007; Teo, 2012) and perceived ease of use on teachers' intentions to use technology (Smarkola, 2007). It can be assumed that if using Madrasati requires little effort and is easy to use, teachers are likely

to continue using it. Based on the previous research, the present study suggests the following hypothesis:

**Hypothesis 3:** The perceived ease of use positively affects the attitude towards the continuance intention to use Madrasati.

### 4. Compatibility (COM)

This represents the extent to which the current system fits the task, values, and user's needs (Ajjan & Hartshorne, 2008; Taylor & Todd, 1995a). According to Tornatzky and Klein (1982), users are more likely to embrace and use a system that is congruent with their current requirements and values. Moreover, a study by Ajjan and Hartshorne (2008) found that compatibility significantly impacts attitude towards using the internet. In the current study, it is defined as the extent to which teachers believe that continuing to use Madrasati would be suitable with the subjects that they teach in their classrooms and their learners' needs. Thus, the following hypothesis was proposed for this study:

**Hypothesis 4:** The perceived compatibility positively affects the attitude towards the continuance intention to use Madrasati.

The purpose of employing e-learning platforms in classrooms is to improve teaching and learning by using specific features of the platforms' tools such as resources, chat, forums, and activities (Chavoshi & Hamidi, 2019). Therefore, to facilitate and improve learning with these tools, learning content quality (LCQ) needs to be considered when a platform is implemented in the classrooms. Thus, the LCQ factor was included in the model as sub-factors under the perceived usefulness.

### 5. Learning Content Quality (LCQ)

Learning content is defined as digital resources including courses, assignments, quizzes, and educational videos, whereas content quality refers to the suitability of the content concerning correctness, appropriateness, and reliability (Chavoshi & Hamidi, 2019). In this case, content in Madrasati should be valuable and applicable in the context of secondary schools. Furthermore, the content and how it is presented in Madrasati might be different depending on the subject and school levels. In comparison with traditional methods, rich content and a range of activities available in Madrasati might increase the perceived usefulness for teachers (Alsalim, 2021). According to Almaiah et al. (2022), content quality was a significant factor behind the adoption of Madrasati among students in SA during COVID-19. Some of the prior studies found that LCQ had a positive influence on perceived

usefulness (Almaiah et al., 2016; Chavoshi & Hamidi, 2019; Cheng, 2012). Therefore, it is reasonable to assume that if teachers find the contents of Madrasati are useful and suitable for their courses, they are likely to use it to enhance the traditional approaches. The following hypothesis is presented accordingly to the previous study:

**Hypothesis 5:** The learning content quality positively affects the perceived usefulness.

### 6. Subjective Norm (SN)

This is the individual perception, which is affected by social pressure, of performing a certain behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975; Taylor & Todd, 1995a). Various studies have used subjective norm as a factor to investigate social influences (Ajzen, 1991; Taylor & Todd, 1995a). According to Bakarman and Almezeini (2021), in their study regarding Madrasati, social influences are significant predictors of an individual's intention for the adoption of e-learning platforms. Past studies have indicated that subjective norms are a significant factor affecting teachers' intentions to use technology (Sugar et al., 2004; Teo, 2009). In this study, subjective norm explores the impacts of opinions and suggestions of other people on teachers' decisions to use Madrasati. The following hypothesis is presented based on the previous studies:

**Hypothesis 6:** Subjective norms of teachers positively affect the continuance intention to use Madrasati.

Subjective norm includes three sub-factors:

### 7. Peer Influence (PI)

This is defined as the effect of family, friends, and peers on a user's intention to perform a certain behaviour (Taylor & Todd, 1995a). According to Ajjan and Hartshorne (2008), colleagues might feel that incorporating the internet content will improve students' learning. Therefore, other colleagues' impressions concerning using the internet might affect others' intentions. It is used in this study to examine the influences of colleagues' views on teachers' intentions to use Madrasati in their teaching and learning environment. The following hypothesis was formulated:

**Hypothesis 7:** Colleagues' influence positively affects the subjective norms towards the continuance intention to use Madrasati.

### 8. Leader Influence (LI)

This refers to the influence on a user by his/her superior (Taylor & Todd, 1995a). A study by Ajjan and Hartshorne (2008) has indicated the importance of superiors' influences on

decisions whether to use Web2.0 to enhance student learning. Because school leaders and the MoE have become important factors for teachers to consider when making decisions to use technology (Teo et al., 2016), leader influence was included in this study as a sub-factor under the subjective norm. In this study, it was used to evaluate headteachers' influence regarding encouraging teachers to use Madrasati to support students' learning (Masmali & Alghamdi, 2021). Based on the assumption that if headteachers believe that using Madrasati might enhance student learning, teachers will be supported and motivated by their leaders to use the platform. Therefore, this study posits the following hypothesis:

**Hypothesis 8:** Leader influence positively affects the subjective norms towards the continuance intention to use Madrasati.

### 9. Students Influence (SI)

This refers to the influence of students on teachers in terms of adopting e-learning within the classrooms (Sadaf et al., 2012). According to Sadaf et al. (2012), students might influence the successful implementation of e-learning when they are interested in using it in their classrooms. In terms of Madrasati, students might be more supportive because their level of acceptance with Madrasati was high (Bakarman & Almezeini, 2021). A study by Ajjan and Hartshorne (2008) demonstrated that students have a positive impact on subjective norm towards using the internet. This factor is included in the model because when students are willing to use Madrasati, it might be expected that teachers will be motivated to use the platform in their classroom environments. Therefore, the following hypothesis was proposed:

**Hypothesis 9:** Students' influence positively affects the subjective norms towards the continuance intention to use the Madrasati platform.

### 10. Perceived Behavioural Control (PBC)

Perceived behavioural control means users' perceptions of how easy or difficult to perform a task is given the resources available to them (Ajzen, 1991). According to Teo (2009), teachers with high skill levels and available resources are likely to accept modern technology. Ajjan and Hartshorne (2008) indicated that perceived behavioural control is an important factor that affects the use of the internet. Applied to Madrasati, perceived behavioural control reflects teachers' beliefs in terms of the resources and self-confidence in their ability to carry out the learning and teaching activities with the use of the platform. Thus, the following hypothesis was proposed:

**Hypothesis 10:** The perceived behavioural control of teachers positively affects the continuance intention to use Madrasati.

In this study, it consists of three sub-factors:

**11. Resource Facilitating Conditions (RFC)**

This refers to the influence including the external factors that affect a user's decision to perform a particular task (Ahmed, 2014; Taylor & Todd, 1995a). Taylor and Todd (1995b) declared that resource facilitating conditions comprise three elements – money, time, and technology – and in the case of the unavailability or insufficiency of these elements, a user's decision towards using e-learning will be affected. Furthermore, the availability of infrastructure affects the success of e-learning adoption (Alsalim, 2021; Zalah, 2018). Teachers are likely to perceive greater control if they have access to required resources, such as electronic devices and internet access, to use Madrasati. This study highlights the role of infrastructure in influencing teachers' decisions on whether to continue using Madrasati. Teachers need to have facilitating conditions available regarding resources such as time, infrastructure, and suitable technology. The following hypothesis is presented for this study:

**Hypothesis 11:** Resource facilitating conditions positively affect the perceived behavioural control towards the continuance intention to use Madrasati.

**12. Technical Support (TS):**

It is the ability of a team to provide online solutions or help for software and hardware issues (Rabiman et al., 2020). It means in this study the IT staff who provide immediate solutions and resolve any issues that teachers would encounter during using the Madrasati platform. It could be argued that the successful implementation of e-learning could be achieved by supporting IT staff to resolve immediate issues as well as the training courses that demonstrate the platform tools (Raza et al., 2021). Hence, the following hypothesis was constructed:

**Hypothesis 12:** Technical support positively affects the perceived behavioural control towards the continuance intention to use Madrasati.

**13. Self-Efficacy (SE):**

It is defined as the degree to which a user has the ability to perform a certain behaviour (Taylor & Todd, 1995a). The importance of self-efficacy in user behaviour and attitude towards technology adoption was highlighted by some studies (Moore & Benbasat, 1991; Taylor & Todd, 1995a). Moreover, Park et al. (2012) have used this element in their model

to examine the user adoption of mobile learning. In the current study, it means teachers' ability to use Madrasati tools. This factor indicates that if teachers feel confident and have the ability to use Madrasati tools, it can be assumed that teachers will continue using Madrasati to support their teaching. The following hypothesis was proposed based on the previous studies:

**Hypothesis 13:** Self-efficacy positively affects the perceived behavioural control towards the continuance intention to use Madrasati.

Self-efficacy in this study can be affected by:

**14. Prior E-learning Experience (PEE)**

This is defined as the experience of both being taught with the aid of e-learning technology and employing that technology in the current learning process (Donnelly & McSweeney, 2008). Due to the lack of e-learning practice in secondary schools, most teachers were not willing to accept Madrasati at the start of the pandemic (Alsalim, 2021), and they were unfamiliar with the concept of e-learning (Ghaban, 2021; Shishah, 2021). Thus, it is important to examine the prior e-learning experience of secondary school teachers during the pandemic and how it affected their continued usage. A study by Sulaymani et al. (2022) indicated that prior e-learning experience is a significant predictor of self-efficacy. From previous studies, it could be argued that teachers' experiences of adopting e-learning grew from their extensive use of it during the COVID-19 period. It also implies that teachers' perceptions towards mandatory e-learning might affect their adoption of e-learning when it became an optional choice. This instrument is not one of the DTPB factors. However, it is included in this study as a sub-factor based on the findings of recent studies such as Aldossry (2021), Alkinani and Alzahrani (2021). The following hypothesis was proposed:

**Hypothesis 14:** Prior e-learning experience positively affects self-efficacy.

In conclusion, many studies have found strong relationships between those constructs that affect users' attitudes and behaviour towards ICT. Furthermore, several studies have confirmed those relationships, such as Ajzen (2011), Armitage and Conner (2001). Figure 4.6 presents the proposed model along with its factors and relationships. This comprehensive model and its elements would help to promote the use of e-learning among teachers by extending the DTPB model and identifying the important factors that might encourage teachers to continue using Madrasati.

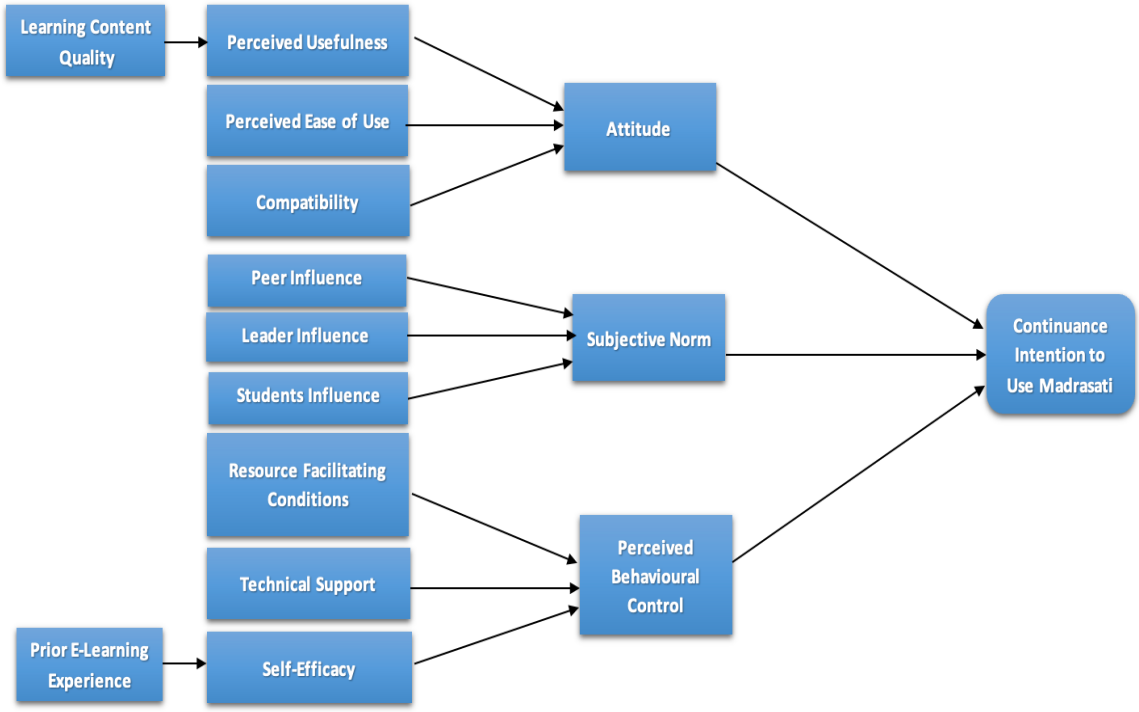


*Figure 4.6 The proposed model*

## 4.6 Chapter Summary

This chapter clarified the most important models and theories that have been adopted to investigate the factors impacting users' intentions to accept and continue using technology. It also illustrated the proposed conceptual model developed for the present research.

The proposed conceptual model was illustrated in this chapter, including factors and sub-factors derived from technological acceptance/continuance theories and prior studies on Madrasati. The proposed model comprises the ATU factor and its associated sub-factors: PU, PEU, and COM. However, LCQ was drawn under PU as a sub-factor, while the SN factor, with its variables, was used to examine the social impact factors: PI, LI, and SI. Moreover, the PBC factor included RFC, TS, and SE. Since technology is one of the facilitating resources (Taylor & Todd, 1995a), the construct named technology facilitating conditions was added as a sub-factor under the RFC. TS was included under the PBC as a sub-factor because some studies highlighted the value of technical services to help teachers while using Madrasati (Aldossry, 2021; Alkinani & Alzahrani, 2021; Legris et al., 2003). Because of the mandatory use of Madrasati during the COVID-19 pandemic, PEE was included as a sub-factor under the SE factor.

# Chapter 5 Research Methodology

This chapter aims to present an overview of the research paradigms, research methodology, and the research methods employed in this research. It starts with a brief explanation of ontology, epistemology, and the three research paradigms commonly used in educational research more broadly. The research methodology utilised in this investigation is then explained, particularly focusing on the mixed-methods approach, which can help assess the significant factors that influence secondary school teachers' intentions around continuing to use the Madrasati platform in Saudi Arabia.

## 5.1 Research Paradigms

It is crucial for researchers conducting social science studies to be aware of the theories that underpin their field of study. Such theories can provide a logical framework for the research and help to understand the research processes, as well as the results obtained through it (Bryman, 2016). According to Shannon-Baker (2016), a research paradigm is the method of practices and beliefs that have an impact on how a researcher selects the research questions and methods to be adopted when conducting the study. It can provide suggestions for how to tackle a research problem and help to frame the approach based on researcher beliefs regarding the world. Paradigms contain four main constituents: ontology, epistemology, methodology, and methods (Scotland, 2012).

### 5.1.1 Ontology

Ontology is defined as 'the study of being' (Crotty, 1998, p. 10), describing the nature of existence based on the researcher's perspective, whether that reality is independent or dependent on a particular actor such as culture or time (Goduka, 2012). Ontology, according to Guba and Lincoln (1994), simply seeks to answer the question 'What is there to be known?' emphasising the reality that exists independently of human thoughts, beliefs, or understanding. Although the nature of social being is the central concern of ontology, it also seeks to reveal the hidden true meaning of life (Bryman, 2016). People may have different assumptions and perspectives regarding reality; therefore, researchers need to select where they stand with regard to their own beliefs of how reality actually works (Scotland, 2012).

There are two main ontological assumptions that can be identified in social science research: realism and relativism (Pring, 2005). Both positions address social reality, but from different angles. In the context of Pring's (2005) *The Philosophy of Education*, ontological realism refers to the belief and view that there is an objective reality that exists on its own, independent of the ways individuals experience and perceive it. On the other hand, relativism in ontology is the idea that objective truth does not exist and that all knowledge is relative to the individual who experiences based on his/her perspective (Moon & Blackman, 2014). In this case, researchers need to build their own reality.

My research seeks to explore the significant factors that affect teachers regarding whether to continue using the Madrasati platform. These factors exist independently based on participants' interpretations. Therefore, relativism is an appropriate ontological stance that helps me to discover the reality in this study.

### 5.1.2 Epistemology

Epistemology is defined as 'the theory of knowledge embedded in the theoretical perspective and thereby in the methodology' (Crotty, 1998, p. 3). It focuses on the processes of creating, obtaining, and communicating knowledge (Scotland, 2012). An epistemological stance, according to Guba and Lincoln (1994), involves what is known about the reality of any phenomenon. This pertains to the question of how knowledge is acquired and assessed (Halaweh et al., 2008).

Epistemology is often introduced in terms of two aspects: objectivism and constructionism. Objectivist epistemology holds that knowledge can be objectively true, independent of the beliefs or perspectives of individuals. According to this view, there are objective facts and realities that exist independently of human perception, and it is the role of science and other forms of inquiry to discover and describe these truths (Cohen et al., 2007). On the other hand, constructionism is a perspective that views knowledge as being constructed through social and cultural processes. According to this view, knowledge is not passively received but actively created through interaction with the world and with others. As outlined by Crotty (1998), constructionism is often associated with constructivist research paradigms, which emphasise the role of the researcher in shaping their perceptions to understand reality.

The purpose of my research is to examine various perspectives on the nature of knowledge, gained through interactions with individuals who may construct meanings from different perspectives. Therefore, constructionism is an appropriate epistemological stance for this study. It can be expected of each teacher that they identify different aspects that influence him/her to continue using Madrasati. What is important to recognise here is that teachers had different experiences of and backgrounds in using Madrasati during and after the COVID-19 crisis, and their perceptions and attitudes have developed and evolved over time.

### 5.1.3 Methodology

Research methodology refers to the process, strategy, and plan that guide researchers in selecting appropriate methods to collect data (Crotty, 1998). The combination of these strategies works together in order to determine when, where, why, what, and how data will be obtained and analysed in a study. As stated by Guba and Lincoln (1994), a methodology is described as the methods, principles, and rules that researchers use in a specific discipline or field of study. Furthermore, by determining a research methodology, methods and techniques will be clarified and can be explained to others, allowing for an objective evaluation of the research process (Kothari, 2004).

### 5.1.4 Methods

A definition of methods is outlined by Crotty (1998) as 'the techniques or procedures used to gather and analyse data related to some research question or hypothesis' (p. 3). Generally, collecting and analysing data in any research can be used by three common styles, which are quantitative, qualitative, and mixed methods, and a researcher can identify the methodological, ontological, and epistemological viewpoints by focusing on specific research methods. Moreover, different ontological and epistemological perspectives can be used to explore the same social phenomena in different studies (Grix, 2018). More details will be explained later in this chapter.

## 5.2 Paradigms in Educational Research

A large number of theoretical paradigms have been proposed including positivist, postpositivist, pragmatic, interpretivist, constructivist, deconstructivist, critical,

transformative, and emancipatory (Mackenzie & Knipe, 2006). According to Guba and Lincoln (1994), positivist and interpretivist are two dominant paradigms that can be addressed in educational studies. Research that applies the positivist stance tends to use the quantitative approach (method), whereas interpretivist paradigm operates using the qualitative method in order to collect and analyse data. However, more recently, researchers have proposed another paradigm that borrows elements from these two paradigms, named the pragmatic paradigm (Kivunja & Kuyini, 2017) Pragmatism is an alternative philosophical framework that is suited for a mixed method research methodology (Creswell & Plano Clark, 2007; Feilzer, 2010). Overall, Creswell and Plano Clark (2007) claimed that any research employing mixed methods typically incorporates quantitative and qualitative techniques within a single investigation, or potentially across several studies, to address a specific research question. As further detailed in the research methodology, the design for this research included mixed methods involving both approaches (quantitative and qualitative). Therefore, pragmatism, which combines positivist and interpretive paradigms, is the fundamental philosophical paradigm in this study. An explanation of each paradigm is outlined in the following sections.

### 5.2.1 Positivism

The positivist paradigm, which was first proposed by French philosopher Auguste Comte, represents a research perspective that focuses on the scientific method of study (Kivunja & Kuyini, 2017). In this paradigm, real knowledge and human understanding can be only acquired by experimentation, observation, and reason based on experience (Cohen et al., 2007). Positivism proponents emphasise that rather than drawing conclusions from abstract propositions, knowledge about reality or social phenomena should be gained through direct observation. As a research paradigm, positivism assumes that 'social facts' exist independently of the actions of the individuals, including participants and researchers (Scotland, 2012), and its main purpose is to provide data that are valid and reliable regardless of the research setting. The essential principles of positivism are knowledge based on direct observation and acquired objectively in unbiased way (Ritchie et al., 2013).

In this paradigm, research is conducted with the purpose to test the hypothesis. Moreover, the positivist research is characterised by its emphasis on the scientific method, generalised results, and statistical analysis (Mack, 2010). Therefore, positivist research employs the quantitative method for collecting data. Although positivist research attempts to minimise

the complex by controlling variables, it is often hard to apply, particularly in education studies, because variables are constantly changing (Scotland, 2012).

### 5.2.2 Interpretivism

Interpretivism is another paradigm that endeavours to understand the subjective significance of individual experience (Bryman, 2016). As stated by Myers (2019), the interpretivist paradigm is a strategy that helps the social scientist to interpret social actions that impact on a wide range of human activities. This paradigm is sometimes known as constructivism as it refers to people's ability to construct meaning (Mack, 2010).

Ontological interpretivism refers to that social reality can be interpreted differently by one individual to another, resulting in multiple explanations of an experience (Mack, 2010). In this paradigm, our senses mediate our reality and consciousness makes the world meaningful, and interpretive epistemology is based on the idea that no independent world exists outside of our knowledge of it (Grix, 2018). According to this paradigm, it is possible to understand the social world from the perspectives of the people who participate in it (Cohen et al., 2007).

Interpretivism methodology is aimed at understanding a phenomenon from individuals' perspectives based on an interaction between researcher and participants. Consequently, methods under this paradigm seek to understand perceptions and feelings of the participants in the investigation. Accordingly, in this paradigm, the qualitative approach is mostly employed for collecting data. This paradigm was used in this research in order to explore teachers' perceptions about the factors influencing their intentions to continue using Madrasati.

### 5.2.3 Pragmatism

The pragmatic paradigm arose among philosophers who discussed the ability of mixed-methods research to produce a constant exchange of ideas, illustrating the benefits and drawbacks of both quantitative and qualitative research methods (Feilzer, 2010). The work of Peirce, James, Mead, and Dewey set the foundation of this paradigm (Creswell, 2014). The quantitative research approach is most closely related to the positivist paradigm.

Likewise, interpretivism, according to Mackenzie and Knipe (2006), is associated with a qualitative approach. In accordance with the mixed-methods approach employed in this study, incorporating both quantitative and qualitative techniques, it is imperative to maintain a delicate balance between the positivist and interpretivist paradigms.

Pragmatism is an appropriate paradigm for research using a mixed-methods approach. Considering that it 'supports the use of a mix of different research methods' (Feilzer, 2010, p. 6), it enables researchers to integrate their positivist and interpretivist assumptions in order to conduct their studies. As stated by Mackenzie and Knipe (2006), instead of being restricted to one single method, it might be possible for all paradigms to adopt mixed approaches, which may potentially increase the richness and depth of an investigation.

Feilzer (2010), Mackenzie and Knipe (2006) highlighted that mixed methods research can apply the pragmatic paradigm as a guiding framework. Unlike positivism and interpretivism, pragmatism incorporates multiple perspectives and utilised various methods, characterised by a specific worldview and employs distinct techniques for gathering data, as described by Creswell (2014).

## 5.3 Research Methods

Generally, collecting and analysing data in any research can be conducted through three common styles: quantitative, qualitative, and mixed methods as shown in Figure 5.1. Selecting the appropriate method depends on the nature of the research questions and the data to be gathered (Creswell, 2014).

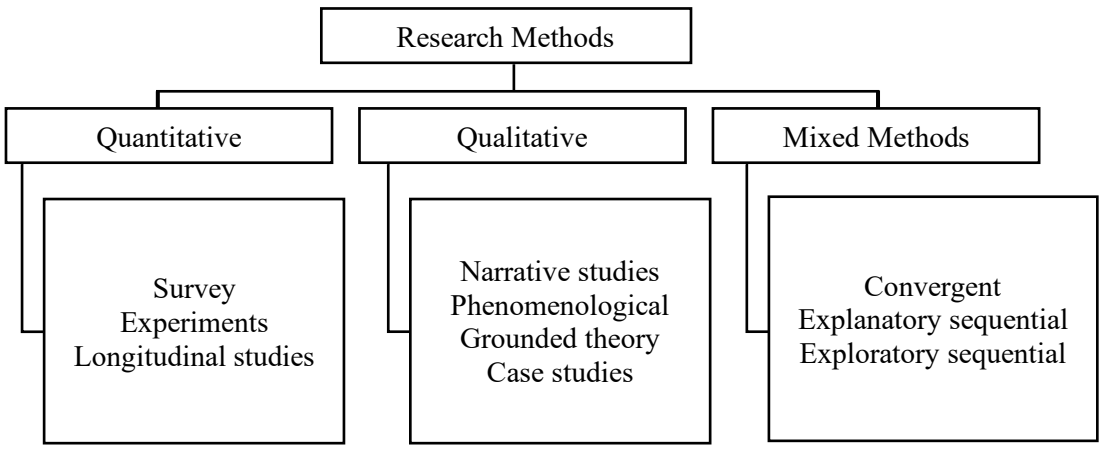


*Figure 5.1 Schematic representation of research methods*

A brief explanation of each method follows.

Quantitative studies collect numerical data to empirically predict and identify a phenomenon with the objective of inspecting an observable phenomenon or theory by statistically exploring the relationships and correlations among its variables. According to Bell and Bryman (2022), quantitative studies are used to examine hypotheses, establish causality, and generalise results from a sample to a broader population with similar characteristics. This approach typically involves systematic data-gathering techniques and the application of statistical methods for data analysis. The quantitative strategy aims to investigate an empirical theory or observable phenomenon by analysing the statistical relationships among related variables, and the measurement of these variables can be classified into different tools including surveys and experiments. The survey is considered one of the commonly used tools for collecting opinions, attitudes, and behavioural patterns (Creswell, 2014). Compared to other tools, surveys have the advantage of being able to efficiently reach a larger proportion of individuals (Brace, 2018). Questionnaires can be designed with either open-ended or closed questions. Participants are free to respond in their own words to open-ended questions, whereas closed questions require participants to select from a set of pre-defined options. It is worth mentioning that one of the most popular tools for managing quantitative analysis is known as the Statistical Package for the Social Sciences (SPSS) (Bhattacherjee, 2012).

On the other hand, the qualitative method seeks to provide a deeper comprehension of human attitudes, behaviours, opinions, and decisions regarding a particular social problem (Creswell & Plano Clark, 2007). This type of method can normally be processed through interviews, observations, and open-ended questions (Taylor, 2005). However, when it comes to collecting qualitative data in this method, interviews are considered the most commonly used approach (Rogers et al., 2015). Additionally, they can take place over the phone, in person, or by email (Creswell, 2014). Coding is the most used technique to analyse and categorise qualitative data according to the research subject (Rogers et al., 2015).

The mixed-methods research approach is the third category, which incorporates both quantitative and qualitative methods through sequential and concurrent techniques (Creswell, 2014). This approach typically involves employing a combination of open-ended and closed-ended questions (Creswell et al., 2003). The rationale for employing this method is to provide the researcher with a thorough and in-depth understanding of the research

problem. There are several advantages of using mixed methods. Firstly, it offers triangulation, by enabling the confirmation of the results and investigating them using different techniques. Secondly, it might produce complimentary results because the results of one approach can support the results of the other (Johnson & Onwuegbuzie, 2004). Mixed-methods research, according to Denscombe (2008), aims to provide a deeper and more comprehensive knowledge of complicated issues in research by combining quantitative and qualitative data. Additionally, this approach allows for the verification and cross-checking of findings through triangulation of data from different methods. Mixed research methods, therefore, have gained popularity and have been frequently used in many studies in different fields, particularly in social research (Bryman, 2016).

Another research approach, known as the sequential mixed-method approach, involves the study being carried out sequentially in several stages (Creswell, 2014). In this approach, each phase is conducted sequentially and the results of the previous phase inform the follow-up phase. Furthermore, the researcher might expand the results of one approach with another. According to Creswell (2014), the sequential mixed method could be applied following several approaches:

- Exploratory sequential mixed-methods approach: This approach progresses from initial exploratory outcomes to the validation of these findings. The researcher begins with qualitative data collection to explore participants' perspectives. After analysing the data, the obtained findings lead the foundation for a subsequent quantitative phase.
- Explanatory sequential mixed-methods approach: an approach that involves two interconnected phases, with the second phase clarifying the results of the first phase. Initially, the researcher undertakes quantitative data, assessing the findings before subsequently moving forwards into qualitative research to provide deep explanations. This approach earns its classification as explanatory since the preliminary quantitative findings are further clarified through the follow-up qualitative data. It is categorised as sequential as it follows a progression from the quantitative phase to the subsequent qualitative phase.
- Embedded sequential mixed-methods approach: This is a research design where one method is embedded within the other. Typically, qualitative data are being collected and analysed during the occurrence of a larger quantitative study.
- Transformative sequential mixed-methods approach: This approach involves two main types of methods—quantitative and qualitative—applied in any order, but guided by a theoretical lens that directs the researcher in investigating the problem.

- Multiphase mixed-methods approach: This is a research design that involves conducting multiple rounds of both qualitative and quantitative research in a back-and-forth manner to build upon and expand the understanding of the research problem. This approach involves teams of researchers working together.

Rogers et al. (2015) listed five key elements that should be taken into account for effective data collection:

1. Setting goals: Identifying the purpose and goal of the study is essential before data collection begins.
2. Specifying participants: People who will take part in the study should be identified. More precisely, this group is referred to as the population.
3. Building a connection with participants: Making a transparent relationship with the participants is crucial for clarifying the study's nature. To confirm this, the participants are requested to provide and sign written consent that explains the purpose of data collection. This document serves as evidence of their informed consent and their voluntary agreement to participate in the research process.
4. Triangulation approach: Triangulation is used in the investigation of a specific phenomenon from at least two different perspectives. It employs both quantitative and qualitative methods. According to Denzin (1978), the triangulation method has four types:
    - Data triangulation: This refers to the collection of data from different situations, times, places, and populations.
    - Investigator triangulation: This means involving several researchers in a study.
    - Theory triangulation: This means interpreting the data by using more than one theoretical framework.
    - Methodological triangulation: This means using many data collection methods, for example, questionnaires and interviews.
5. Pilot study: This is an early trial version of the main study. This technique helps in ensuring that the proposed approach, such as a questionnaire, is understandable and clear before being made available to the actual sample group.

## 5.4 Mixed-Methods Triangulation

Triangulation stands as a common practice within the context of mixed methods research. This approach entails examining the research issue by employing varying methodologies. It

strengthens the credibility of empirical research and helps to reach a comprehensive understanding (Denzin, 1978). Employing triangulation with both qualitative and quantitative methodologies is very beneficial as it combines the strengths of both methods. Although, qualitative findings are more comprehensive and richer, they tend to possess less precision compared to quantitative findings (Runeson & Höst, 2009).

This methodology can be categorised into two distinct types: simultaneous triangulation or sequential triangulation. In simultaneous triangulation, qualitative and quantitative methods are concurrently employed during data collection, where the outcomes of both methods will supplement each other. Conversely, in sequential triangulation, each subsequent phase builds upon the findings of the preceding phase, with literature being integrated into every step to establish a foundation for the research issues (Morse, 1991). Several advantages arise from implementing triangulation, such as: enhanced validity, richer insights, and comprehensive understanding (Jick, 1979).

## 5.5 Selected Research Method in This Research

This study applies a sequential mixed-methods approach, encompassing the collection and analysis of both quantitative and qualitative data. The rationale behind this choice is that the integration of collecting and analysing various information types, as suggested in the literature, delivers a deeper, wider understanding of a research problem compared to relying solely on quantitative or qualitative data (Creswell & Zhang, 2009; Flick, 2009). The primary objective of my research was to explore the main research question: What are the factors that influence secondary school teachers' intentions towards using the Madrasati e-learning platform beyond the pandemic? To answer this question, different research procedures were utilised, guiding me from identifying the problem to reaching the conclusion (literature review, proposed framework, questionnaire, and finally follow-up interview). Given the multiple stages of the study, each of which built upon the results of the previous one, this study employed a sequential mixed-methods approach that utilised triangulation and an explanatory approach to data analysis.

In the preliminary stage, I reviewed the literature, drew on my own experience working as a teacher in the education system in Saudi Arabia, and held several informal discussions with some school teachers. Although it might add time to the study, this is considered an essential step for me, as it allows me to identify the research problem and discover how the population perceives the subject that is being investigated.

Following the preliminary phase, I developed a proposed framework by combining relevant factors from technology acceptance models and factors examined in previous Madrasati studies. At this stage, I conducted a focused investigation through studies on Madrasati to explore the key factors influencing teachers' utilisation of the platform during and after the COVID-19 crisis. The review aimed to explore all prior studies in order to develop the proposed framework.

The initial phase employed a quantitative approach, which involved multiple stages, starting with the design, followed by piloting and the distribution of a closed-ended online questionnaire among Saudi secondary school teachers in the Asir region. After collecting the data, I used the Structural Equation Modelling (SEM) statistical technique to validate the proposed research model, analyse the gathered data, and test the model relationships and hypotheses.

The second phase was a follow-up using qualitative method, which involved conducting one-to-one interviews with some secondary school teachers who gave consent to participate in the interviews. The qualitative phase aimed to interpret and explain the survey findings, as well as discuss the factors that impact the continuance of Madrasati usage within the current educational environment. Given that quantitative and qualitative results might be complementary to each other, this can promote a comprehensive and in-depth examination of the research problem, offering a complete picture of the research question (Flick, 2009; Miles & Huberman, 1994).

## 5.6 Positionality and Reflexivity

Growing up and completing all stages of my education in Saudi Arabia, I experienced the national education system first as a student and later as a high school computer science teacher. This long-term engagement with the Saudi educational context has shaped my understanding of teaching practices, institutional expectations, and the everyday realities faced by teachers. During the COVID-19 pandemic, Madrasati was used extensively by Saudi teachers to support emergency remote instruction. Following the return to face-to-face teaching, I observed different responses among teachers to the platform: while some discontinued their use of the platform, others continued to integrate it into their teaching practices.

In this research, I am in a dual position of being an insider and an outsider. As a Saudi teacher, I am an insider who shares cultural, institutional, and professional experiences with the participants. This insider position enabled me to understand contextual nuances, professional language, and challenges associated with teaching and technology integration within Saudi schools. At the same time, as a PhD researcher, I adopted an outsider stance by critically examining these practices through theoretical and analytical lenses. This dual positioning required ongoing reflexivity to balance professional familiarity with critical distance throughout my research process.

These observations and experiences shaped my interest in exploring and examining the factors influencing teachers' intentions to continue using Madrasati beyond the pandemic. I believe this platform can have the potential to support teaching and learning in post-pandemic contexts when it aligns with teachers' pedagogical practices and needs. However, I also recognise that my professional background and generally positive orientation towards educational technology may influence my assumptions, interpretations, and expectations.

To address this, I embedded reflexivity throughout all stages of my research process. During the design of this study, I carefully constructed survey instruments and interview questions to remain open and neutral, which allow teachers to express both supportive and critical perspectives on adopting Madrasati. I made a conscious effort to avoid framing questions in ways that might privilege continued use of the platform or reflect my personal experiences as a technology-oriented teacher.

Furthermore, during qualitative data analysis, I prioritised grounding interpretations in participants' accounts rather than my own expectations. I reviewed the data several times to ensure that themes and conclusions emerged from teachers' perspectives, including those that contrasted with my initial assumptions. The mixed-methods design also assisted in this reflexive process by enabling the triangulation between quantitative and qualitative data. Quantitative findings provided a broad overview of patterns related to teachers' use of Madrasati after the pandemic, while qualitative data offered deeper insights into teachers' motivations, challenges, and contextual constraints. Additionally, regular supervisory feedback was used to critically review analytic decisions and interpretations in order to support transparency and help mitigate potential bias arising from my positionality.

## 5.7 Methodology Applied in This Explanatory Study

The term ‘explanatory sequential design’ describes a methodology in which a quantitative method is conducted first, followed by qualitative investigation in sequential order. In this approach, phase two provides a deeper understanding and additional explanations of the obtained statistical results (Creswell, 2014).

This research employed the explanatory sequential method, although it involved several initial stages. In the preliminary phase, I developed a theoretical framework based on the literature, designed to effectively enable the exploration of the adoption of the Madrasati platform in the Saudi secondary school context, particularly after the pandemic ended.

Both quantitative and qualitative techniques were adopted in a sequential approach. Using both approaches might guarantee more accurate results and assist me to obtain more robust and precise findings. After developing the model, the quantitative data were obtained and examined, so that the factors were identified that might significantly influence teachers’ intentions to continue using Madrasati. Consequently, the results delivered a broader picture of the research problem. At this stage, a clarification was needed to explain why these factors play an important role and also to reveal any ambiguities about the results. Hence, the qualitative data collection was conducted to refine the results that emerged from the first phase and to expand relevant themes using open-ended questions. Figure 5.2 encapsulates the research design and presents all the stages conducted.

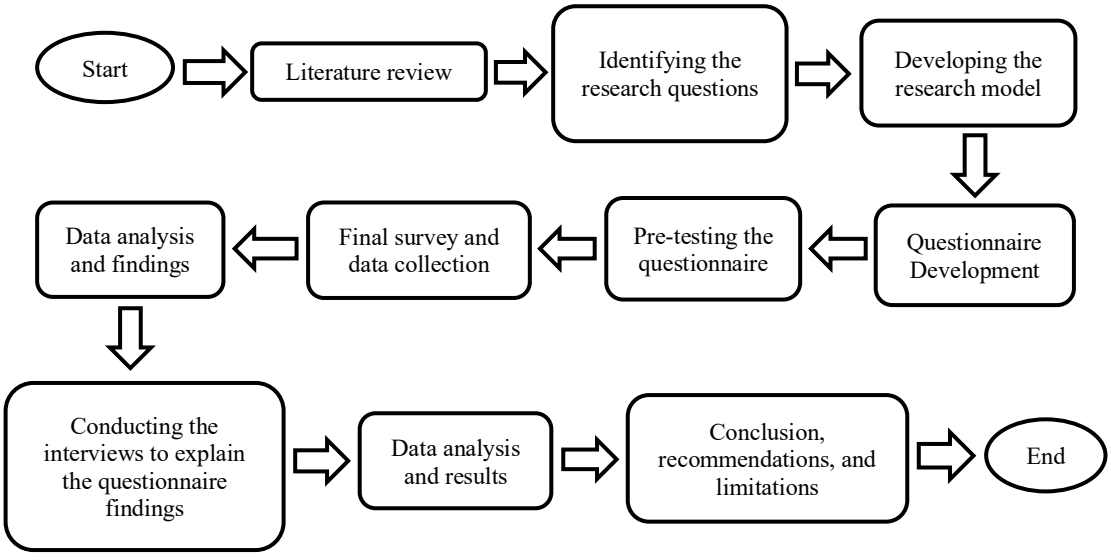


*Figure 5.2 Comprehensive outline of the research methodology*

Table 5.1 maps out each question, with the proper methodology selected to address the main research question: What are the factors that influence secondary school teachers' intentions regarding using the Madrasati e-learning platform beyond the pandemic?

## 5.8 Chapter Summary

This chapter delivered an explanation of the research paradigms, methodology, and research techniques used in this study. I briefly presented the ontological and epistemological paradigms, along with three research paradigms commonly employed in educational research. Thereafter, I explained the research methods through a discussion of the diverse mixed-methods adopted in my research. It clarified the adoption of the sequential mixed-methods technique in investigating the research question across several stages, including the proposed model, quantitative, and qualitative analysis.

The proposed model was initially developed based on the DTPB, incorporating significant factors from previous studies. The second stage involved an empirical investigation facilitated by an online questionnaire. The final follow-up phase—semi-structured interviews with teachers currently embedding Madrasati in their teaching—generated the outcomes of this study, clarifying the survey results and providing explanations for the factors impacting the continued use of Madrasati among teachers.

*Table 5.1 Individual research questions adopted in this study*

| Research Question | Method | Purpose | Analysis | Outcome |
|---|---|---|---|---|
| Q1: What is the appropriate framework with which to investigate secondary school teachers' continuance intentions towards using the Madrasati platform? | Review theories and models (Chapter 4) | - Explore significant factors in order to develop the framework.<br>- Propose the model with research hypothesis. | - Key factors were determined.<br>- Identified the appropriate framework to tackle the research question. | The proposed model. |
| Q2: To what extent and why do the factors in the model explain the variances in the continuance intentions to use Madrasati among Saudi secondary school teachers? | Review methodology and methods (Chapter 5) | - To determine the appropriate methodology in investigating the research question. | - Research paradigms.<br>- Methodology.<br>- Methods. | The explanatory sequential mixed- methods approach. |
| Q3: What are the relationships between the factors that affect secondary school teachers' continuance intentions towards using Madrasati? | Survey (Chapter 6) | - Determine strength, size, direction of relationships between the variables in the model. | SEM:<br>• Measurement level analysis.<br>• Structural level analysis. | The strongest determinant of CIM was SN, followed by ATU and PBC. |
| Q4: What are the perceptions of Saudi secondary school teachers regarding the factors that impact the continuance of Madrasati usage? | Follow-up interviews (Chapter 7) | - To obtain a deep understanding of teachers experience of using Madrasati.<br>- To discuss and clarify the factors impacting the adoption of Madrasati. | Reflexive thematic analysis for open-ended questions. | Four themes were identified with more explanations of the quantitative results. |

# Chapter 6 Quantitative Phase Design and Findings

As explained in the methodology section (see Chapter 5, section 5.7), I employed a sequential mixed-methods approach in this research, commencing with a quantitative phase to validate the proposed model. I then designed the subsequent qualitative phase based on the quantitative findings. This chapter explains the first stage of data collection, encompassing three key components: creating an online questionnaire, conducting statistical analysis of the gathered data, and discussing the obtained results.

## 6.1 Questionnaire Structure and Design

The principal aim of this study was to collect attitudes and opinions of secondary school teachers in SA based on the proposed model, which integrates the factors influencing their intentions to continue using the Madrasati platform. Accordingly, an online self-administered questionnaire was selected and designed to gather data so that participants could complete it independently, without the researcher being present. In comparison to other survey tools, it is simple to disseminate it to a large number of participants and, more importantly, it does not need trained staff to run the survey (Kazi & Khalid, 2012). However, the questionnaire ought to be designed and formulated carefully to achieve precise results since the accuracy and quality of the responses are strongly related to the content and structure (Brace, 2018). The following sections will detail the design stage of the questionnaire.

### 6.1.1 Questionnaire Development

In order to develop an online self-administered survey for this study, a range of online survey tools was taken into consideration including SmartSurvey, Google Forms, and Qualtrics. Among these, I selected the Qualtrics tool to create the online survey as it is the tool recommended by the University of Glasgow.

The copy of the survey layout is attached in the Appendix A.2.2. The survey comprises five pages, starting with a welcome page that describes the study objectives and includes a link to the plain language statement. Following that, the respondent should tick a checkbox to

confirm their agreement to take part in the survey, after which they will be directed to the beginning of the survey.

Since this study investigates secondary school teachers' perceptions and beliefs regarding using Madrasati, the first question concerns whether the participant is a secondary school teacher or not; if not, there is a pop-up message to thank them and request that they leave. The next pages then cover demographics, the current usage of Madrasati questions, and, lastly, scaled questions designed to measure the factors influencing the continuance intention to use Madrasati, according to the proposed model. All the statements were derived from the prior literature and tailored to meet the research problem. The following subsections will expand the devolvement of each part of the questionnaire.

### 6.1.2 Demographic and Madrasati Usage Questions

The demographic questions encompass eight aspects that concentrate on gender, age range, years in teaching, qualifications, the subject currently taught, daily contact hours of the classes, average student numbers, and current school location (urban-rural). Gendall and Healey (2008) suggested that since age range responses have a higher response rate than straightforward questions, it is preferable to categorise them into groups (Gendall & Healey, 2008). Moreover, because a drop-down menu is known to increase the error rate, the radio button choice was preferred to avoid this issue (Gendall & Healey, 2008).

The next section of the survey was designed to obtain information on teachers' current usage of Madrasati. It investigates whether they still use it or not and the estimated daily hours spent on Madrasati, if applicable. Additionally, a question was asked relating to the training courses and most of the tools provided by Madrasati that had been used frequently. These kinds of questions were important to obtain general information regarding the current usage of Madrasati among teachers.

### 6.1.3 Measuring the Factors of the Proposed Model

After finishing the demographic and Madrasati usage questions, participants were instructed to the next page to complete the survey. In this section, there were 15 latent constructs, wherein each factor was evaluated by three statements (observed variables). For instance,

the attitude construct was assessed by three observed variables. As was pointed out in the definition of the latent construct, a latent construct cannot be evaluated by only a single statement (Byrne, 2010).

The attitudinal beliefs factor, including perceived ease of use, perceived usefulness, compatibility, and learning content quality, was evaluated in the first part. Then, the subjective norm factor with its variables, containing peer influence, leader influence, and students influence, was measured in the second part. The third part includes perceived behaviour control, facilitating conditions, technical support, self-efficacy, and prior e-learning experience. Finally, the continuance intention to use Madrasati was evaluated in the last part.

All statements used in the survey were derived from existing validated measures from prior leading literature (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975; Taylor & Todd, 1995b), and previous relevant studies (Ajjan & Hartshorne, 2008; Hsu & Chiu, 2004; Sadaf & Gezer, 2020; Teo, 2011). Nevertheless, some statements have been altered slightly to fit within the field of education. Although some of them were modified and tailored to address the research problem, most of the items had been already tested and used in other studies.

I designed the survey measures to be clear and understandable to elicit accurate responses and reduce the probability of ambiguous questions. Besides that, the questions were presented to the participants in Arabic, as it is the native language spoken by the target population in my research. A five-point Likert scale, commonly used to measure research model constructs and widely adopted in education and social sciences research (Joshi et al., 2015), was employed to assess the statements for each construct.

I adopted a couple of strategies to increase the validity and accuracy of the questionnaire responses. Firstly, to mitigate acquiescence bias, which is the propensity to agree or say ‘yes’ with statements instead of saying ‘no’, answers were presented starting with the ordered rating: [completely disagree, disagree, neutral, agree, and completely agree] (Kalton & Schuman, 1982). Secondly, this survey encompasses some reverse items, which used a negative wording format instead of a positive wording format – a suitable strategy for avoiding biased responses in the survey (Weijters et al., 2013). However, some researchers argue that reverse items may cause systemic errors and be unclear, hindering the ability to accurately represent the construct and thereby reducing the validity of the findings (Jackson

et al., 1993). Therefore, this study includes just five reverse items from 46 in order to avoid biased responses and confirm the survey responses' validity.

### 6.1.4 Instruments Validity

A survey is perceived valid when it accurately measures what it was intended to measure and effectively captures the result it was designed to capture. In this stage, validity has two common categories: construct and content validity. Where content validity illustrates how well the questionnaire items measure the corresponding construct (Brace, 2018), construct validity indicates how a group of items selected to represent each construct fits together to test and reflect the construct (Straub et al., 2004).

Litwin (2003) argued that survey content validity can be verified by how suitable scales or items are to a set of reviewers who are considered experts in the field. There are several methods to determine content validity, such as reviewing the literature, experts' recommendations and reviews, and empirical evaluation (Straub et al., 2004). To confirm the survey content validity, my study integrated all the three suggested methods.

To begin, I derived all the statements adopted in the survey from prior leading literature and relevant studies. It is strongly recommended to use statements from previous studies instead of creating new scaled statements (Straub et al., 2004). However, I altered some of the statements slightly to fit the research problem.

The second method is experts in the same field reviewing the questionnaire. During the preliminary piloting stage, I discussed the questionnaire statements with five experts in the School of Education at the University of Glasgow. I provided the experts an overview of the research topic, objectives, and the proposed model, then I reviewed and discussed the questionnaire statements through either an in-person meeting, an online call, or by email.

In the third validation step, I conducted an empirical evaluation in different stages to ensure that all the statements are readable, understandable, and clear in the survey (Rogers et al., 2015). Brace (2018) suggested that a pre-testing survey can be conducted with three different approaches: an initial pilot (colleagues), a cognitive interview, and a formal pilot with a representative large sample size. All three approaches will be explained in detail in the pilot study section (see section 6.1.7).

The last validation method involved validating the questionnaire statistically using the Structural Equation Modelling (SEM), which was done throughout the stage of data analysis while conducting several validity and reliability evaluations. Construct validity examines whether a group of items chosen to represent each construct in the questionnaire fit together to assess and reflect the essence of that construct (Hair et al., 2010; Straub et al., 2004). The correlation between the item measurements and their constructs is used to check the construct validity, a stronger correlation representing a higher level of validity. Related to the last validation step, Hair et al. (2010) illustrated that convergent, nomological, and discriminant validities are three different ways to check the construct validity in SEM.

### 6.1.5 Instruments Reliability

Instrument reliability is essential when a study has multi-items of factors and sub-factors. The aim of the reliability check is to assure that all survey items are interconnected and evaluate the same construct consistently. Measurement reliability, as described by Hair et al. (2010), refers to the level of consistency in the evaluations generated by the measures used to assess a particular construct.

Reliability is generally classified into two types: temporal stability and internal consistency. Oppenheim (2000) defined temporal stability as the extent to which the statements produce similar findings when provided again to the same group of participants. Internal consistency, on the other hand, was defined by Litwin (2003) as the degree to which the instruments' items on a questionnaire or a survey consistently measure the same construct or domain. This study employed internal-consistency reliability as a well-established method for evaluating the consistency of multiple measurements (Sekaran & Bougie, 2016).

Cronbach's alpha is the statistical criterion commonly used for determining the instrument's internal consistency. It has a measurement range from 0 to 1, with ($\alpha$) $\geq$ 0.8 measurements considered good reliability, meaning that the multiple statements measuring that construct are related and consistent (Cronbach, 1951). According to Hair et al. (2010), Sekaran and Bougie (2016), Cronbach's alpha reliability score is considered reliable based on the following table (Table 6.1):

*Table 6.1 Cronbach's Alpha reliability scores*

| Internal consistency (α) Score | Reliability Level |
|---|---|
| 0.9 < (α) | good reliability |
| 0.5 < (α) < 0.8 | acceptable reliability |
| (α) < 0.5 | poor reliability |

After collecting all data, I conducted reliability measurement in two stages. First, I carried out a Cronbach's alpha test using IBM SPSS, then I performed composite reliability employing SEM measurement level analysis.

### 6.1.6 Survey Translation

The targeted sample of this study was Saudi secondary school teachers in the Asir region. Therefore, the survey required a translation from English into an Arabic version. In this case, Brislin (1970, 1980) suggested several translation approaches including a bilingual committee approach, pre-tests, and a back-translation. Nevertheless, one of the most significant ways is to have the survey translated by native local speakers (Brace, 2018). Furthermore, Forsyth et al. (2007) proposed five strategies when translating a survey from English into any Asian languages:

1- Professional translation.
2- Reviewing the primary translation.
3- Bilingual adjudicator evaluation revision.
4- Cognitive review pre-test.
5- Final adjudication and review.

After developing and validating the questionnaire in the English version, a professional, bilingual native-Arabic speaker translated it into Arabic. Then, three bilingual PhD researchers at the School of Education, University of Glasgow, reviewed the Arabic version. Following that, I carried out cognitive interviews, or walkthroughs, with five native speakers, after which I made slight changes. Once I reached a satisfactory final version, I sent the Arabic survey to another translator for back-translation into English. To confirm the precision of the translation, I compared the final version with the initial instrument. Minor differences, such as synonyms and some expressions used to represent the same phrase, were found but did not affect the real meaning. Finally, I conducted a large-scale pilot test with 30 participants to ensure that all questions were clear and understood.

### 6.1.7 Piloting the Questionnaire

As mentioned earlier, Brace (2018) suggested three well-known approaches for piloting the questionnaire: initial pilot (colleagues), cognitive interview, and formal pilot. The initial pilot can be done within a group of colleagues who work in the same field in order to reveal any issues with the questions or the translation. Whereas reviewing the survey with colleagues may detect possible issues, it will not predict how actual participants will understand and answer the survey. Accordingly, one-to-one cognitive discussions or walkthroughs with a limited number of the targeted sample are helpful, where the researcher discusses the questionnaire with the participants while they answer the questions either physically or digitally. Consequently, a 'talk-aloud protocol' is essential to let the respondents 'think-out-loud', so they can explain how they perceive the survey and how they respond. (Brace, 2018).

In order to obtain the first insights, I piloted the survey informally with five researchers from the University of Glasgow to check the instrument's statements. This step was confirmed by Rogers et al. (2015), who stated that peer feedback is beneficial to enhance and refine the survey instruments. I took their advice and recommendations into consideration and then addressed them in the questionnaire. Thereafter, I conducted an expert panel with five experts from the School of Education to test the questionnaire statements. I then conducted cognitive interviews via Zoom with some respondents who work as teachers in Saudi Arabia. I obtained some recommendations during all the stages, and I applied a few changes and updates to the survey statements.

After achieving a satisfactory final version of the questionnaire (Appendix A.2.2 contains the complete questionnaire), I sent a formal request to the representative of the General Administration of Education in the Asir region, Saudi Arabia, to obtain authorisation and assistance in dissemination for both the large-scale pilot and main data collection (see Appendix A.1.2 for the approval letter). I illustrated the goals and requirements of the study and attached a QR code to show that the survey was ready to be distributed. I then held a discussion with the manager of the IT team, who explained the process of the survey distribution. Subsequently, the manager sent a notification email through Madrasati to a random number of teachers willing to take part in a pilot study. I included a brief summary of the research and my contact details, such as email ID, phone number, or WhatsApp text

messaging, with the email. A week later, a total of 30 participants from the targeted sample communicated with me, and I informed them that they would need to complete an online internet survey and give feedback regarding the questions. Respondents then gave their comments regarding the survey and how long it took them to finish it. Teachers provided positive comments, as the questionnaire was simple and easy to read and follow.

I then checked the initial internal consistency reliability (Cronbach's alpha) using IBM SPSS software. Consequently, all factors yielded acceptable alpha scores ranging from 0.6 to 0.9, which indicated the questionnaire instruments would be reliable and ready for the larger formal test. Figure 6.1 shows the questionnaire piloting stages. Additionally, Table 6.2 presents the initial internal consistency results.


*Figure 6.1 Questionnaire piloting stages*

*Table 6.2 Initial internal consistency results*

| Factor | Cronbach's alpha |
|---|---|
| Learning Content Quality | .891 |
| Perceived Usefulness | .875 |
| Perceived Ease of Use | .896 |
| Compatibility | .928 |
| Attitude | .848 |
| Peer Influence | .907 |
| Leader Influence | .617 |
| Student Influence | .733 |
| Subjective Norms | .730 |
| Prior E-Learning Experience | .900 |
| Self-Efficacy | .887 |
| Facilitating Conditions | .878 |
| Technical Support | .903 |
| Perceived Behavioural Control | .866 |
| Continuance Intention to Use Madrasati | .879 |

### 6.1.8 Ethics Considerations

Before disseminating the questionnaire to participants, ethical approval needs to be obtained. Consequently, I applied for and received approval from the College of Social Science Research Ethics Committee at the University of Glasgow (Research Ethics Number 400220163). I also granted permission for this research from local education authorities, the Director of Education for the Asir region, and school leaders of participating schools. The participants received a plain language statement, which included all relevant details of the study (see Appendix A.1.4). They were notified that their contribution was entirely voluntary, and they might leave or withdraw from the survey at any point. I collected all data anonymously, and I analysed and retrieved it collectively as one group (Appendix A.1.1 includes the ethical approval).

### 6.1.9 Study Population and Sampling

The term 'population' is commonly used to describe a group of individuals who possess a common characteristic or attribute (Creswell, 2012). To prevent potential issues like wasted resources and time, it is crucial for researchers to precisely define the sample selection early in the research process and consider it when collecting data (Cohen et al., 2007). For the purposes of this study, the target population consisted of secondary school teachers in Saudi Arabia who had either used or were currently using the Madrasati platform. Typically, researchers use a sample, which represents only a part of the target population, to assist them in generalising the findings to the entire population (Creswell, 2012). Therefore, the Asir region was selected out of the 13 regions to represent the targeted population in this study. This region was selected based on the permission that was given by the Saudi MoE to conduct this research. It contains more than 4,700 secondary school teachers, both male and female. (Appendix A.1.3 represents statistics on secondary school teachers in the Asir region.)

The Asir region was selected as the study site due to its educational diversity and strategic relevance within the Saudi context. As one of the largest regions in the Kingdom, Asir encompasses a wide spectrum of school environments, ranging from highly developed urban centres such as Abha and Khamis Mushait to more remote rural areas (Alqahtani, 2024). This diversity provides a rich setting for examining teachers' perceptions of Madrasati across

varying socio-economic and technological contexts. Furthermore, the region has been an active participant in national digital transformation initiatives, particularly through higher-education institutions (King Khalid University, 2025), making it a suitable case for exploring the implementation and use of e-learning systems. However, a potential limitation of this regional focus is that the findings may not be fully generalisable to other Saudi regions, particularly those with different infrastructures or educational challenges. For example, rural schools in Asir sometimes face challenges, such as limited internet access, which may affect perceptions of Madrasati differently compared with urban schools. Despite this, the choice of Asir provides valuable, contextually grounded insights into teachers' experiences with Madrasati.

At this stage, I planned to use SEM to statistically analyse the obtained quantitative data. Different studies suggested that a large number of samples is essential when using SEM, as stated by Kline (2016). Indeed, a large sample is crucial because it can enhance the accuracy, statistical strength, and general applicability of the results, while minimising the possibility of sampling bias. According to previous research, there should be at least five participants for each item of a variable (Hair et al., 2010), meaning that there should be at least 15 participants for each construct in the proposed model.

Furthermore, several recommendations associate the appropriate sample size with the total number of variables examined in the research. A widely cited guideline is the rule of 10, which advises including at least 10 cases per variable, thereby producing a sample size that is 10 times greater than the total number of variables (Everitt, 1975; Schreiber et al., 2006; Velicer & Fava, 1998). Applying this guideline to the model, which comprises 15 factors, indicates that a minimum of 150 participants is required.

On the other hand, 200 participants were considered sufficient for SEM, as per previous studies' suggestions (Kline, 2016). However, the survey was distributed to reach out to more participants in case of missing data or ineligible responses. Consequently, this study collected responses from 314 participants, which were adequate for reaching a reliable analysis.

## 6.2 Conducting the Questionnaire

To reach out to Saudi school teachers, I prepared and reviewed an Arabic-translated version of the questionnaire (see section 6.1.6). After receiving the ethics committee approval and completing the pilot study, the need for participants was publicised via different methods, for example, through an e-mail service on Madrasati which was sent by the IT team in the General Administration of Education in the Asir region. With permission from the Director of Education for the Asir region, I arranged with the IT team that a link would be sent to the targeted sample of secondary school teachers, designating it as coming directly from me to avoid imposing any obligation to complete the survey. It is worth noting that only teachers belonging to secondary schools in the Asir region were emailed the survey, which meant that non-teaching personnel who worked in secondary schools did not receive the email to their accounts. Moreover, from the Centre of Educational Supervision of the Asir region's Educational Administration, which has access to teachers' contact numbers, a link was passed on via SMS text to male and female teachers, including the invitation. This procedure was essential since I had no access to teachers' mobile numbers, and it would have been unethical to access such numbers. Moreover, I used snowballing techniques, as described by Emerson (2015), via WhatsApp and Telegram messages to ensure that the survey was distributed to a broad participant pool. I sent the link to the questionnaire to secondary school teachers with a gentle request to share with their colleagues. As stated by Bethlehem (2010), a web survey is considered a simple technique, uncomplicated to use, and easily accessible, that can produce a large sample in little time.

### 6.2.1 Sample Description

A total of 314 questionnaires were collected via Qualtrics, and I then eliminated a few responses during the data screening process. During this procedure, I removed ineligible responses from "non-teachers", such as a librarian, a computer lab technician, and a science lab assistant. In addition, I also excluded a few responses and categorised them under unengaged responses, in which participants selected the same responses to all questions. According to Tabachnick and Fidell (2007), these outliers might compromise data analysis. The following table (Table 6.3) displays the total collected responses and the excluded cases of the survey.

*Table 6.3 Total collected responses in the survey*

| Responses | Total |
|---|---|
| Total responses | 314 |
| Ineligible responses | 8 |
| Unengaged responses | 2 |
| Total valid responses | 304 |

### 6.2.2 Statistical Analysis Methods Used in This Study

The primary analytical approach employed in this study was SEM, a sophisticated statistical analysis technique utilised to test hypotheses that involve several variables (Hair et al., 2010). By using this approach, Hair et al. (2010) argued, researchers are allowed to evaluate theoretical models, and the extent to which observable data fits these models. I chose this approach for several reasons. Firstly, for multiple complex constructs in complicated theoretical models, SEM is strongly recommended, as it helps to examine and analyse the relationships between dependent and independent variables simultaneously. Whereas other methods, like bivariate correlations and multiple regression, implement that independently for each variable. Accordingly, when comparing SEM with other statistical methods, SEM provides the best global model fit (Byrne, 2010; Gefen et al., 2000). Secondly, in behavioural science and education research, SEM is widely used to model complex, multivariate data sets. When validating research instruments and assessing relationships between constructs, SEM is considered rigorous as suggested by the literature (Gefen et al., 2000).

To evaluate theoretical models, SEM employs a two-stage process consisting of measurement and structural models. The measurement model entails conducting various tests to establish the validity and reliability of the measured values, which in turn reflect the underlying latent factors. The structural model, on the other hand, assesses the relationships between the various constructs within the model (Hair et al., 2010). Table 6.4 presents a summary of the approaches used for data analysis in this research.

*Table 6.4 Summary of data analysis approaches used in this research*

| Analysis | Purpose |
|---|---|
| Descriptive Statistics: Sample Characteristics | To describe the demographic data of this sample |

| | |
|---|---|
| Descriptive Statistics: Current Usage of Madrasati | To explore the current Madrasati usage among teachers |
| SEM: The Measurement Model | A set of reliability and validity tests to assess the theoretical model |
| SEM: The Structural Model | An assessment of the model hypothesis |

## 6.3 Data Analysis and Findings

In the above sections, the procedure for designing, piloting, and conducting the online survey was explained in detail. The results and analysis of the obtained data are presented in the following section. I accomplished the statistical analysis using two widely used statistical software packages, SPSS (version 28) and IBM AMOS (version 28). Both versions were supplied by the University of Glasgow IT Helpdesk. Before the analysis, I performed a preliminary data examination, which involved assessing normality, checking for missing data, and verifying the instrument's initial reliability. After completing this step, the findings of SEM analysis are detailed, which is divided into two main phases: the measurement model and the structural model.

### 6.3.1 Data Examination

The process of data examination involves reviewing and exploring the data to identify any inconsistencies or patterns that may affect the quality and validity of the analysis. It typically includes several practices such as data cleaning, data coding, descriptive statistics, and data exploration. Hair et al. (2010) emphasised the importance of careful data examination to ensure the accuracy and reliability of consequent statistical analysis. To confirm that the collected data are ready for SEM analysis, several steps should be followed. First, all data should be checked for any errors or inconsistencies and then corrected as necessary. Examples of errors include missing values, incorrect responses, and out-of-range values. Second, all data must be properly coded in line with the coding sheet and stored in the proper format (Pallant, 2020). In this step, I assigned all responses with numerical values to be used in IBM SPSS. For instance, if the survey asks participants to indicate their satisfaction levels using a scale ranging from 1 to 5, their answers would fall into the categories of 1, 2, 3, 4, or 5. In addition, I labelled all variables in the survey with abbreviated names. I reviewed the data after I imported it from Qualtrics and coded it in accordance with the coding sheet.

After that, I checked for missing data, outliers, and conducted normality tests, then I examined demographics data and Madrasati usage data.

#### 6.3.1.1 Missing Data

A common challenge in any statistical analysis, which might cause complications, is missing data. Particularly, in the case of SEM, this could result in a failure to achieve an appropriate fit for the model (Hair et al., 2010). To mitigate this issue, I designed the survey instruments to require all questions to be answered, with any missing responses reported to the participants, which meant respondents could not move forward without answering all the questions on that page. Furthermore, because some respondents could not finish the survey within 24 hours, I set up Qualtrics to not record any uncompleted answers after 24 hours of opening the survey. In the meantime, in case a participant closes the survey website without completing the questionnaire, the survey will remain in progress within the allotted time, 24 hours, with a chance that they might return to finish it. However, if a respondent does not come back within that time, answers will be automatically discarded. Consequently, no missing data was found in the survey, and all responses were completed.

#### 6.3.1.2 Outliers

Outliers refer to observations or data points that differ substantially from other observations in a dataset (Hair et al., 2010). Identifying and addressing outliers in the data screening procedure is an essential step before conducting SEM. Univariate and multivariate outliers are the two primary types of outliers. To determine univariate outliers, there are different detections, including box-plots, histograms, and standardised z-score. On the other hand, Mahalanobis D2 distance is used to check multivariate outliers (Kline, 2016). At this point, since outliers can significantly affect data normality, leading to changes in the statistical findings, attention must be given to identifying these outliers (Hair et al., 2010; Tabachnick & Fidell, 2007).

##### A. Univariate Outliers

In order to detect univariate outliers, I used the standardised (z) score value to analyse each observed variable. As argued by Hair et al. (2010), if the absolute value of the standardised (z) score is above 4 in a large sample size of over 200, it indicates an extreme observation.

Therefore, the range of standardised (z) scores for the research variables was between -2.682 and 2.933, showing that all variables were within the acceptable cut-off threshold of ±4. Subsequently, no univariate outliers were found among the collected data in this study. The standardised (z) scores of all the cases are summarised in the following table (Table 6.5).

*Table 6.5 Standardised (z) score of all cases*

| **Constructs** | **Items** | **Standardised value (Z-Score)** | |
|---|---|---|---|
| | | **Maximum value** | **Minimum value** |
| Learning Content Quality (LCQ) | LCQ1 | -2.087 | 1.204 |
| | LCQ2 | -2.161 | 1.270 |
| | LCQ3 | -2.254 | 1.207 |
| Perceived Usefulness (PU) | PU1 | -1.607 | 1.618 |
| | PU2 | -1.634 | 1.485 |
| | PU3 | -1.868 | 1.410 |
| Perceived Ease of Use (PEU) | PEU1 | -2.577 | 1.171 |
| | PEU2 | -2.556 | 1.296 |
| | PEU3 | -1.911 | 1.522 |
| Compatibility (COM) | COM1 | -1.993 | 1.459 |
| | COM2 | -2.101 | 1.487 |
| | COM3 | -2.199 | 1.292 |
| Attitude (ATU) | ATU1 | -2.278 | 1.372 |
| | ATU2 | -2.233 | 1.062 |
| | ATU3 | -2.197 | 1.202 |
| Peer Influence (PI) | PI1 | -1.861 | 1.664 |
| | PI2 | -1.846 | 1.711 |
| | PI3 | -2.059 | 1.508 |
| Leader Influence (LI) | LI1 | -2.319 | 1.006 |
| | LI2 | -2.558 | 1.025 |
| | LI3 | -2.039 | 1.215 |
| Student Influence (SI) | SI1 | -1.558 | 1.553 |
| | SI2 | -1.537 | 1.562 |
| | SI3 | -3.541 | 1.292 |
| Subjective Norm (SN) | SN1 | -2.323 | 1.552 |
| | SN2 | -2.426 | 1.285 |
| | SN3 | -2.281 | 1.625 |
| Prior E-Learning Experience (PEE) | PEE1 | -2.571 | 0.805 |
| | PEE2 | -2.436 | 0.699 |
| | PEE3 | -2.366 | 0.881 |
| Self-Efficacy (SE) | SE1 | -2.283 | 1.200 |
| | SE2 | -2.129 | 1.650 |
| | SE3 | -2.306 | 1.354 |
| Resources Facilitating Conditions (RFC) | RFC1 | -1.446 | 1.586 |
| | RFC2 | -1.524 | 1.644 |
| | RFC3 | -1.617 | 1.358 |
| Technical Support (TS) | TS1 | -1.531 | 1.719 |
| | TS2 | -1.589 | 1.899 |
| | TS3 | -1.563 | 1.548 |
| | PBC1 | -2.525 | 1.381 |

| | | | |
|---|---|---|---|
| Perceived Behavioural Control (PBC) | PBC2 | -2.190 | 1.453 |
| | PBC3 | -2.054 | 1.504 |
| Continuance Intention (CIM) | CIM1 | -2.107 | 1.124 |
| | CIM2 | -1.983 | 1.089 |
| | CIM3 | -2.090 | 1.168 |

### B. Multivariate Outliers

To further analyse the data, multivariate detection, specifically Mahalanobis distance, was employed to detect any multivariate outliers. Using AMOS regression, D-squared distances based on Mahalanobis distance were computed for each case. Each non-demographic measure was treated as an independent variable in the regression analysis, with case number serving as the dependent variable. At this stage, a potential multivariate outlier was identified if the $D^2$/df value exceeded 3.5, as recommended by Hair et al. (2010). Based on AMOS regression (see Appendix A.2.10), the largest $D^2$ value was 92.045, belonging to case 84. However, after examining all D2 values for all cases, it was found that the maximum $D^2$/df value was only 0.920 (92.045/100), which is much lower than the standard of 3.5. Based on the analysis conducted, it can be inferred that there were no outliers identified using multivariate detection, and therefore all observations were included for further analysis (Hair et al., 2010).

#### 6.3.1.3 Normality

Normality refers to the fact that the data follow a normal distribution (Pallant, 2020). In SEM, normality indicates the assumption that the observed variables in the model are normally distributed (Hair et al., 2010). Following the confirmation of the data cleaning process, I evaluated the normality of all variables in order to prepare the data for SEM. There are two ways to check normality: skewness and kurtosis. Both were used as indicators of normality, with skewed distribution reflecting either a positive or negative skewness, and kurtosis reflecting either the upper or lower end of the distribution (Field, 2007). The acceptable boundaries of the skewness and kurtosis z-score, according to Hair et al. (2010), are recommended to be between -2.58 and +2.58. Applying both tests, each variable in the dataset was determined to be normally distributed, as the scores of kurtosis and skewness were within the suggested range. (Appendix A.2.11 presents the findings of the normality assessment for the items).

#### 6.3.1.4 Demographic Data

Initially, participants were asked a couple of demographic questions at the beginning of the survey. Table 6.6 illustrates the statistical description of the respondents. The sample encompassed 304 responses, 138 from male teachers and 166 female with approximately 250 of the teachers aged between 30 and 50 and only 15 teachers aged over 55.

Most survey respondents had more than 10 years of teaching experience, with 122 teachers having over 20 years, while 13 teachers reported having fewer than five years of experience. Additionally, most teachers held educational bachelor's degrees, while 29 held non-educational bachelor's degrees. Less than 11% had master's degrees, and three had PhDs.

In terms of the subjects that teachers taught, 18% of responses were from science teachers, 16% were maths teachers, and 7% were computing teachers. Notably, the lowest recorded number of responses (approximately 3%) were from physical and art education teachers. Additionally, the results show a high load of teaching hours, where the majority of the participants taught between 12 and 19 hours per week. Furthermore, the number of pupils in each class averaged between 21 and 40.

The results showed that the sample contains teachers from both urban and rural areas, with approximately 231 and 73 responses, respectively. Although the Asir region has different areas including cities, villages, and remote areas, I was able to evenly disseminate the survey to teachers working in those different areas for a broader view of the research problem.

*Table 6.6 Demographic data summary*

| | | Frequency | Percentage |
|---|---|---|---|
| **Gender** | Male | 138 | 45.4 |
| | Female | 166 | 54.6 |
| **Age** | 25–29 | 8 | 2.6 |
| | 30–34 | 27 | 8.9 |
| | 35–39 | 67 | 22 |
| | 40–44 | 80 | 26.3 |
| | 45–49 | 77 | 25.3 |
| | 50–54 | 30 | 9.9 |
| | 55–59 | 15 | 4.9 |
| **Years of experience** | 1–4 | 13 | 4.3 |
| | 5–9 | 33 | 10.9 |
| | 10–14 | 86 | 28.3 |
| | 15–19 | 50 | 16.4 |

| | | | |
|---|---|---|---|
| | More than 20 years | 122 | 40.1 |
| **Qualification** | Diploma | 16 | 5.3 |
| | Bachelor degree (Educational) | 225 | 74 |
| | Bachelor degree (Non educational) | 29 | 9.5 |
| | Master degree | 31 | 10.2 |
| | PhD | 3 | 1 |
| **Subject taught** | Mathematics | 48 | 15.8 |
| | Computing (ICT) | 22 | 7.2 |
| | Arabic language | 32 | 10.5 |
| | English language | 37 | 12.2 |
| | Science (chemistry, physics or biology) | 55 | 18.1 |
| | Social science (history, geography) | 27 | 8.9 |
| | Islamic education | 56 | 18.4 |
| | Physical education | 7 | 2.3 |
| | Art education | 4 | 1.3 |
| | Family and consumer science | 9 | 3.0 |
| | Other | 7 | 2.3 |
| **Teaching load** | Less than 5 hours | 23 | 7.6 |
| | 5–9 hours | 20 | 6.6 |
| | 10–14 hours | 85 | 28 |
| | 15–19 hours | 85 | 28 |
| | 20–24 hours | 91 | 29.9 |
| **Number of students** | Less than 20 | 42 | 13.8 |
| | 21–30 | 124 | 40.8 |
| | 31–40 | 107 | 35.2 |
| | More than 40 | 31 | 10.2 |
| **School location** | Urban area | 231 | 76 |
| | Rural area | 73 | 24 |

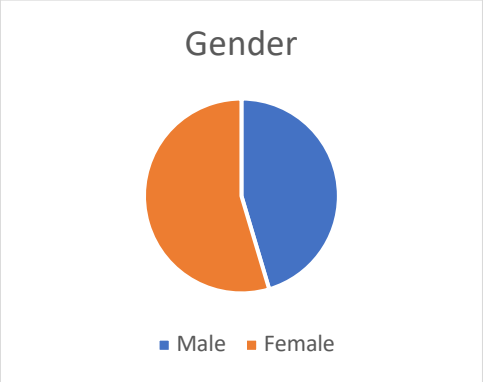


*Figure 6.2 Gender distribution*

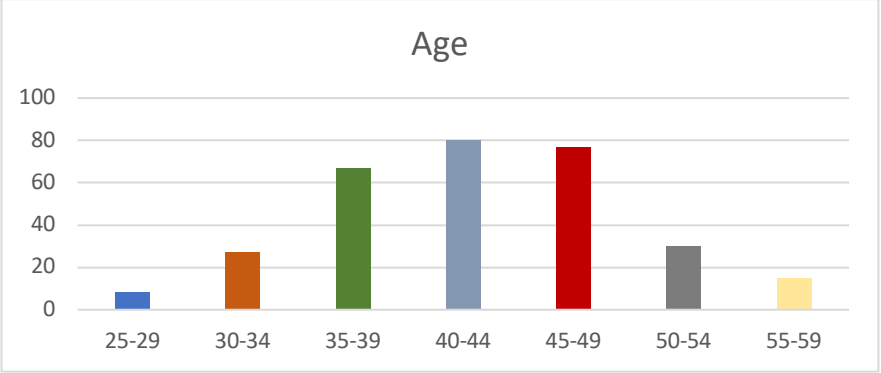


*Figure 6.3 Age distribution*

#### 6.3.1.5 Madrasati Platform Usage

It was beneficial to initially explore the extent of the current usage of Madrasati among the targeted sample. Thereafter, the second section of the survey contained this question: 'Currently, are you using the Madrasati platform?' In this case, if a respondent answered 'yes', they would be taken to the Madrasati usage questions page. However, if the answer was 'no', the respondent would be taken directly to the model questions. Most teachers in this study were using Madrasati; 92% of the participants still used it at the time of the survey, whereas only 8% of the sample stopped using it after the pandemic.

Table 6.7 shows the results of the Madrasati platform usage. Accordingly, most of the respondents use the Madrasati platform for around two hours. This reveals that most teachers use Madrasati regularly in their teaching process. Afterward, when the participants were asked about the training courses related to Madrasati, almost 50% pointed out that they had not been trained to use Madrasati before. These results concur with Aldossry (2021) as he pointed out that most teachers had not participated in the induction training courses that MoE offered during the pandemic. However, there were a noticeable number of teachers who had the skills needed to work on Madrasati without any training courses (Alkinani & Alzahrani, 2021).

*Table 6.7 Madrasati usage results*

| | Choices | Number of respondents | Percentage |
|---|---|---|---|
| **Current use of Madrasati** | Yes | 280 | 92.1 |
| | No | 24 | 7.9 |
| **Average daily usage (hours)** | Less than one hour | 113 | 37.2 |
| | One to two hours | 124 | 40.8 |

| | | | |
|---|---|---|---|
| | More than two hours | 43 | 14.1 |
| **Received training courses** | Yes | 142 | 46.7 |
| | No | 138 | 45.4 |
| **Tools and programs usage** | Microsoft Teams | 245 | 80.5 |
| | Email service | 109 | 35.8 |
| | Office 365 | 170 | 55.9 |
| | E-books | 126 | 41.4 |
| | E-assessment | 218 | 71.7 |
| | Additional sources | 203 | 66.7 |
| | iEN National Education Portal | 157 | 51.6 |
| | School schedule | 216 | 71 |
| | Learning activities | 149 | 49 |
| | Virtual classes | 118 | 38.8 |
| | School announcements | 75 | 24.6 |

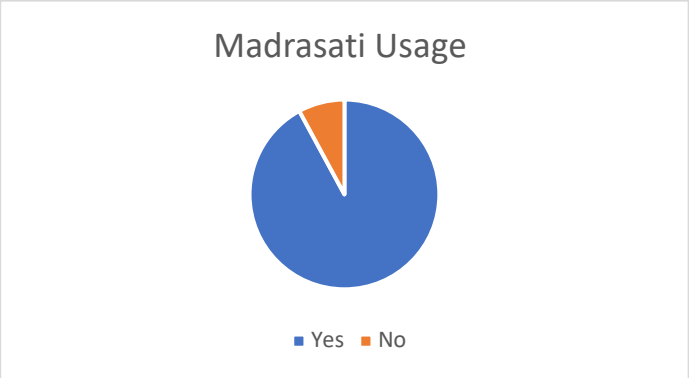


*Figure 6.4 Madrasati usage*

Lastly, teachers were asked about the tools and features offered by Madrasati and frequently used. Microsoft Teams was the tool most used by the sample, while e-assessment, schedule, and additional sources features were among the tools most often adopted by the participants generally. Figure 6.5 displays the most frequently used tools by participants.

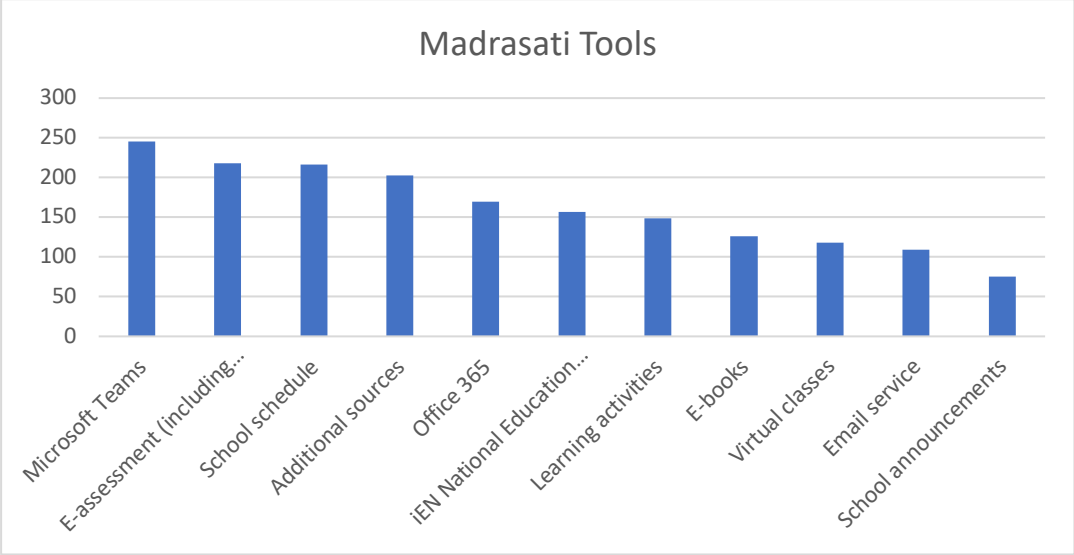


*Figure 6.5 Madrasati tools usage*

#### 6.3.1.6 Descriptive Analysis of the Variables

I performed the descriptive analysis in this investigation by the covariance matrix method, which allowed all the factors to be considered. The composite score for each variable was calculated by combining the original measurement item scores using parcelling. Based on the factor loadings, several items can be summed or averaged, which are then used as indicators for the constructs (Coffman & MacCallum, 2005; Hair et al., 2010).

These parcels are used to simplify complex models, making them more understandable and reliable. This approach subsequently improves the understanding of how different constructs and their items are related to each other (Coffman & MacCallum, 2005). Table 6.8 shows the means and standard deviations (SD) of the constructs, calculated using a five-point Likert scale.

*Table 6.8 Descriptive statistic results for constructs*

| Constructs | Mean statistic | Median statistic | SD | Minimum value | Maximum value |
|---|---|---|---|---|---|
| Learning Content Quality (LCQ) | 3.554 | 4.000 | 1.008 | 1 | 5 |
| Perceived Usefulness (PU) | 3.123 | 3.333 | 1.096 | 1 | 5 |
| Perceived Ease of Use (PEU) | 3.544 | 3.667 | 0.959 | 1 | 5 |
| Compatibility (COM) | 3.390 | 3.667 | 0.998 | 1 | 5 |
| Attitude (ATU) | 3.598 | 4.000 | 1.026 | 1 | 5 |
| Peer Influence (PI) | 3.166 | 3.333 | 0.960 | 1 | 5 |
| Leader Influence (LI) | 3.648 | 4.000 | 1.135 | 1 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Students Influence (SI) | 2.993 | 3.000 | 1.168 | 1 | 5 |
| Subjective Norm (SN) | 3.450 | 3.667 | 0.884 | 1 | 5 |
| Prior E-Learning Experience (PEE) | 4.023 | 4.333 | 1.109 | 1 | 5 |
| Self-Efficacy (SE) | 3.465 | 3.667 | 0.977 | 1 | 5 |
| Resources Facilitating Conditions | 3.002 | 3.000 | 1.177 | 1 | 5 |
| Technical Support (TS) | 2.906 | 3.000 | 1.095 | 1 | 5 |
| Perceived Behavioural Control | 3.433 | 3.667 | 0.959 | 1 | 5 |
| Continuance Intention (CIM) | 3.586 | 4.000 | 1.101 | 1 | 5 |

What can be observed in the above table is that I used the mean as a way to assess the central tendency. This revealed that, for most constructs, the mean values were scoring higher than the neutral midpoint level of 3, implying that respondents tended to agree with statements. Consequently, the mean values of student influence (SI) and technical support (TS) were less than the mid-point level of 3, showing that the respondents were less likely agree with these constructs. Prior e-learning experience (PEE) was given the highest mean value, at 4.023. On the other hand, technical support (TS) had the lowest mean rating, 2.906.

In order to demonstrate how much variation there was between respondents for each variable, I employed SD as a statistical measure of dispersion. Among the variables studied, resource facilitating conditions (RFC) showed the greatest deviation score (SD = 1.177). This result showed a high level of variability in the perceptions of teachers regarding resource facilitating conditions (RFC), indicating that there was the most variation among survey participants in the resource facilitating conditions (RFC) variable compared to the others. Conversely, the variable with the smallest deviation from its mean was the subjective norm (SN), with a standard deviation of 0.884. Figure 6.6 illustrates all the variables with the means and standard deviations (SD).

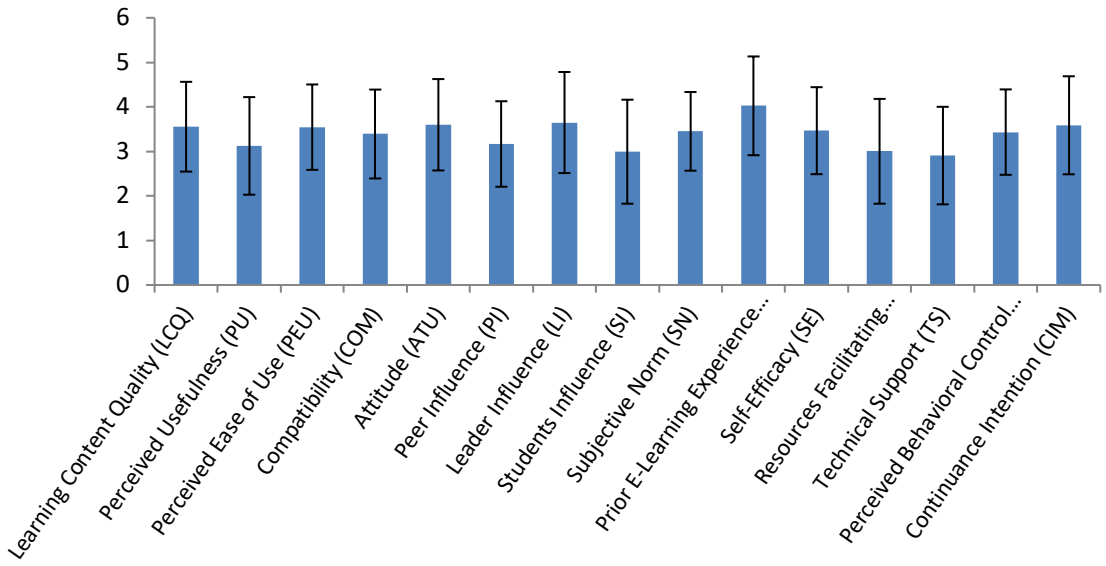


*Figure 6.6 All construct variables with means and standard deviations (SD)*

#### 6.3.1.7 Instruments Reliability

This study employed Cronbach's alpha test to measure the internal consistency reliability of the instruments (Cronbach, 1951). As illustrated earlier in this chapter, the Cronbach's alpha reliability score is assessed according to the following criteria (Hair et al., 2010; Sekaran & Bougie, 2016):

- Good when it is scored 0.8 and above.
- Acceptable when it is falling within $0.8 > \alpha \geq 0.5$.
- Poor when it is scored below 0.5.

As shown in Table 6.9, most constructs were scored above 0.7, which implies that the questionnaire instruments' reliability is considered acceptable (Hair et al., 2010). However, there was an unsatisfactory reliability score in two constructs: leader influence (LI) and student influence (SI) with scores of (.661) and (.646), respectively. While the obtained scores were still within the acceptable criteria => 0.5 (Hair et al., 2010; Sekaran & Bougie, 2016), all items were retained for further reliability checks in the measurement model analysis.

*Table 6.9 Reliability scores for constructs*

| Construct | Cronbach's alpha |
|---|---|
| LCQ | .816 |

| | |
|---|---|
| PU | .851 |
| PEU | .852 |
| COM | .848 |
| ATU | .875 |
| PI | .811 |
| LI | .661 |
| SI | .646 |
| SN | .801 |
| PEE | .883 |
| SE | .866 |
| RFC | .881 |
| TS | .877 |
| PBC | .863 |
| CIM | .849 |

### 6.3.2 Structural Equation Modelling (SEM)

It is essential here to elaborate on what is meant by SEM. It is a sophisticated statistical technique which helps investigate hypotheses regarding inter-relationships among several variables (Pallant, 2020). SEM is also recognised by different terms: latent variable, covariance structure analysis, and occasionally it is named by the software used such as LISREL and AMOS (Hair et al., 2010). What is important to recognise here is that SEM has the ability to explain the relationships between factors and sub-factors in a model (Byrne, 2010).

The primary analytical approach employed in this research was SEM, which was utilised to assess the proposed model and to evaluate the inter-relationships between the constructs. The theoretical models can be investigated by SEM in two main stages. The first stage is the measurement model or confirmatory factor analysis (CFA), which includes validity and reliability tests to measure the interrelationships between each construct and its items. The second stage involves structural analysis, focusing on examining the model relationships among the constructs to assess how they are related to each other. An explanation of both stages will be presented in detail in the next sections.

#### 6.3.2.1 The First Phase of SEM: Measurements Level Analysis (CFA)

The aim of the measurement level analysis in SEM is to estimate the inter-relationships concerning unobserved latent variables and their corresponding observed variables (Byrne, 2010). This can be achieved by conducting a set of measurements to evaluate the validity and reliability of the model (Hair et al., 2010). To evaluate the quality of the measurement level, researchers typically use several indicators of validity and reliability. Commonly used reliability measures include Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). On the other hand, validity is assessed through convergent and discriminant validity checks. Table 6.10 summarises the followed criteria to assess the measurement model.

*Table 6.10 Measurement model indicators*

| | Description | Criterion | Threshold value | Reference |
|---|---|---|---|---|
| **Internal Consistency Reliability** | Internal consistency describes items inter-relatedness and indicates the degree to which all different items or indicators are anticipated to measure the same latent construct. | Cronbach's alpha<br>• 0.9 < (α) good reliability.<br>• 0.5 < (α) < 0.8 acceptable reliability.<br>• (α) < 0.5 poor reliability. | Value >.70 | (Cronbach, 1951; Hair et al., 2010) |
| **Convergent Validity** | The degree to which a group of items in each construct are correlated with each other. | **Factor loading:** Measures the degree to which a latent variable is associated with its observed variables, indicating the magnitude of the path linking the two.<br>• 0.7 <= FL good loading.<br>• 0.7 < FL < 0.5 acceptable loading.<br>• FL < 0.5 poor loading. | Value >.5 | (Hair et al., 2010) |
| | | **Composite reliability:**<br>$\frac{(\sum_{i}^{n} = 1 Li)^2}{(\sum_{i}^{n} = 1 Li)^2 + \sum_{i=1}^{n} e_i}$<br>• $Li$ → Standardised factor loading<br>• n → No. of items<br>• $\boldsymbol{ei}$ → Construct's error variance | Value >.7 | (Hair et al., 2010) |

| | | | | |
|---|---|---|---|---|
| | | **Average variance extracted (AVE):**<br>$\frac{\sum_{i=1}^{n} Li^2}{n}$<br>• $Li$ → standardised factor loading<br>• n → No. of items | Value >.5 | (Hair et al., 2010) |
| **Discriminant Validity** | The degree to which a construct is genuinely separate from other constructs is assessed based on both its correlation with other constructs and the extent to which the measured variables uniquely represent only this specific construct. | **Fornell-Larcker criterion** | The correlation between each two constructs is less than the square root of the AVE. | (Fornell & Larcker, 1981) |
| | | **Cross-loadings** | Value >.0.85 | (Kline, 2016) |
| **Nomological Validity** | The degree of which the relationships among constructs are consistent with established theoretical support (Hair et al., 2010). | **Correlation between the constructs** | The hypothesised paths between the constructs should confirm a theoretical framework. | (Hair et al., 2010) |

I implemented several assessments in the level of the measurement model analysis to confirm the validity and reliability of the measurement scales performed in this study. Performing this type of analysis is crucial and needs to be done before the structural model analysis in SEM. According to Kline (2016), if the measurement analysis is not conducted properly, the study may not produce meaningful results. In the next subsections, the process of each measurement model is discussed, and the findings of each concept are presented using AMOS 28. The final measurement model is shown in Appendix A.2.4.

### A. Reliability and Convergent Validity

Table 6.11 displays the construct reliability and convergent validity scores for all constructs. At this point, it is recommended to have a standardised factor loading of 0.5 or above (Hair et al., 2010). It can be seen from the data in Table 6.11, the standardised factor loading of LI2 and SI3 were lower than 0.5. For this reason, items with lowest standardised factor loading were removed. This procedure would be helpful to improve the model fit and to enhance the reliability and validity of the constructs. After deleting these items, values have exceeded the threshold and meet the criteria described in the Table 6.10. This approach led to achieve good convergent validity of the constructs.

*Table 6.11 Cronbach alpha and convergent validity results*

| Constructs | Item | Factor loading | AVE | CR | Internal reliability Cronbach alpha |
|---|---|---|---|---|---|
| Learning Content Quality (LCQ) | LCQ1 | 0.788 | 0.599 | 0.817 | 0.816 |
| | LCQ2 | 0.817 | | | |
| | LCQ3 | 0.714 | | | |
| Perceived Usefulness (PU) | PU1 | 0.827 | 0.658 | 0.852 | 0.851 |
| | PU2 | 0.774 | | | |
| | PU3 | 0.831 | | | |
| Perceived Ease of Use (PEU) | PEU1 | 0.875 | 0.674 | 0.860 | 0.852 |
| | PEU2 | 0.877 | | | |
| | PEU3 | 0.698 | | | |
| Compatibility (COM) | COM1 | 0.84 | 0.657 | 0.851 | 0.848 |
| | COM2 | 0.875 | | | |
| | COM3 | 0.707 | | | |
| Attitude (ATU) | ATU1 | 0.801 | 0.668 | 0.858 | 0.857 |
| | ATU2 | 0.81 | | | |
| | ATU3 | 0.841 | | | |
| Peer Influence (PI) | PI1 | 0.852 | 0.616 | 0.821 | 0.811 |
| | PI2 | 0.917 | | | |
| | PI3 | 0.53 | | | |
| Leader Influence (LI) | LI1 | 0.814 | 0.746 | 0.854 | 0.852 |
| | ~~LI2~~ | 0.251[a] | | | |
| | LI3 | 0.911 | | | |
| Students Influence (SI) | SI1 | 0.746 | 0.651 | 0.787 | 0.784 |
| | SI2 | 0.863 | | | |
| | ~~SI3~~ | 0.267[a] | | | |
| Subjective Norms (SN) | SN1 | 0.808 | 0.574 | 0.801 | 0.801 |
| | SN2 | 0.691 | | | |
| | SN3 | 0.77 | | | |
| Prior E-Learning Experience (PEE) | PEE1 | 0.668 | 0.668 | 0.855 | 0.883 |
| | PEE2 | 0.798 | | | |
| | PEE3 | 0.96 | | | |
| Self-Efficacy (SE) | SE1 | 0.85 | 0.643 | 0.841 | 0.866 |
| | SE2 | 0.639 | | | |
| | SE3 | 0.893 | | | |
| Resource Facilitating Conditions (RFC) | RFC1 | 0.842 | 0.716 | 0.883 | 0.881 |
| | RFC2 | 0.799 | | | |
| | RFC3 | 0.894 | | | |
| Technical Support (TS) | TS1 | 0.753 | 0.713 | 0.881 | 0.877 |
| | TS2 | 0.875 | | | |
| | TS3 | 0.898 | | | |
| Perceived Behavioural Control (PBC) | PBC1 | 0.837 | 0.680 | 0.864 | 0.863 |
| | PBC2 | 0.83 | | | |
| | PBC3 | 0.806 | | | |
| Continuance Intention to Use Madrasati (CIM) | CIM1 | 0.834 | 0.656 | 0.851 | 0.849 |
| | CIM2 | 0.771 | | | |

| | | | | | |
|---|---|---|---|---|---|
| | CIM3 | 0.824 | | | |

[a]: Deleted items due to factor loading <0.5

## B. Discriminant Validity

In accordance with Hair et al. (2010), the squared root of the average variance extracted (AVE) for each two constructs should be compared to their correlations in order to assess the discriminant validity of correlations between constructs (Fornell & Larcker, 1981; Hair et al., 2010). Therefore, a satisfactory discriminant validity is reached when the correlation between each two constructs is not high and less than the squared root of AVE for each construct. Accordingly, Table 6.12 illustrates the achieved discriminant validity which follows the standard of Fornell and Larcker criterion. Furthermore, the inter-correlations across all constructs ranged from 0.003 to 0.772, which falls under the suggested threshold of 0.85 (Kline, 2016).

*Table 6.12 Discriminant validity test results*

| | PBC | PU | PEU | COM | PI | LI | TS | SE | ATU | SN | LCQ | PEE | CIM | RFC | SI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PBC** | **0.824** | | | | | | | | | | | | | | |
| **PU** | 0.457 | **0.811** | | | | | | | | | | | | | |
| **PEU** | 0.746 | 0.550 | **0.821** | | | | | | | | | | | | |
| **COM** | 0.606 | 0.707 | 0.632 | **0.811** | | | | | | | | | | | |
| **PI** | 0.365 | 0.679 | 0.423 | 0.606 | **0.785** | | | | | | | | | | |
| **LI** | 0.253 | 0.265 | 0.270 | 0.240 | 0.385 | **0.864** | | | | | | | | | |
| **TS** | 0.184 | 0.169 | 0.187 | 0.131 | 0.128 | 0.003 | **0.844** | | | | | | | | |
| **SE** | 0.582 | 0.315 | 0.655 | 0.410 | 0.259 | 0.195 | 0.252 | **0.802** | | | | | | | |
| **ATU** | 0.345 | 0.575 | 0.537 | 0.547 | 0.506 | 0.200 | 0.160 | 0.287 | **0.818** | | | | | | |
| **SN** | 0.411 | 0.658 | 0.439 | 0.646 | 0.701 | 0.277 | 0.157 | 0.324 | 0.540 | **0.758** | | | | | |
| **LCQ** | 0.433 | 0.476 | 0.606 | 0.622 | 0.444 | 0.244 | 0.165 | 0.411 | 0.519 | 0.513 | **0.774** | | | | |
| **PEE** | 0.393 | 0.258 | 0.483 | 0.324 | 0.287 | 0.222 | 0.135 | 0.757 | 0.273 | 0.273 | 0.334 | **0.817** | | | |
| **CIM** | 0.592 | 0.772 | 0.637 | 0.757 | 0.710 | 0.319 | 0.170 | 0.518 | 0.707 | 0.729 | 0.561 | 0.393 | **0.810** | | |
| **RFC** | 0.157 | 0.174 | 0.263 | 0.140 | 0.182 | 0.096 | 0.309 | 0.229 | 0.195 | 0.091 | 0.074 | 0.197 | 0.145 | **0.846** | |
| **SI** | 0.421 | 0.658 | 0.455 | 0.624 | 0.734 | 0.201 | 0.076 | 0.193 | 0.434 | 0.752 | 0.468 | 0.128 | 0.679 | 0.130 | **0.807** |

Square root of AVE > inter-construct correlation

The examination of convergent validity and discriminant validity during the measurement model phase revealed that the overall measurement model was reliable and met the validity criteria. Consequently, this analysis supports Hair et al.'s (2010) recommendation to proceed with the structural level analysis.

### C. Nomological Validity

In a study, nomological validity is achieved by confirming a model containing relationships between constructs with a theoretical framework. This is typically done by defining a series of structural relationships between constructs and evaluating whether these relationships are consistent with a theoretical framework. Based on existing studies, all the hypothesised relationships between the constructs in this investigation were derived from them, which should typically be logical. However, the validity of these relationships will be further evaluated later using the structural model analysis.

### D. Measurement Model Goodness of Fit (GoF) Indices

In the context of SEM, GoF is utilised to assess the level of congruence between a specified model and the observed data. As clarified above, the main aim of SEM is to estimate a theoretical model that represents the hypothesised relationships among multiple constructs (latent and observed variables), and GoF helps to determine how adequately the model fits the observed data. The results of GoF are achieved through a comparison of the proposed model (hypotheses) with the covariance matrix (observed data), as described by Hair et al. (2010).

Measuring the GoF can be conducted using a number of techniques in order to deliver enough evidence of a model fit (Hair et al., 2010). These techniques are classified into three categories: absolute fit measures, incremental fit measures, and parsimony fit measures. Hair et al. (2010) recommend evaluating three to four GoF measures which should include at least one incremental index, one absolute fit measure, and the Chi-square value ($\chi^2$) with associated degrees of freedom (*df*), to adequately assess model fit. Therefore, this study follows the literature and reports both incremental and absolute fit indices as suggested (Hair et al., 2010; Hooper et al., 2008; Hu & Bentler, 1998). Table 6.13 presents a concise summary of the various GoF used in this analysis. The absolute fit measures include three different types of indices: the Chi-Squared test ($\chi^2$), Relative Chi-Square ($\chi^2$/df), and Root Mean Square Error of Approximation (RMSEA). Meanwhile, the level of model fit was assessed using the Comparative Fit Index (CFI), which falls under the incremental fit indices category.

*Table 6.13 Summary of the various GoF indices used in this study*

| GoF Indices | Description |
|---|---|
| Chi-Squared ($X^2$) | It is a likelihood ratio check that compares the model to a fully saturated model, aiming to determine the best fit between the two. |
| Degrees of freedom (*df*) | It denotes the summation of the unique values in the input matrix subtracted from the total of the predictable parameters. |
| Root Mean Square Error of Approximation (RMSEA) | The objective is to address and improve the tendency of Chi-Squared ($X^2$) when dealing with a large number of observed variables or a substantial sample size. |
| Comparative Fit Index (CFI) | It measures the fit between the observed covariance matrix and the hypothesised model. |

Table 6.14 illustrates the measurement model GoF indices results based on Hair et al. (2010)'s recommendation for sample sizes greater than 250. The obtained results indicate substantial support for the model fit, which consequently supports Hair et al.'s suggestion of proceeding with the structural level analysis.

*Table 6.14 Measurement model GoF indices results*

| Fit Indices | Achieved Fit Indices | Suggested Fit Indices (size>250) |
|---|---|---|
| Chi-Squared $X^2$ | 918.573 | N/A |
| *df* | 753 | N/A |
| *p*-value | 0.000 | > 0.05 |
| $X^2/df$ | 1.220 | < 3.00 |
| RMSEA | 0.027 | < 0.07 |
| CFI | 0.979 | ≥ 0.90 |

#### 6.3.2.2 The Second Phase of SEM: Structural Level Analysis

The structural model, as previously stated, is the second analysis phase of SEM. It is essential at this stage to examine the hypothesised relationships between latent variables, particularly after ensuring all the constructs in the measurement model were valid and reliable. The structural model involves a path estimate which evaluates all proposed hypotheses between constructs in the model. Initially, the adequacy of the overall model fit is assessed. Following that, an analysis is conducted to determine the direction, size, and significance of the

hypothesised parameter estimates, shown by the one-headed arrows in the path diagrams (Hair et al., 2010).

The path analysis conducted within the structural model examined all proposed paths between constructs. The model of this study comprises 14 hypothesised relationships, all of which are outlined in Table 6.15 and illustrated in Figure 6.7. Additional moderation hypotheses, such as age and gender, will be evaluated in the following sub-sections.

*Table 6.15 Research hypotheses codes and paths*

| Constructs | Hypotheses | Hypothesised relationships |
|---|---|---|
| Continuance Intention (CIM) | | |
| Attitude (ATU) | H1 | ATU → CIM |
| Perceived Usefulness (PU) | H2 | PU → ATU |
| Perceived Ease of Use (PEU) | H3 | PEU → ATU |
| Compatibility (COM) | H4 | COM → ATU |
| Learning Content Quality (LCQ) | H5 | LCQ → PU |
| Subjective Norm (SN) | H6 | SN → CIM |
| Peer Influence (PI) | H7 | PI → SN |
| Leader Influence (LI) | H8 | LI → SN |
| Student Influence (SI) | H9 | SI → SN |
| Perceived Behavioural Control (PBC) | H10 | PBC → CIM |
| Resource Facilitating Conditions (RFC) | H11 | RFC → PBC |
| Technical Support (TS) | H12 | TS → PBC |
| Self-Efficacy (SE) | H13 | SE → PBC |
| Prior E-Learning Experience (PEE) | H14 | PEE → SE |

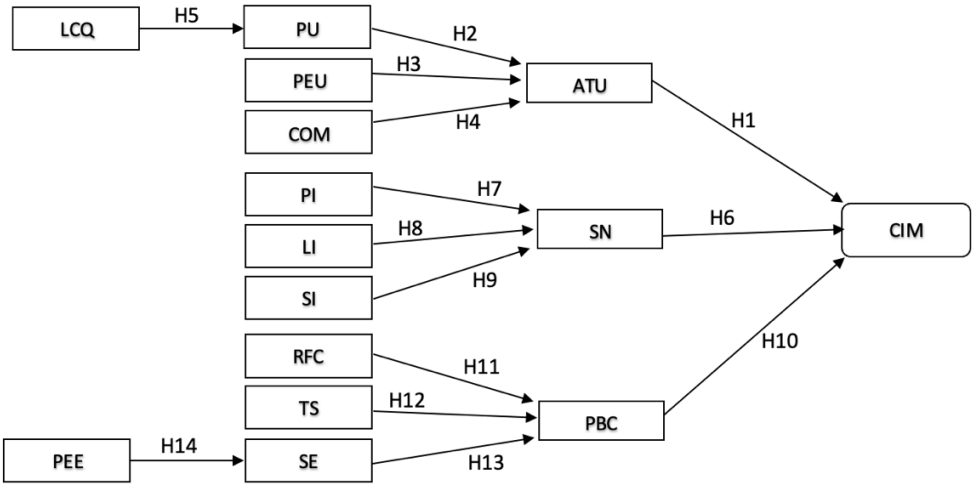


*Figure 6.7 Figure research model with hypotheses*

### A. Structural Level GoF

The GoF test is considered the initial step in assessing the structural model, as it evaluates the alignment between the proposed model and the observed data, ensuring that the hypothesised model corresponds to the collected data (Byrne, 2010).

I provided an explanation of the fit indices used to evaluate GoF in the above section (the measurement model, Table 6.13). Likewise, the GoF results for the structural model are presented in Table 6.16. Considering the sample size > 250, they were compared to Hair et al. (2010)'s suggestion, and the findings show that the proposed model fits the collected data well.

*Table 6.16 Structural model (GoF) indices results*

| Fit Indices | Achieved Fit Indices | Suggested Fit Indices (size>250) |
|---|---|---|
| Chi-squared $X^2$ | 1382.519 | N/A |
| *df* | 810 | N/A |
| *p*-value | 0.000 | > 0.05 |
| $X^2/df$ | 1.707 | < 3.00 |
| RMSEA | 0.048 | < 0.08 |
| CFI | 0.829 | ≥ 0.92 |

## B. Hypothesised Relations Assessment

According to Hair et al. (2010), in order to validate the proposed model, a good model fit check itself is insufficient, and the relationships between the constructs must be evaluated. There are 14 hypotheses, all of which are shown in Table 6.15, that need to be assessed. The examinations of these hypotheses include standardised path coefficient $\boldsymbol{\beta}$, critical ratio, and *p*-value (Hair et al., 2010). Thus, the next sub-section will present the examination of the direct effect hypothesis. Following that, additional moderation effect, such as gender and age, will be examined respectively.

Examining the model paths in SEM involves assessing the strength, direction, and significance of the linked correlations between latent and observed variables. Assessing the model paths has the goal of obtaining a comprehensive understanding of the underlying relationship variables and to make more accurate predictions about the outcome variables.

To evaluate the model paths, each hypothesis was examined using regression coefficients and their corresponding *p*-values (Hair et al., 2010). The regression coefficients, also known as standardised path coefficients ($\boldsymbol{\beta}$), were assessed to define the strength between variables. The *p*-value and the findings from the examination of the hypothesised direct effects are presented in below table (Table 6.17). The structural model is shown in Appendix A.2.5.

*Table 6.17 Direct effect hypotheses results*

| Hypothesised path | Standardised estimate Beta ($\boldsymbol{\beta}$) | critical ratio (c.r.) | *p*-value | Hypothesis result |
|---|---|---|---|---|
| ATU → CIM | 0.454*** | 7.538 | 0.000 | H1) Supported |
| PU → ATU | 0.344*** | 4.234 | 0.000 | H2) Supported |
| PEU → ATU | 0.249** | 3.238 | 0.001 | H3) Supported |
| COM → ATU | 0.213* | 2.398 | 0.016 | H4) Supported |
| LCQ → PU | 0.619*** | 7.916 | 0.000 | H5) Supported |
| SN → CIM | 0.501*** | 7.458 | 0.000 | H6) Supported |
| PI → SN | 0.324** | 3.172 | 0.002 | H7) Supported |
| LI → SN | 0.061 | 1.068 | 0.286 | H8) Rejected |
| SI → SN | 0.542*** | 5.177 | 0.000 | H9) Supported |
| PBC → CIM | 0.297*** | 5.474 | 0.000 | H10) Supported |
| RFC → PBC | 0.042 | 0.682 | 0.495 | H11) Rejected |
| TS → PBC | 0.062 | 1.006 | 0.314 | H12) Rejected |
| SE → PBC | 0.524*** | 8.209 | 0.000 | H13) Supported |
| PEE → SE | 0.712*** | 14.027 | 0.000 | H14) Supported |

* p<0.05, ** p<0.01, *** p<0.001

The data presented in the above table demonstrates that, with the exception of one path from leader influence (LI) to subjective norm (SN) and two paths from resources facilitating conditions (RFC) and technical support (TS) to perceived behavioural control (PBC), all other paths showed statistical significance with a *p*-value below the acceptable level of 0.05. Consequently, the hypothesised paths H1, H2, H3, H4, H5, H6, H7, H9, H10, H13 and H14 are deemed to be supported. Conversely, the paths of H8, H11, and H12 are rejected since the achieved *p*-values were above the threshold of the acceptable level of 0.05.

The findings also highlight that the strongest predictor of attitude (ATU) was perceived usefulness (PU), followed by perceived ease of use (PEU) and compatibility (COM). In addition, the strongest determinant of subjective norm (SN) was student influence (SI), followed by peer influence (PI). The strongest single determinant of perceived behavioural control (PBC) was self-efficacy (SE). The strongest determinant of continuance intention (CIM) was subjective norm (SN), followed by attitude (ATU) and perceived behavioural control (PBC).

### C. Moderating Variables Effect Assessment

To assess the moderating effect in SEM, data are divided into groups according to the moderating variables (Hair et al., 2010). Gender and age are considered potential moderators of the relationships between model constructs. Previous research has identified that gender and age are main moderators for the adoption of technology by users (Burke, 2002; Sun & Zhang, 2006; Venkatesh et al., 2003). To investigate this, gender was analysed across two groups – male and female – while age was divided into younger (44 years and below) and older groups (45 years and above). Age categorisation was done by determining the frequency distribution first, and then creating a dummy variable for age with two groups: 1= younger (25–44 years old), 2= older (45–59 years old). A nonparametric approach suggested by Henseler et al. (2009) was used to compare the causal effects of the constructs with two groups of gender and age. A moderating variable is considered a moderator if there is a significant difference in the standardised estimate of $\beta$ for the causal effect between the two constructs with *p*-value <0.05.

### C.1 Examining Moderating Effect of Gender

The results of how gender moderates the relationships between the variables are presented in following table (Table 6.18). I obtained the standardised factor loading for both male and female groups through AMOS graphs of the structural model (the gender assessment is presented in Appendix A.2.6 and A.2.7).

*Table 6.18 Comparing causal effects between male and female*

| Hypothesised Path | Male | | Female | | $\beta$-Difference $\Delta$ | t-value | *p*-value | Significant Difference |
|---|---|---|---|---|---|---|---|---|
| | $\beta$ | SE | $\beta$ | SE | | | | |
| ATU → CIM | 0.573*** | 0.109 | 0.376*** | 0.067 | -0.197 | 1.600 | 0.111 | No |
| PU → ATU | 0.384** | 0.118 | 0.335** | 0.099 | -0.049 | 0.322 | 0.748 | No |
| PEU → ATU | 0.232* | 0.110 | 0.255* | 0.118 | 0.023 | 0.141 | 0.888 | No |
| COM → ATU | 0.191 | 0.105 | 0.225 | 0.147 | 0.034 | 0.182 | 0.856 | No |
| LCQ → PU | 0.666*** | 0.153 | 0.573*** | 0.102 | -0.093 | 0.522 | 0.602 | No |
| SN → CIM | 0.429*** | 0.135 | 0.545*** | 0.098 | 0.116 | 0.712 | 0.477 | No |
| PI → SN | 0.405** | 0.111 | 0.293* | 0.112 | -0.112 | 0.706 | 0.481 | No |
| LI → SN | 0.051 | 0.049 | 0.069 | 0.071 | 0.018 | 0.201 | 0.841 | No |
| SI → SN | 0.515*** | 0.103 | 0.534*** | 0.127 | 0.019 | 0.113 | 0.910 | No |
| PBC → CIM | 0.222** | 0.089 | 0.340*** | 0.071 | 0.118 | 1.053 | 0.293 | No |
| RFC → PBC | 0.202* | 0.080 | -0.061 | 0.062 | -0.263** | 2.646 | 0.009 | Yes |
| TS → PBC | 0.154 | 0.074 | -0.013 | 0.061 | -0.167 | 1.763 | 0.079 | No |
| SE → PBC | 0.482*** | 0.076 | 0.532*** | 0.073 | 0.05 | 0.474 | 0.636 | No |
| PEE → SE | 0.746*** | 0.069 | 0.69*** | 0.068 | -0.056 | 0.576 | 0.565 | No |

$\beta$: Standardised estimate Beta, SE: Standardised error

As shown in the above table, the results of Henseler's nonparametric approach indicated that, apart from a path from resources facilitating conditions (RFC) to perceived behavioural control (PBC), the *p*-value for the causal effect paths between male and female is above the acceptable level of 0.05. Accordingly, the two groups did not show any significant difference according to the statistical analysis. Conversely, the findings indicated that only the effect of RFC on PBC is significantly different between male and female since the achieved *p*-value was below the threshold of the acceptable level of 0.05. Therefore, the conclusion can be drawn that only the relationship between RFC and PBC was affected by gender as a moderating factor. Specifically, the effect is significantly stronger for males than females.

### C.2 Examining Moderating Effect of Age

The results of how age moderates the relationships between the variables are presented in following table (Table 6.19). I obtained the standardised factor loading for both young and

old groups through AMOS graphs of the structural model (the age assessment is presented in Appendix A.2.8 and A.2.9).

*Table 6.19 Comparing causal effects of young and old*

| Hypothesised Path | Young | | Old | | $\beta$-Difference Δ | t-value | *p*-value | Significant Difference |
|---|---|---|---|---|---|---|---|---|
| | $\beta$ | SE | $\beta$ | SE | | | | |
| ATU → CIM | 0.441*** | 0.07 | 0.452*** | 0.103 | 0.011 | 0.092 | 0.927 | No |
| PU → ATU | 0.368*** | 0.097 | 0.267* | 0.129 | -0.101 | 0.639 | 0.524 | No |
| PEU → ATU | 0.303*** | 0.096 | 0.072 | 0.141 | -0.231 | 1.409 | 0.160 | No |
| COM → ATU | 0.172 | 0.109 | 0.39* | 0.149 | 0.218 | 1.211 | 0.227 | No |
| LCQ → PU | 0.602*** | 0.123 | 0.644*** | 0.115 | 0.042 | 0.238 | 0.812 | No |
| SN → CIM | 0.509*** | 0.111 | 0.51*** | 0.111 | 0.001 | 0.006 | 0.995 | No |
| PI → SN | 0.28* | 0.106 | 0.395* | 0.141 | 0.115 | 0.665 | 0.506 | No |
| LI → SN | 0.051 | 0.056 | 0.098 | 0.075 | 0.047 | 0.513 | 0.608 | No |
| SI → SN | 0.581*** | 0.108 | 0.469** | 0.149 | -0.112 | 0.626 | 0.532 | No |
| PBC → CIM | 0.269*** | 0.072 | 0.381*** | 0.098 | 0.112 | 0.944 | 0.346 | No |
| RFC → PBC | 0.033 | 0.058 | 0.037 | 0.084 | 0.004 | 0.041 | 0.968 | No |
| TS → PBC | 0.092 | 0.06 | -0.027 | 0.077 | -0.119 | 1.235 | 0.218 | No |
| SE → PBC | 0.601*** | 0.07 | 0.35*** | 0.08 | -0.251* | 2.338 | 0.020 | Yes |
| PEE → SE | 0.781*** | 0.053 | 0.445*** | 0.119 | -0.336** | 2.884 | 0.004 | Yes |

$\beta$: Standardised estimate Beta, SE: Standardised error

As shown in the above table, the results of Henseler's nonparametric approach indicate that, apart from two paths from self-efficacy (SE) to perceived behavioural control (PBC) and prior e-learning experience (PEE) to self-efficacy (SE), the *p*-value for the causal effect paths between young and old is above the acceptable level of 0.05. Accordingly, the two groups were not shown any significant difference based on the statistical analysis. Conversely, the findings implied that the impact of SE on PBC and the effect of PEE on SE are significantly changed between young and old groups since the achieved *p*-values were less than the threshold of the acceptable level of 0.05. Thus, the conclusion can be drawn that age has a moderating impact only on the relationships between SE to PBC as well as PEE to SE. Specifically, the effect is significantly stronger for young compared to old. The overall results are summarised in the next table (Table 6.20). In addition, Figure 6.8 depicts the structured model findings with the moderations.

*Table 6.20 Summary of the structure results*

| Path Codes | Hypothesis Description | Moderator Variable | Results | Conclusion |
|---|---|---|---|---|
| H1) ATU → CIM | ATU has positive effect on CIM | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.454; *p*-value=0.000). Stronger effect in males, but it was not significant. However, there was non-significant moderation impact for age. | Supported |
| H2) PU → ATU | PU has positive effect on ATU | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.344; *p*-value=0.000). Stronger effect in males, but it was not significant. However, this impact was stronger for young teachers, but was not significant. | Supported |
| H3) PEU → ATU | PEU has positive effect on ATU | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.249; *p*-value=0.001). Stronger effect in females, but it was not significant. However, this impact was stronger for young teachers, but was not significant. | Supported |
| H4) COM → ATU | COM has positive effect on ATU | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.213; *p*-value=0.016). Stronger effect in females, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Supported |
| H5) LCQ → PU | LCQ has positive effect on PU | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.619; *p*-value=0.000). Stronger effect in males, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Supported |
| H6) SN → CIM | SN has positive effect on CIM | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.501; *p*-value=0.000). Stronger effect in females, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Supported |
| H7) PI → SN | PI has positive effect on SN | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.324; *p*-value=0.002). Stronger effect in males, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Supported |
| H8) LI → SN | LI has negative effect on SN | None | Non- significant weak impact ($\boldsymbol{\beta}$ = 0.061; *p*-value=0.286). Stronger effect in females, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Rejected |
| H9) SI → SN | SI has positive effect on SN | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.542; *p*-value=0.000). Stronger effect in females, but it was not significant. However, this impact was stronger for young teachers, but was not significant. | Supported |
| H10) PBC → CIM | PBC has positive effect on CIM | None | Significant positive impact ($\boldsymbol{\beta}$ = 0.297; *p*-value=0.000). Stronger effect in females, but it was not significant. However, this impact was stronger for old teachers, but was not significant. | Supported |
| H11) RFC → PBC | RFC has negative effect on PBC | Gender | Non- significant positive impact ($\boldsymbol{\beta}$ = 0.042; *p*-value=0.495). Significantly stronger for males. However, this impact was stronger for old teachers, but was not significant. | Rejected |
| H12) TS → PBC | TS has negative effect on PBC | None | Non- significant positive impact ($\boldsymbol{\beta}$ = 0.062; *p*-value=0.314). Stronger effect in males, but it was not significant. However, this impact was stronger for young teachers, but was not significant. | Rejected |
| H13) SE → PBC | SE has positive effect on PBC | Age | Significant positive impact ($\boldsymbol{\beta}$ = 0.524; *p*-value=0.000). Stronger effect in females, but it was not significant. However, this impact was significantly stronger among young teachers. | Supported |
| H14) PEE → SE | PEEE has positive effect on SE | Age | Significant positive impact ($\boldsymbol{\beta}$ = 0.712; *p*-value=0.000). Stronger effect in males, but it was not significant. However, this impact was significantly stronger among young teachers. | Supported |

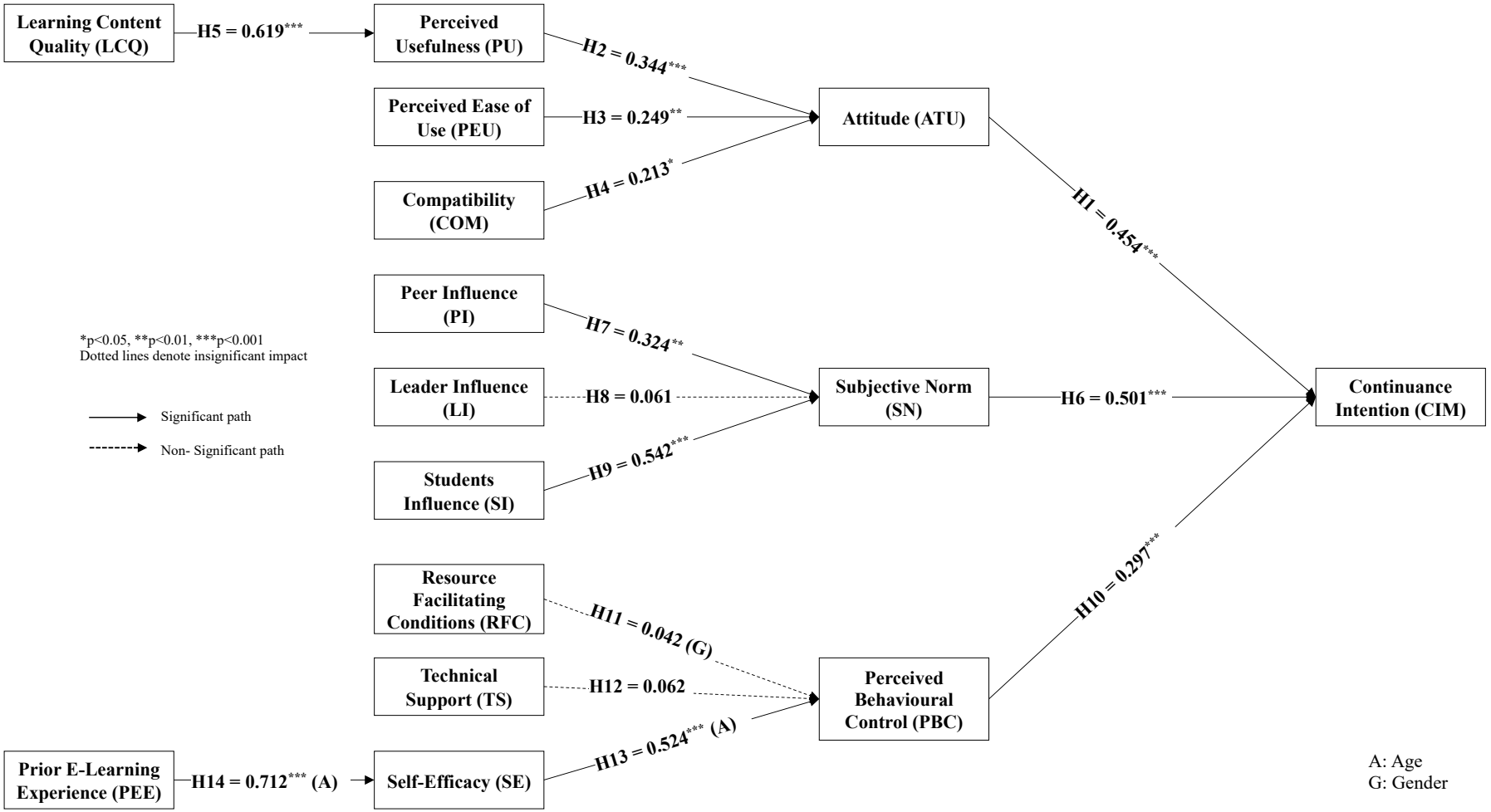


*Figure 6.8 The structural model results*

## 6.4 Discussion of the Quantitative Results

The main focus of this study was to identify the factors influencing secondary school teachers' intentions towards using the Madrasati e-learning platform beyond the pandemic. To achieve this goal, the Decomposed Theory of Planned Behaviour (DTPB) was chosen as the basis for building the proposed model in this study. The proposed model includes the attitude (ATU) factor and its associated sub-factors: perceived ease of use (PEU), perceived usefulness (PU), and compatibility (COM). Additionally, learning content quality (LCQ) was incorporated as a sub-factor under perceived usefulness (PU) in order to examine how the content of Madrasati might affect teachers' perceptions towards Madrasati's usefulness. The subjective norm (SN) factor, along with its variables, was used to examine social impact factors: peer influence (PI), student influence (SI), and leader influence (LI). Moreover, the perceived behavioural control (PBC) factor includes resource facilitating conditions (RFC), technical support (TS), and self-efficacy (SE). Finally, prior e-learning experience (PEE) was included as a sub-factor under SE to examine how prior e-learning experience might affect teachers' ability and confidence to continue using Madrasati.

The empirical results supported the effectiveness of the proposed model for investigating the adoption of Madrasati in SA. The investigation confirmed that the proposed model achieved a good fit with the collected data and all the instruments of the model were valid and reliable. The results of testing the hypotheses showed that attitude, subjective norm, and perceived behavioural control have a direct influence on the continuance intention among teachers to use Madrasati. In terms of the attitude factor, perceived usefulness, perceived ease of use, and compatibility all have a direct impact on attitude, whereas perceived usefulness was significantly affected by learning content quality. In addition, peer influence and student influence affected subjective norm, while leader influence did not show any influence on subjective norm. Furthermore, with the exception of resource facilitating conditions and technical support, perceived behavioural control was only affected by self-efficacy. Specifically, prior e-learning experience was found to have a strong direct impact on self-efficacy.

In the following sections, I will discuss each hypothesis separately, presenting its statistical results and comparing them with those of other studies.

**A- The Effect of Attitude on Continuance Intention**

This study proposed a theoretical model suggesting that the attitude of teachers would have a positive impact on their intention to continue using Madrasati (H1). The statistical analysis supported this hypothesis, with a path coefficient of $\beta$=0.454 and a $p$-value of less than 0.05. Additionally, ATU emerged as the second most influential factor driving teachers' intentions to continue using Madrasati after the pandemic, compared to SN and PBC.

This result aligns with previous studies that examine users' acceptance and continued use of technology. For instance, a study on teachers' intentions to use the internet in classrooms found that behavioural intention is most strongly influenced by attitude (Sadaf et al., 2012), while another study found that the most significant predictor of behavioural intention is attitude (Ajzen, 2005). These findings clearly indicate that a more positive perception towards Madrasati usage positively influences teachers' intentions to continue using the platform.

**B- The Effect of Perceived Usefulness on Attitude**

In this study, it was hypothesised that perceived usefulness would positively influence the attitude towards the continuance intentions to use Madrasati (H2). Considering this hypothesis, the path coefficient and p-value are ($\beta$=0.344, $p$<0.05). Therefore, this hypothesis was supported, indicating that teachers' attitudes towards using Madrasati are heavily influenced by their perceptions of its usefulness. It was shown in the analysis that perceived usefulness was the strongest predictor of attitude, which could imply that most teachers in the survey sample saw benefits from using Madrasati in their teaching, leading them to continue using it.

The result above concurs with previous studies, such as (Davis, 1989), who identified perceived usefulness as a primary determinant of user acceptance of information technology, and (Taylor & Todd, 1995b), who confirmed its significant influence on users' attitudes toward technology usage. In line with that, Alkinani and Alzahrani (2021) showed evidence that attitude is positively affected by perceived usefulness. In addition, Liesa-Orús et al. (2023) examined the relationship between the perceived usefulness of technology and attitude, empirically demonstrating that this relationship was direct and significant. The findings clearly indicate that if teachers found Madrasati useful for teaching and learning, they are likely to continue using it.

**C- The Effect of Perceived Ease of Use on Attitude**

This study proposed that perceived ease of use would positively affect the attitude towards the continuance intention to use Madrasati (H3). The achieved path coefficient and *p*-value are ($\beta$=0.249, $p$<0.05). Consequently, this hypothesis was confirmed, demonstrating that teachers' attitudes towards the use of Madrasati are influenced by the ease of use of the platform tools. This factor was shown to be the second strongest predictor of teachers' attitudes, which suggests that most respondents in the survey found Madrasati easy to use.

The substantial positive impact of perceived ease of use on the attitude towards continuing to use Madrasati concurs with the TAM model and previous research findings mentioned in Chapter 4. In addition, the findings regarding this factor align with the results presented by Alkinani and Alzahrani (2021), who indicate that the intention of teachers to participate in Madrasati is substantially influenced by the perceived ease of use. Nonetheless, a study conducted by Shishah (2021) shows that Madrasati usability is insufficient and needs to be improved. Given that adopting Madrasati is not mandatory for teachers, the usability of the platform is a significant component in the proposed model. Accordingly, it could be concluded that teachers' decisions may be influenced by the platform's usability, while encountering obstacles during usage may lead to resistance from the teachers. Therefore, it can be argued that if teachers are unable to overcome the challenges of using the platform, they will simply discontinue the use of Madrasati and may find other platforms that are more user-friendly and require less effort to complete tasks.

**D- The Effect of Compatibility on Attitude**

In the proposed theoretical model, it was hypothesised that teachers' attitudes towards the intention to continue using Madrasati are influenced by the compatibility of Madrasati with the tasks and subjects taught in schools (H4). The obtained results support this hypothesis, with a path coefficient of $\beta$=0.213 and a *p*-value of less than 0.05. Based on these results, it was shown that compatibility was the third most significant indicator of attitude. Therefore, teachers' attitudes towards using Madrasati are significantly influenced by the tools and content provided by Madrasati that are compatible with teachers' needs.

Several studies have identified that compatibility is a significant factor influencing individuals' attitudes and their intentions to adopt and use technology. For example, a study conducted in Saudi Arabia on the adoption and use of online services demonstrated that compatibility affects a user's intention to use electronic services (Al-Ghaith et al., 2010).

Additionally, research by Hartshorne and Ajjan (2009) discovered that compatibility had a significant impact on students' attitudes towards adopting technology tools in educational contexts. Another study examining factors that influence teachers' intentions to use Web 2.0 technology found that compatibility played a significant role in shaping teachers' intentions (Sadaf et al., 2012). In relation to Madrasati, it was apparent that teachers in the survey found Madrasati is compatible with tasks and subjects that they taught in schools, which positively affected their attitudes towards it.

**E- The Effect of Learning Content Quality on Perceived Usefulness**

The learning content quality factor was hypothesised to have a positive effect on the perceived usefulness (H5) with the obtained results showing a path coefficient of $\beta$=0.619 and a $p$-value of $p$<0.05. Therefore, the hypothesis (H5) is supported, indicating that the content of Madrasati is useful and suitable for teaching and learning. Although this factor is not part of the DTPB theory, it was included in the model to examine how teachers perceive the Madrasati content in terms of usefulness. It was evident that teachers in the current study found the content on Madrasati to be useful and suitable for teaching and learning.

Similarly, other research has found a significant relationship between learning content quality and perceived usefulness. Chavoshi and Hamidi's (2019) study, which explored the important factors affecting mobile learning, revealed that LCQ has a significant effect on PU. Another study examining the effect of course content quality on perceived usefulness also found a significant effect between these two factors (Almaiah et al., 2016). Regarding Madrasati, teachers' opinions on the usefulness of Madrasati, which resulted in a positive attitude towards the platform, are significantly influenced by the quality of its content (Alkinani & Alzahrani, 2021). Accepting this hypothesis shows that teachers perceive the content in Madrasati is a very important factor in deciding to continue using the platform.

**F- The Effect of Subjective Norm on Continuance Intention**

It was hypothesised that subjective norm would have a positive effect on the continuance intention among teachers to use Madrasati (H6). Based on the results, the path coefficient and $p$-value are ($\beta$=0.344, $p$<0.05), resulting in confirmation and support of the research hypothesis (H6). Compared with other factors (ATU, PBC), this factor shows the strongest indicator to the continuance intention to use Madrasati.

As found in this study, other research has revealed that SN has a significant effect on users' behavioural intentions towards technology adoption. For example, a study carried out to investigate users' intentions to continue using e-learning exposed that SN has a significant influence on the continuance intention (Lee, 2010). Furthermore, in a study by Hussein (2018), SN was identified as the strongest predictor of university students' intention to use e-learning in Malaysia. The study suggests that students' decisions to participate in and engage with e-learning platforms are more strongly influenced by the opinions and expectations of significant others, such as friends, family, and teachers, rather than by the intrinsic enjoyment derived from using the technology. Conversely, Sadaf et al. (2012) found no significant effect of subjective norm on behavioural intention to use Web 2.0 technologies. In the context of this study, it was observed that social influence has a positive influence on students' behavioural intention towards Madrasati in Saudi Arabia (Bakarman & Almezeini, 2021). To conclude, it could be said that teachers' decisions to continue using Madrasati are likely influenced by the impact of school members, such as school leaders, colleagues, and students.

**G- The Effect of Peer Influence on Subjective Norms**

The relationship between peer influence and subjective norm was hypothesised, assuming that colleagues' influence would positively affect the subjective norm among teachers towards the intention to continue to use Madrasati (H7). With a path coefficient of $\beta$=0.213 and a *p*-value of less than 0.05, this hypothesis was supported, implying that teachers are influenced by their colleagues to continue using Madrasati. The peer influence factor was revealed to be the second strongest predictor for SN.

In the proposed model, peer influence was considered an important component with the potential to motivate teachers to continue using Madrasati. During the COVID-19 pandemic, using the Madrasati platform was mandatory, which meant all teachers used it. In that sense, social impact becomes a crucial predictor when new technology is mandated rather than implemented voluntarily, as explained by Venkatesh et al. (2003). However, the necessity of learning online because of the pandemic influences teachers' willingness to adopt it, as it became the sole means to continue education after in-person teaching was suspended. This factor could also motivate teachers to continue utilising Madrasati to enhance their instructional practices upon returning to traditional classroom settings. The obtained result in this study is consistent with a study conducted by Cheung and Vogel (2013), which discovered a substantial relationship between peer influence and attitudes towards

technology. Additionally, Ajjan and Hartshorne (2008), in their study on teachers' decisions to use Web 2.0 technology, found that the subjective norm is significantly affected by peer influence. As anticipated, teachers are more likely to be influenced by their colleagues who use Madrasati, encouraging them to continue using the platform.

**H- The Effect of Leader Influence on Subjective Norm**

The effect of leader variable was hypothesised in H7, assuming that leader influence would positively affect the subjective norm towards the continuance intention to use Madrasati among teachers. From the analysis of Table 6.17 above, it was found that the path coefficient and p-value were $\beta$=0.61 and $p$=0.286, leading to the non-acceptance of this hypothesis because the p-value was more than 5% (0.286 > 0.05). This indicates that the influence of school leaders on the subjective norm of using Madrasati was statistically insignificant. That is, the influence of school leaders was not considered important for teachers in this sample in terms of influencing them to continue using the platform.

This finding partially aligns with a study by Alwani and Soomro (2010), which indicated that school administrators in K-12 schools in Yanbu, Saudi Arabia, were perceived as not primarily supportive of technology adoption. Additionally, the results of this study are likely related to a study by Teo (2011), who found that the SN factor did not significantly impact teachers' intentions to use technology. Teo argues that the participants in his study did not rely on institutional mandates, such as directives from school leaders, to determine whether or not to use technology. However, school leader influence is a crucial factor for the successful integration of ICT in schools (Almalki & Williams, 2012). Supportive school leaders adopting technology tools, including Madrasati, will help generate plans and programmes for teachers to integrate technology in their teaching activities. In line with this, several studies have indicated how school leaders are important in terms of encouraging teachers to use technology in their teaching, such as those by Sadaf and Gezer (2020) on exploring factors impacting teachers' intentions to use technology, Albugami and Ahmed (2015) on exploring success factors to implement ICT in Saudi secondary schools, and Zalah (2016) on encouraging secondary school teachers to use e-learning technology. To conclude, leader influence cannot be considered as a factor influencing teachers' continuance intention regarding using Madrasati in this sample.

**I- The Effect of Students' Influence on Subjective Norm**

In Chapter 4, it was hypothesised that students' influence would positively affect the subjective norm towards the continuance intention among teachers to use Madrasati (H9). The path coefficient and *p*-value are 0.542 and 0.000, respectively, and because the *p*-value was less than 0.05, H9 was supported. Importantly, SI is considered the strongest factor compared to PI, which explains that the influence of students significantly affected the subjective norm regarding teachers' intentions to continue using Madrasati.

The results of this study are in line with Sadaf and Gezer's (2020) study, which revealed that student influence has the strongest impact on teachers' intentions to integrate technology, compared to peer and administrator influence. Another study, which investigated faculty decisions to adopt the internet, found that the influence of students had a positive impact on the subjective norm of faculty members (Ajjan & Hartshorne, 2008). Students' perceptions and engagements with e-learning, particularly Madrasati, play an important role in shaping teachers' decisions to continue using the platform. Since the acceptance of the e-learning experience was high among secondary school students (Bakarman & Almezeini, 2021), it was anticipated that teachers are more likely to be influenced by their students, which might inspire them to continue using Madrasati.

**J- The Effect of Perceived Behavioural Control on Continuance Intention**

In this study, it was hypothesised that the perceived behavioural control of teachers would positively affect the continuance intention to use Madrasati (H10). With a path coefficient of $\beta$=0.297 and a *p*-value of less than 0.05, this hypothesis was accepted, suggesting that teachers took into consideration some required resources and support to continue using Madrasati. Compared to the other factors (ATU, SN), this factor emerged as the least influential factor, showing a slight effect on teachers' intentions to continue using Madrasati.

The results of this factor are consistent with studies conducted by Ajjan and Hartshorne (2008), Chien et al. (2014), Kilinc et al. (2016), and Sadaf and Gezer (2020). The context of Sadaf and Gezer's (2020) study is the factors impacting teachers' intentions to integrate technology in classrooms. Meanwhile, Ajjan and Hartshorne's (2008) study focuses on the decisions of faculty members to adopt technology, while the study by Kilinc et al. (2016) concerns the factors impacting middle school teachers' intentions to use educational technologies in Turkey. These previous studies have empirically demonstrated that perceived behavioural control influences behavioural intention. However, there are studies

stating the opposite, such as Huang and Chuang (2007), who found only an insignificant effect of perceived behavioural control on employees' behavioural intention to use an information system. From the findings in this study, the PBC factor demonstrated influence on teachers' behavioural intentions to continue using Madrasati.

**K- The Effect of Resource Facilitating Conditions on Perceived Behavioural Control**

In the proposed theoretical model, it was hypothesised that resource facilitating conditions would positively affect the perceived behavioural control towards the continuance intention to use Madrasati (H11). The path coefficient and the significance value (*p*-value) reached 0.042 and 0.495, respectively, but because the *p*-value was more than 5% (0.495 > 0.05), H11 was rejected. The results of testing hypothesis H11 indicate that teachers in this study did not regard facilitative resources and technology to be factors impacting their intentions to continue using Madrasati.

The findings of not supporting hypothesis H11 concurs with a study by Ajjan and Hartshorne (2008) which reported that both resource conditions and facilitating technology have no impact on the perception of behavioural control regarding faculty members' intentions to use technology. Conversely, Sangeeta and Tandon (2020) reveal that facilitating conditions had a significant positive effect on teachers' intentions to adopt online teaching in North India, showing that this factor could lead to greater actual use of online teaching among teachers. The availability of resources, such as time, infrastructure, and suitable devices, are major factors that effectively motivate teachers to use online learning platforms, as stated by Masmali and Alghamdi (2021). The findings in this study, however, show that these resources were not important among teachers in terms of determining their intentions to continue using Madrasati.

**L- The Effect of Technical Support on Perceived Behavioural Control**

In Chapter 4, it was hypothesised that technical support would positively affect the teachers' perceived behavioural control towards the continuance intention to use Madrasati (H12). The path coefficient and the significant value (*p*-value) were determined to be 0.062 and 0.314, respectively. As the *p*-value of 0.314 is greater than 0.05, H12 was rejected. Results of this hypothesis indicate that teachers in this study did not regard training courses and technical support as factors influencing their intentions to continue using Madrasati.

In prior studies, technical support was found to be an important factor to a successful implementation of Madrasati, which could motivate teachers to continue using the platform, as outlined previously in Chapter 2 (Alasmari, 2022; Aldossry, 2021; Alkinani & Alzahrani, 2021; Khanfar, 2020). Jones (2004) discovered that only some training courses can be useful, and the design of the courses must be carefully considered. The rejection of H12 was similar to the findings of a study conducted by Sulaymani et al. (2022), which found that Saudi teachers have not received sufficient training or technical support to help them use Madrasati, resulting in a negative impact on students' acceptance of e-learning. Although the MoE has shown its commitment to improving the educational system by delivering intensive training courses to enhance teachers' technological knowledge and abilities (Alzahrani & Joseph, 2024), most teachers still need additional training courses to use Madrasati (Al Mahmud & Saqlain, 2023). Rationally, teachers would want to continue using Madrasati if they received sufficient training and IT support, including high-quality courses and immediate solutions to challenges they might face when using the platform.

**M- The Effect of Self-Efficacy on Perceived Behavioural Control**

The self-efficacy factor in this study was hypothesised to have a positive effect on the perceived behavioural control towards the continuance intention to use Madrasati (H13). From the analysis of Table 6.17 above, it was found that the path coefficient and *p*-value ($\beta$=0.524, $p$>0.05) were supporting this hypothesis. This factor was the only one that affected the perceived behavioural control among the other factors (RFC, TS). This means that teachers' behavioural control is affected solely by their abilities regarding their intentions to continue using Madrasati.

The factor of teacher self-efficacy was determined to have a significant effect on technology usage (Alzahrani, 2019). The results relating to this factor correspond with the previous studies conducted by Ajjan and Hartshorne (2008), Hsu and Chiu (2004), and Sadaf and Gezer (2020). In this study, teachers considered SE to be a significant factor that positively impacts their intentions to continue using Madrasati. They showed a high level of self-confidence and ability in using Madrasati within the current school contexts. This may be justified by the extensive usage of the platform during the pandemic, which in turn resulted in enhancing teachers' technological skills and abilities. In addition, the findings show that most teachers (92%) still use the platform as demonstrated in Table 6.7. Thus, the constant usage of the platform has increased their confidence to deal with Madrasati tools in different ways.

Regardless of not accepting the effect of other factors, such as resource availability and technical support, teachers realised that their existing skills and experience in using Madrasati could increase their enthusiasm for utilising the platform as a valuable tool in the learning and teaching process. To conclude, it can be said that teachers' confidence and skills in using Madrasati significantly influence their behavioural control, which in turn motivate them to continue using the platform.

**N- The Effect of Prior E-Learning Experience on Self-Efficacy**

In the proposed theoretical model, it was hypothesised that prior e-learning experience would positively affect teachers' self-efficacy towards the continuance intention to use Madrasati (H14). The obtained results showed a path coefficient of $\beta$=0.619 and a $p$-value of $p$<0.05. Consequently, the hypothesis H14 is accepted, indicating that teachers' prior experience plays an important role in motivating them to continue using Madrasati. Although this factor is not one of the original DTPB instruments, it was integrated into the model to explore how teachers' prior technology experience and their mandatory usage of Madrasati during the pandemic impact their abilities to continue using the platform. The survey data indicated that the prior technological experience of teachers significantly enhanced their confidence and abilities, thereby positively affecting their intentions to continue using Madrasati.

The results of this factor are consistent with the findings of a study conducted by Sulaymani et al. (2022), which found that prior e-learning experience is a significant predictor of self-efficacy. Furthermore, prior e-learning experience has been identified as one of the important factors that improve teachers' technological skills (Daraghmeh et al., 2021). In addition, a study on teachers' adoption of Madrasati during the pandemic highlighted that some teachers were not willing to continue using Madrasati due to a lack of the awareness of e-learning patterns (Alsalim, 2021). However, this study found that teachers' prior e-learning experience had a significant impact on increasing teachers' self-efficacy, thereby motivating their continued usage of the platform within the current education contexts. As anticipated, although e-learning platforms had not been used extensively among Saudi teachers before the pandemic (Shishah, 2021), their skills and confidence increased when they used Madrasati consistently during the pandemic and after, which in turn motivated them to continue using the platform.

**O- The Effects of Gender and Age**

An examination of the gender moderation impact was conducted, revealing no significant differences between males and females except for one relationship: influence of resources facilitating conditions (RFC) on perceived behavioural control (PBC). This relationship showed a significant change between either males or females, as the achieved *p*-value was below the acceptable threshold of 0.05. Thus, this finding is inconsistent with a study conducted by Al Mahmud and Saqlain (2023) which indicates that female teachers have a more favourable attitude towards using Madrasati than male teachers.

Regarding the moderation impact of age, there were no significant differences between young and old except for two paths: influence of self-efficacy (SE) on perceived behavioural control (PBC) and prior e-learning experience (PEE) on self-efficacy (SE). Since the *p*-values were less than the acceptable threshold of 0.05, these two paths significantly differed when followed by younger or older participants. Therefore, this finding contradicts a study conducted by (Alharbi et al., 2022c), which indicates that both groups, younger and older, played a moderating role in the use of Madrasati.

## 6.5 Chapter Summary

This chapter described the process of designing and implementing the survey regarding the continued use of the Madrasati system among secondary school teachers, as well as analysing and interpreting the results obtained. The chapter began with an overview of the importance of questionnaire design, highlighting how it helps in ensuring the validity and reliability of data collection.

The first section of the chapter focused on the key considerations for designing a questionnaire, such as selecting the appropriate question types, checking the validity and reliability of the questionnaire, translating the instruments, and piloting the questionnaire to ensure its effectiveness. The chapter also discussed the importance of ethical considerations when designing a questionnaire, such as obtaining informed consent and protecting the privacy of participants.

The second section of the chapter addressed the results obtained from the survey, including the data analysis process and the interpretation of the results. It explored the different types of data analysis techniques that can be used, such as data examination, outliers, normality,

and descriptive analysis. Structural Equation Modelling (SEM) was discussed in this chapter as a statistical approach to analysis the quantitative data. Using both phases, the measurement model and structural model, results were presented effectively using tables and charts to illustrate the obtained quantitative data. The third section discussed the survey results in the context of previous studies, analysing each hypothesis and comparing the findings with those of earlier research.

Overall, the proposed model for the continued use of the Madrasati system in secondary teaching post-COVID was validated in this chapter. The hypothesised paths of the model were evaluated separately in order to determine whether they are supported or rejected before moderating effects, such as age and gender, were assessed.

# Chapter 7 Qualitative Phase Design and Findings

This chapter details the second stage of this study, which involves follow-up interviews with some of secondary school teachers who consented in the survey to participate in follow-up discussions. The definition of the mixed-methodology approach was explained by Creswell (2014): the sequential 'explanatory' approach is used when a quantitative study is followed by a qualitative approach to explain the quantitative results better (Creswell, 2014). In addition, Flick (2009) clarified that it was useful to combine qualitative and quantitative results in a single study, either sequentially or at the same time. He also illustrated an example of integrating the survey and interview outcomes to confirm or support the obtained findings of both quantitative and qualitative methods, showing that such integration help researchers to gain a deeper understanding of the problem under review or to provide further explanation of the results obtained (Flick, 2009). Hence, to gain a clear understanding of the teachers' experiences using Madrasati, and their motivation for a continued use of the platform post-pandemic, follow-up interviews were conducted in this stage.

An interview is a form of an internal discussion between an interviewer and interviewee(s). This dialogue can be carried out as one-to-one interactions, involve large groups, or take the form of focus groups. Meetings may also occur face-to-face, via Zoom calls, or through social media platforms such as Twitter, WhatsApp, and Facebook. In qualitative research, there are three different forms of interviews, which vary in the extent to which interview questions are predetermined: structured, unstructured, and semi-structured (Alalwani, 2022).

In structured interviews, data collection consists of a set of questions that are administered verbally. These questions involve asking each participant the same questions in the same order, often using limited questions designed in advance that can be utilised to elicit a specific concept (Ruslin et al., 2022). In this instance, the goal of the study at this stage would not be effectively achieved by this type of interview because I might change the order of the questions or add probing questions based on the topics discussed during the interviews.

In contrast, unstructured interviews contain different flexible questions based in the conversation between an interviewer and participants (Cohen et al., 2007). The researcher adds additional questions when required or avoids questions that are not considered relevant to the issue being studied. This type of interview can be conducted when the researcher wants

to investigate likely unexplored subjects, and it can be used to find new ideas or perspectives on subjects that have already been studied. I considered this type of interview inappropriate due to the lack of a specific structure as it might provide inconsistent data that is difficult to compare between teachers. Such interviews are more suitable for studies where little is known about the topic, particularly those that are more exploratory in nature.

Semi-structured interviews incorporate aspects of both unstructured and structured approaches, making them a flexible method for conducting investigations. Semi-structured interviews are generally an informal style, which means that the conversation is conducted in a more relaxed and conversational manner rather than asking direct questions. This type of discussion is referred to as 'conversation with purpose' (Ruslin et al., 2022). In this method, the interviewer has a prepared list of questions or themes but is still able to elicit further responses or explore areas that are relevant to the discussion (Bryman, 2016). This approach is structured around some key questions, and sometimes, this might also include possible prompts to probe things more fully, while at the same time reserving the right of the interview to move around, revisit different parts of the protocol, and ask emerging questions responsively. The following sections describe the interview design, analysis, and results.

## 7.1 Interview Design

In this study, I employed semi-structured interviews to collect data from the participants. The rationale behind selecting this type of interview was that the purpose of conducting this phase was to gather rich data that would allow me to more fully understand key findings from the quantitative chapter. Hence, a semi-structured interview format was more suitable because of the scope they allow participants to express their opinions more freely compared to other types of interviews or direct questions (Flick, 2009). The literature also recommends semi-structured interviews, as there was a noticeable increase in the use of semi-structured interviews among investigators in social science research (Ruslin et al., 2022). Therefore, follow-up interviews were carried out as a final stage in this study in order to obtain further explanations regarding the factors in the proposed model.

Careful attention was given to the interview design in this study, focusing on open-ended questions and probes. These types of questions can obtain an in-depth understanding of the viewpoints of participants and reduce researcher biases (Turner, 2010). Furthermore, when

it was necessary to delve deeper into further detail, the probing questions proved useful in gathering additional data regarding the studied issue. Each interviewee was asked different probing questions based on the conversation and the participants' responses.

Because teachers' responses to the survey questions highlighted areas that needed further investigation, I designed the semi-structured interviews to cover the issues mentioned in the literature and the findings of the survey. In other words, the analysis and findings of the collected surveys helped to build the interview questions. These areas include teachers' experience of using Madrasati in the post-crisis period, the quality of educational content integrated into the platform, the opinions and perceptions of school members on teachers' use of the platform, and the availability of infrastructure and support. Furthermore, survey respondents were invited to participate in the interviews, if they wished, to provide additional details and clarify the obtained quantitative findings. The interviews were aimed at achieving the following key goals:

- To discuss teachers' perceptions of the experience of using Madrasati in the current educational context.
- To evaluate the suitability of the educational content integrated into Madrasati for teaching and learning purposes.
- To examine the impact of other factors—such as social influence, available infrastructure, and training courses—on the usage of Madrasati.

The following sections provide details of the design of the semi-structured interviews and the procedure of data collection.

### 7.1.1 Interview Pilot

Initially, I developed the interview questions in English before translating them into Arabic. I found it preferable to start developing the interview questions in English, as it enabled me to easily discuss them first with the supervisory team members. Following this, I invited three bilingual researchers from the University of Glasgow to review the draft questions to ensure that all the questions were clear and unambiguous. Minor changes were made to the questions' wording but did not affect their meaning. For instance, the phrase *educational content* in the second question was altered from *educational resources* to *educational*

*content* ("مواد تعليمية" to "محتوى تعليمي"). Also, the word *interaction* in the third question was changed from *dealing* to *interacting* ("التعامل" to "العمل على المنصة").

Before conducting the official interviews with the targeted participants, I contacted two Saudi teachers by email, using the addresses provided in the survey dataset, and asked them to pilot the questions to confirm their validity. This procedure was an essential one with the actual participants who shared similar interests, as they were involved in the same study (Turner, 2010). After receiving responses from the targeted participants in the pilot study, I scheduled a Zoom call at an agreed time with each individual to discuss the interview questions. I explained the study's purpose, engaged the participants in conversation based on the draft interview questions, and collected their comments and feedback.

Each of the participants provided different suggestions for improving the interview questions. For example, one teacher suggested that it would be useful to re-arrange the order of the open-ended questions, starting with "*Do you intend to continue using Madrasati in the future*?". This question had originally been listed at the end of the interview to assess how teachers would continue using Madrasati, enabling them to provide any additional factors that had not been discussed during the interviews. Nevertheless, I found it helpful to begin with this question, as it encouraged participants to speak freely about the key factors without being affected by other factors mentioned in the interview questions that could impact their responses. Another participant suggested that it would be helpful to unpack the term infrastructure to include aspects such as time, money, electronic devices, and internet access. After the pilot interview process, I applied all the suggested comments to the interview questions. The next section presents the final interview questions.

### 7.1.2 Interview Questions

The following table, Table 7.1, presents the interview questions. During the interview, closed questions were first asked about the participants' demographics and questions about their current use of Madrasati. Thereafter, questions regarding the experience of using Madrasati and the factors that could motivate teachers to use the platform were discussed.

*Table 7.1 Interview questions*

| **Closed Question** |
|---|
| 1- What is your gender?<br>2- What is your age?<br>3- By the end of this academic year, how many years will you have been teaching together?<br>4- Currently, do you still use Madrasati?<br>5- How many hours a day on average do you spend on Madrasati? |
| **Open Questions** |
| 1- Do you intend to continue using Madrasati in the future? Could you please explain the reasons behind that?<br>2- What do you think about Madrasati's contents? Are they sufficient and adequate for learning?<br>3- How easy or difficult is it for you to use Madrasati in your teaching? Is interacting with it clear and understandable or difficult and complicated?<br>4- Do the opinions or impressions of others in your school community impact your usage of Madrasati? Please explain.<br>5- Do you think your experience of using Madrasati during the COVID-19 period has affected your perception regarding using it now in your teaching? How?<br>6- Do you think the availability of resources, such as time, money, electronic devices, and internet connection, have an effect on the continued use of Madrasati? Explain more.<br>7- Have you attended any training sessions on using Madrasati? If yes, can you tell me more about these sessions?<br>8- In your experience, what do you think the benefits and drawbacks are of using the Madrasati platform for teaching and learning? |

For the open-ended questions, I designed most to cover areas that emerged from the quantitative findings and required further explanation during the interviews. The first question was intended to evaluate how teachers intended to continue using Madrasati, identifying key factors that could encourage them to continue using the platform. The second question was based on the survey finding that the content on Madrasati is useful and adequate for teaching and learning, as this was the only factor affecting the perceived usefulness of Madrasati and was included under that construct. The third question aimed to assess the extent to which teachers found Madrasati easy to use, as this factor was a key part of the model that could impact teachers' perceptions of the platform. Since the relationship between leader influence and subjective norm was not significant, and social influence was found to be the most important factor affecting teachers' intentions to continue using Madrasati, it was essential to explore the impact of others in the school community—such as school principal, colleagues, and students—on teachers' use of Madrasati.

For the fifth question, the aim was to explore the effect of using Madrasati during the crisis and how this experience could enhance teachers' perceptions and skills in using the platform. For the sixth question, the relationship between resource facilitating conditions and perceived behavioural control was not significant in the quantitative phase, necessitating an evaluation of the resources that could be essential for using Madrasati in the post-crisis period. Similarly, the factor of technical support was not significant, which required further explanation regarding the support provided by the MoE in training sessions. Finally, for the eighth question, it was beneficial to discuss the overall experience of using Madrasati among teachers, summarising its benefits and drawbacks for teaching and learning process.

### 7.1.3 Ethics Considerations

The College of Social Science Research Ethics Committee at the University of Glasgow granted approval regarding ethical considerations to carry out the interviews (Research Ethics Number 400220163). Before starting the interview, each participant was given a plain language statement to review the details of the study (refer to Appendix A.1.4). Participants were then required to either sign the consent form or respond with written consent via email (see Appendix B.1.2).

In addition, I obtained official permission from the General Administration of Education in the Asir region to conduct face-to-face and online interviews with secondary school teachers who participated in the survey (see Appendix B.1.1). Approximately 65 teachers consented via the email option at the end of the survey to take part in the follow-up interviews. However, the interview sample included 19 teachers selected based on specific criteria, as explained in the sample description (see section 7.1.4).

I explained to the participants that taking part in the interview was entirely voluntary and they could withdraw their participation at any time without any justification. To avoid errors or misunderstandings in the interpretation of responses during data analysis, I recorded the interviews using the iPhone recorder application, which allowed me to easily transfer the discussion to a PC later. This procedure helps interviewers refer back and gain accurate information from the conversation that has been taken place (Creswell, 2012). Before making any recordings, I obtained consent forms from the interviewees. I also assigned each participant a unique code (T1–T19) to protect their confidentiality.

### 7.1.4 Characteristics of the Sample

In the literature, there is considerable discussion about the appropriate sample size of data collection in qualitative research (Bhattacherjee, 2012; Guest et al., 2006). Some believed that it should fall between six and eight participants (Creswell, 2014), while others suggested that it should range between six and 10 interviewees (Morse, 2000). According to Guest et al. (2006), there are no standard procedures or adequate tests for determining the sample size needed to obtain saturation.

Guest et al. (2006) conducted a qualitative investigation involving in-depth interviews with a group of 60 female participants. The study aimed to establish methodological guidelines for an appropriate sample size in qualitative research. The investigation determined that data saturation, indicating the point at which no new significant data emerges, was achieved notably early in the research process by the time 12 participants had been interviewed. Specifically, most themes became stable following the first six interviews, based on the analysis of all conducted interviews. Consequently, it can be concluded that a minimum of 12 interviews is adequate to achieve data saturation in such studies.

It was evident from the survey that the topic was very important to participants, and there was a strong desire among many teachers to be heard. A total of 65 email addresses were found in the dataset, which suggested that participants wanted to take part in the interviews. To allow as many diverse voices to be heard as possible and provide participants with a platform where they could express both their concerns and hopes—a number typical for this type of research—the number of participants recruited was 19.

Participants were selected using the purposive sampling technique, a non-random method whereby participants are chosen for the information or experience that they possess in a particular phenomenon (Etikan et al., 2016). This method is used widely in qualitative research and does not require specific theories or a determined number of interviewees. Furthermore, Bhattacherjee (2012) stated that non-random sampling is frequently employed in qualitative research, where participants are selected based on a specific objective.

For this study, it was essential to choose participants who use Madrasati, as they can provide useful insights into the current use of the platform and the motivation enabling them to continue using it after the pandemic. I selected participants through purposeful selection

criteria based on their relevant demographics, with the assumption that they would provide the most insightful data. As Anderson (2010) suggested, including participants with as much heterogeneity as possible can be useful in any study. Furthermore, this approach enables the selection of non-standard or extreme situations, which consequently empowers the analysis of the desired question. Purposive sampling often enables the identification of cases based on the intensity level of the related, interesting experiences (Patton, 2002). There was a defined objective for having different perspectives when performing the interviews, including respondents who had varying levels of usage of Madrasati. These criteria included the different subjects taught by teachers, the variation in average daily hours of the platform usage, and the demographic location of schools (urban or rural). Table 7.2 presents the demographics of the participants for the interview stage. The sample included a total of 19 participants with an equal gender distribution: male and female. Additionally, the participants' ages ranged from 25 to 55 years, with a significant proportion falling within the 36–45 age group.

*Table 7.2 Demographics results*

| Age range | Number of Participants | Gender |
|---|---|---|
| 25–35 | 2 | 2 male |
| 36–45 | 10 | 6 female, 4 male |
| 46–55 | 7 | 2 female, 5 male |
| Total | 19 | 8 female, 11 male |

### 7.1.5 Presented Materials

In order to conduct effective interviews, it is crucial that participants have a clear understanding of their roles in the interviews and what they can expect to be asked. Therefore, providing a clear summary of the task is essential for the success of these interviews (Tessmer, 2013). Accordingly, each participant received the following materials in the invitation email, and they were also provided at the start of each interview, both digitally for online interviews and in hard copy for in-person interviews:

- plain language statement.
- consent form.
- interview questions.

### 7.1.6 Running Interviews

I organised one-to-one interviews with participants by mutual agreement, either virtually or face-to-face. I sent a reminder email to participants one day before each scheduled interview. I conducted the interviews from January to March 2024, with each interview lasting approximately 25 to 30 minutes. For the face-to-face interviews, I selected five schools in the Asir region as locations in which to physically meet the interviewees. As outlined in the purposive sampling criteria (see section 7.1.4), I aimed to include schools from different locations within the targeted region. Two schools were located in rural areas, while the remaining three were situated in urban areas in Abha city. I carried out all the interviews in Arabic and later translated them into English (see section 7.1.7).

I started each interview with a warm welcome to the participant, expressing gratitude for his/her participation in the interview. I then gave a brief introduction of myself, described the goals of the research, and indicated what the current study was attempting to achieve. According to Gill et al. (2008), the introduction is important at the beginning of the interview for building a rapport between the interviewer and participants, enabling them to provide precise data that could positively affect the subsequent discussion. Thereafter, before proceeding with the questions, I provided the participants with a consent form to sign. For the physical interviews, I collected consent forms manually, whereas for the online interviews, I requested participants to resend the signed form back to me via email prior to the start of the interviews. Furthermore, I asked participants for permission to record the conversation.

The interview started with the demographic questions, followed by brief questions about the participants' use of the Madrasati platform. Next, I asked open-ended questions focusing on the research problem. I asked most questions in the same order as they were presented on the interview question sheet, although I adjusted some questions during certain interviews depending on the participants' responses. Then, to draw the interview to a close, I gave the interviewee an opportunity to provide any additional information or suggestions for the study. I concluded the discussion by thanking the interviewee for their time and valuable information that they provided.

### 7.1.7 Data Transcription and Translation

In order to prepare and organise the data for the analysis, the recorded responses were transcribed into written content. This process was explained as the method of converting field notes or audiotape recordings into written data (Creswell, 2012). To become familiar with the data, researchers are advised to personally transcribe the recorded interviews (Riessman, 1993), the reason behind that being that transcription is regarded as an interpretive process in which researchers can obtain insights and explanations, rather than only the conversion of spoken phrases into a written form (Gill et al., 2008).

I established a plan to start transcribing the data manually. I scheduled two interviews per day, assuming each interview would take about four hours to transcribe the audio into written data. I transferred voice-recorded files from the in-person interviews from the iPhone to my PC, together with the Zoom call recordings carried out online, and then stored them in my cloud account at the University of Glasgow. I used Media Player and Microsoft Word as tools to assist in the process of listening to and typing the data. For each interview, I found it useful to listen to the entire interview once at the beginning of each transcription to become familiar with and gain a sense of the flow, including the accent, key topics, and any challenges that might happen during the interview, such as noise or disruptions. I considered it essential at this stage to type all the sentences and phrases. However, I excluded some parts not related to the study's objectives from some transcripts recorded during the in-person interviews. These included interruptions from some teachers entering the interview room, invitations from some teachers to join them for lunch or dinner, and a call that was received by one teacher. I placed each question in a separate paragraph to facilitate the translation process after all interviews were completed. Additionally, I named folders according to the participant's label (T1–T19), which identified them.

After transcribing the interviews, I translated the data into English. During this process, I divided all the transcripts over 19 days, with the aim of having each interview translated on a single day. I conducted the translation sentence by sentence, with electronic assistance using a digital dictionary. Importantly, I translated some phrases exactly as the interviewees expressed them, such as "*educational enrichments,*" which was explained by a teacher to mean the educational resources added to the platform by teachers. To ensure the accuracy of the translation, I asked two Arabic researchers at the University of Glasgow to compare both the Arabic and English transcriptions. Following this comparison of both versions, I made

slight changes to the English version to clarify the meaning of some expressions. For instance, I replaced “straightforward” with “clear and easy to use.” Subsequently, I tasked another Arabic researcher with back-translating three random English versions into Arabic. While some minor variations were identified, such as synonyms, they did not affect the meaning.

### 7.1.8 Analysis Procedure

The analysis procedure for the qualitative data in this study followed Braun and Clarke’s thematic approach, specifically adopting their six-step guide to reflexive thematic analysis as the analytical approach at this stage (Braun et al., 2018; Braun & Clarke, 2006). These six steps include: (1) familiarising oneself with the data, often through transcription; (2) preliminary codes generation; (3) patterns and themes identification; (4) themes evaluation; (5) themes labelling and categorisation; and (6) the conclusive analysis development, which includes relevant and clear illustrations to support the analysis.

The process of identifying themes in reflexive thematic analysis can be approached in multiple ways. The continuum of inductive/deductive approaches in reflexive thematic analysis defines the degree to which the exploration of analytical meanings is grounded in the data, as opposed to being influenced by pre-existing theoretical concepts that researchers wish to investigate, utilising the dataset for this purpose (Braun et al., 2018; Braun & Clarke, 2006). The main purpose of conducting this phase was to gain a more in-depth understanding of the findings obtained from the quantitative chapter. Therefore, a deductive method, also known as ‘top-down’ approach, was employed, whereby the formulation of themes and questions was guided by the theoretical interests of the researcher in the studied subject (Braun et al., 2018; Braun & Clarke, 2006). This method allows for a structured and focused analysis that aligns with existing knowledge or theoretical perspectives. In that sense, my focus in this follow-up study was to comprehend teachers’ perceptions and opinions towards the factors affecting the continuance of the Madrasati platform usage.

I adopted the deductive thematic approach for the interview analysis because my study was guided by the proposed model that included specific factors influencing teachers’ intention to continue using Madrasati. I identified and tested the model factors during the quantitative phase (see Chapter 6). After that, I designed the interview questions in direct response to the quantitative findings, with the aim of gaining deeper insight into each construct in the

proposed model (see section 7.1.2). Since my objective of the qualitative phase was to explore teachers' experiences and perceptions within the structure of the proposed model, the deductive approach allowed me to analyse the data systematically in alignment with the research question. In this way, I achieved consistency across the study stages, and the predefined theoretical framework guided my organised interpretation of the qualitative findings.

Before starting the analysis, I printed all interview data and stapled each transcript together with its corresponding papers. During my initial reading of the transcripts, I noted and underlined certain words and phrases. To define the initial codes, I listed all the model categories on a separate sheet of paper. These codes, for example, included *attitude*, *subjective norm*, *usefulness*, *learning content*, etc. I began the coding process by applying these codes to the first transcript, followed by subsequent transcripts, which I treated individually in the same manner. I highlighted each code in a distinct colour using highlighter pens to differentiate between codes. I then conducted a second reading to ensure that I applied all predetermined codes consistently and highlighted them appropriately. Following this, I manually extracted and grouped quotations related to each code. For example, I placed quotes related to the *usefulness* code in one group with all relevant quotations from all transcripts. At the same time, I extracted codes and their quotations into a table, making the process of identifying codes with quotations more organised (see Appendix B.2.2). I reviewed each group a couple of times to ensure that all examples were related to the code.

After that, I divided some codes into several sub-codes to capture the data more precisely, and then I named them to reflect the content derived from the transcripts. For example, I ungrouped *usefulness* into different sub-codes and named them with different titles, such as *lesson planning*, *supporting teaching process*, *virtual learning environment*, etc., while I combined some codes with others—for instance, I combined *self-efficacy* and *prior e-learning experience* and then named them *confident in using Madrasati*. I conducted a couple of rounds of review to re-combine codes where appropriate (see Appendix B.2.3). In this way, I grouped *attitude* and its associated codes together; I also grouped *subjective norm*, which included factors such as leader, teacher, and student influence, together; and I grouped perceived behavioural control together with its associated factors. The next step involved reviewing and refining all codes within each theme. I then named, refined, and analysed the

themes to identify the specific aspect of the data captured by each theme. At the final stage, I wrote a report to explain the themes and their codes.

## 7.2 Interview Results

This section presents the findings gathered from the interviews. The qualitative data were analysed using a reflexive thematic analysis approach, and the interpretation of these results will be explained within the discussion that follows.

I started the interviews by gathering demographic data through closed-ended questions, followed by questions regarding Madrasati usage. Then, I asked open-ended questions. To avoid incomplete or brief responses, I employed probing questions to gather more detailed information. The following table, Table 7.3, provides demographics and Madrasati usage for each participant.

*Table 7.3 Demographics and Madrasati usage results*

| Code | Gender | Age | Teaching service | Subject | School location | Current use of Madrasati | Average daily usage |
|---|---|---|---|---|---|---|---|
| T1 | Female | 43 | 23 | English | Urban | Yes | 4 hours |
| T2 | Female | 37 | 12 | Digital Technology | Urban | Yes | 3–4 hours |
| T3 | Female | 45 | 24 | Mathematics | Urban | Yes | 1–2 hours |
| T4 | Male | 38 | 16 | Biology | Rural | Yes | 2 hours |
| T5 | Female | 47 | 23 | Mathematics | Urban | Yes | 1 hour |
| T6 | Female | 45 | 22 | English | Urban | Yes | 2–3 hours |
| T7 | Male | 38 | 16 | English | Urban | Yes | 10–15 minutes |
| T8 | Male | 34 | 11 | English | Rural | Yes | 1 hour |
| T9 | Male | 44 | 18 | Chemistry | Rural | Yes | 3 hours |
| T10 | Male | 35 | 14 | English | Urban | Yes | 30 minutes |
| T11 | Female | 50 | 20 | Digital Technology | Urban | Yes | 2–3 hours |
| T12 | Male | 48 | 29 | Library and Information Science | Urban | Yes | 1–1:30 hours |
| T13 | Male | 46 | 22 | Physics | Urban | Yes | 1–1:30 hours |
| T14 | Male | 44 | 21 | Physics | Urban | Yes | 1–1:15 hours |
| T15 | Male | 48 | 22 | Geography and History | Urban | Yes | 1:30–2:30 hours |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| T16 | Male | 47 | 24 | Arabic | Urban | Yes | 1 hour |
| T17 | Female | 42 | 17 | Linguistic Competences | Urban | Yes | 30–1 hour |
| T18 | Male | 52 | 29 | Vocational Education | Urban | Yes | 30–40 minutes |
| T19 | Female | 38 | 12 | Digital Technology | Urban | Yes | 30 minutes |

In the qualitative thematic analysis, I identified four themes. Each of these themes is expounded upon with relevant examples in the following subsections. Table 7.4 outlines all the themes and their underlying codes, with each code driven from the model.

*Table 7.4 Themes and their underlying codes*

| Theme | Definition | Codes | Model construct | |
|---|---|---|---|---|
| Teachers' attitudes towards Madrasati | Teachers' perceptions and attitudes towards using Madrasati | Adopting modern technology in education. | Attitude | Attitude |
| | | Lessons planning through Madrasati. | Perceived usefulness | |
| | | Supporting teaching process. | | |
| | | Using different teaching strategies. | | |
| | | Ease of communication. | | |
| | | Implementing virtual learning environment. | | |
| | | Madrasati is easy to use. | Perceived ease of use | |
| | | Confident in using Madrasati. | Self-efficacy/ Prior e-learning experience | |
| Influence of educational content quality on teachers' decisions to use Madrasati | The impact of educational content on teachers' attitudes towards Madrasati | Efficient educational content.<br>Insufficient e-textbooks.<br>External educational content.<br>iEN educational channels. | Learning content quality | |
| Influences on teachers' use of Madrasati within the school community | The impact of the opinions and suggestions of school members on teachers' use of Madrasati | School leader influence. | Leader influence | Subjective norm |
| | | Peer influence. | Peer influence | |
| | | Students influence. | Students influence | |
| External influences on | The impact of other factors | IT support and training. | Technical support | |

| | | | | |
|---|---|---|---|---|
| teachers' decisions regarding the use of Madrasati | outside school environment on teachers' use of Madrasati | Resources availability. | Resources facilitating condition | Perceived behavioural control |

### 7.2.1 Teachers' Attitudes Towards Madrasati

As implied by its name, this theme examines teachers' perceptions and attitudes regarding the Madrasati platform. The open-ended questions began by asking teachers whether they intended to continue using Madrasati and to elaborate on their answers in detail. Most of the participants pointed out that they intended to continue using Madrasati, citing various reasons ranging from its positive impact on their teaching to some advantages of adopting Madrasati in the teaching and learning process. The analysis identified eight emerging codes related to teachers' attitudes towards Madrasati. The following table, Table 7.5, presents each code along with its definition and examples taken from the transcripts.

*Table 7.5 Codes, definitions, and examples for teachers' attitudes theme*

| **Teachers' Attitudes Towards Madrasati** | | |
|---|---|---|
| **Code** | **Definition** | **Example** |
| Adoption modern technology in education | Positive expressions towards Madrasati, emphasising its role as a tool for keeping up with new educational technology | *'E-learning has become a very essential need in the age of technology.'* |
| Lessons planning through Madrasati | Preference of participants to plan lessons through Madrasati after they were previously neglecting it | *'I believe lessons planning through Madrasati offers numerous benefits.'* |
| Using different teaching strategies | Implementing different teaching strategies through Madrasati such as flipped classroom strategy and self-learning method | *'Madrasati enables the implementation of new teaching strategies such as the flipped classroom method.'* |
| Supporting teaching process | Statements that Madrasati bolsters the teaching process | *'Madrasati helps teachers in the teaching process.'* |
| Ease of communication | Statements indicate that Madrasati facilitates easy and official communication between teachers and students | *'Students currently use Madrasati daily, which has improved my communication with them.'* |
| Implementing virtual learning environment | Statements show that Madrasati fosters the implementation of virtual learning environments | *'I have conducted virtual classes on the platform when in-person attendance at schools is suspended due to weather conditions.'* |
| Madrasati is easy to use | Perceptions of teachers towards how easy using Madrasati | *'I find the platform easy to use.'* |

| | | |
|---|---|---|
| Confident in using Madrasati | Teachers' ability to effectively use Madrasati tools, reflecting their confidence and competence in using the platform | *'Teachers are being skilful in using the platform.'* |

The participants shared their opinions and perceptions regarding the adoption of Madrasati in their teaching. Most teachers have favourable attitudes towards Madrasati, emphasising its role in keeping up with modern technology in education. This theme also explores teachers' perceptions about the benefits of adopting Madrasati, particularly after the COVID-19 crisis. The data show that, although preparing lessons was previously overlooked, most teachers prefer nowadays preparing lessons through Madrasati. Furthermore, the participants highlighted the significance of Madrasati in integrating some pedagogical approaches alongside the traditional methods, thereby enhancing the teaching process. The interviewees also flagged up that the platform facilitates easy communication between teachers and students as well as parents. Besides that, teachers can create a virtual learning environment through Madrasati, making the learning process more effective. In addition, most of the participants indicated that the platform is easy to use and offers features that any teacher can use with little effort. Finally, teachers expressed confidence in using Madrasati, crediting their experience with the platform during the crisis for helping them adopt it in the current education settings.

Generally, most teachers emphasised the significance of technology adoption in education. Sometimes, instead of referring to Madrasati, teachers used different terms such as e-learning or technology. For instance, T2 started her discussion with the statement, '*Currently, as people progress technologically, e-learning is increasingly seen as the optimal choice*'. Similarly, T6 articulated, '*Previously, I used to feel that e-learning was a crucial need in the teaching process. Now, e-learning has become a very essential need in the age of technology*'. She added, *'I can't imagine traditional teaching without using an educational platform or other teaching supports, including Madrasati'*. She indicated that there is a difference between previous generations and the current generation, saying, '*I am now dealing with students who are part of the technology generation. I have to keep pace with the students and evolve with them*'. Additionally, T1 remarked, *'the platform has helped to keep up with modern learning*'. In line with that, T14 expressed his gratitude to the MoE for this platform, stating, '*I see that Madrasati is one of the projects that the MoE should be praised for'*. He added, '*Honestly, if the platform were not positive, it would not have continued with us throughout the period after the end of the COVID-19 period*'.

Moreover, the findings reveal that most teachers have shifted to prepare lessons through Madrasati after previously neglecting it. Participant T10 expressed satisfaction with lessons preparation through the platform, stating, '*Preparing lessons through the platform is excellent. Paper lesson planning was previously ignored by most teachers. Most teachers did not prepare lessons when they were paper-based. But now with the platform, preparation has become easier, even the lesson objectives are available for the teachers*'. Lessons preparation through the platform offers useful options, including objectives, materials, assignments, and tests. For instance, T1 remarked, '*I believe lessons planning through Madrasati offers numerous options. For instance, teachers can choose to include tests, assignments, and educational enrichments to the lessons planning*'. This might seem exhausting for students across all subjects, but with proper preparation, teachers can decide what is the best for each day. T1 also gave an example of which a teacher can provide in lessons preparation, '*For example, a short YouTube video could serve as an enriching activity*', while T4 noted, '*when a teacher is on the lesson preparation page on the platform, he does not need to leave the page at all. He can just add all his objectives and choose many things available in the platform such as lesson presentations, videos, and educational games*'. Once a lesson is assigned, the lesson appears to students and school leaders as a link. By clicking on it, students are directed to the lesson, where they can access all the educational materials, while school leaders can assess the lesson objectives, offering guidance and advice to teachers. It is worth mentioning that prior to the pandemic, teachers often relied on some informal applications to prepare lessons, whereas others used paper-based notebooks. However, with Madrasati, teachers have realised how effective lesson preparation is, offering benefits for both teachers and student. T17 asserted, '*Now, lessons preparation is done through the platform. We used to rely on lessons preparation apps before. But today, speaking for myself, lessons preparation is done through the platform in the easiest way possible. I can prepare for the entire week with just a click of a button*'.

In addition, the analysis found that Madrasati helps most teachers in applying certain pedagogical methods. Some teachers mentioned that one of the myriad benefits of using Madrasati in the school context is the flipped classroom method. For instance, T10 stated, '*Madrasati enables the implementation of new teaching strategies such as the flipped classroom method*'. T5 elaborated on this method by explaining, '*I could ask students to watch a video at home, added to the platform, and then discuss and ask questions about it the next day in the classroom. The video includes a set of questions that help students to*

*prepare for the lesson and assess their learning level in the topic to be explained*'. Along with this method, T4 noted that, '*one of the benefits of Madrasati is self-directed learning*'. T18 also observed improvement in some students using this method, stating, '*I have noticed improvement in most of my students, not everyone, of course, but I have a group of students who have shown improvement and a desire for self-learning*'. Prior to the pandemic, students lacked the experience and skills required for self-directed learning. One reason for this was that students were accustomed to waiting for a teacher to start a class in the morning, with one lesson following another until the last session. However, with Madrasati, students can now go home to review, attend, or watch previous lessons. They can also plan and prepare for upcoming lessons. Even for external students, who attend schools only for exams, Madrasati helps them to activate the self-learning method by providing content in an organised manner. T11 mentioned, '*Even if students haven't attended school, such as external students who attend school only during final exams, they can learn through the self-learning strategy via the platform*'.

Among the emerging codes in the data analysis, Madrasati stands out for its significant contribution to facilitating the teaching process for most teachers. There was a general agreement among the participants that Madrasati has become a primary supporter in the teaching process. As highlighted by T9, '*Although I used some technology tools to display images and virtual experiments, especially in scientific subjects like computers, projectors, and the resource room, the platform has become a primary support in my teaching process. It's become an essential tool that can't be ignored now*'. Likewise, T4 asserted that, '*Madrasati helps teachers in the teaching process. In other words, the platform, as I mentioned earlier, provides different educational materials, and it can cover almost 80% to 90% of the curriculum*'. Additionally, T3, a math teacher, provided an example of how Madrasati helps her in the teaching process: '*Previously, I had to explain the lesson over two or three sessions. In the first session, the lesson was explained, in the second session, exercises were answered, and in the third session, worksheets were distributed to the students for them to answer. However, Madrasati has simplified this entire effort for me. The platform has reduced all these tasks I mentioned into just one class session. With Madrasati, I can create tests for the students, send and upload worksheets, receive assignments from the students for grading*'.

Along with the above, teachers have mentioned the ease of communication using Madrasati, as the platform facilitates quick and formal communication between teachers and students.

*The platform provides benefits in providing quick feedback to my students. For example, using Forms, I sent questions and exercises to students who were struggling with a certain topic. By assessing their responses, I could gauge their understanding and adjust my approach accordingly, either by providing more questions or moving on to more challenging topics. In this regard, I was able to evaluate the academic progress of each student and provide them immediate feedback.* (T10)

Moreover, T6 confirmed that '*students currently use Madrasati daily, which improves my communication with them. This has been useful, so I will continue using the platform*'. Teachers from the sample tended to avoid informal communication with students, preferring instead to use official platforms. Madrasati provides convenience and positivity, while avoiding technical complications that may arise with other platforms not specifically designed for education. Even with some apps like YouTube and Telegram, teachers and students might encounter issues such as advertisements and privacy concerns. T16 clarified: *'Since I have an account on Madrasati, why would I turn to others that are not designed for teaching and may introduce privacy concerns or distractions. I want to maintain official communication and professionalism with my students. Madrasati provides me an official communication, and it's sufficient and professional'*. Additionally, parents can also communicate with teachers through their accounts on Madrasati. Some parents may have questions regarding their boys' academic achievements and can ask them through the platform.

*I can receive messages from parents asking about their boys' academic achievement levels. This can be done through my email on the platform, which is through Microsoft and my email provided by the MoE. When I log into the platform, there are a range of icons: assignments, schedules, and messages. In the message icon, I find messages sent from parents and students.* (T15)

*Student academic tracking is now available for parents on the platform. When students haven't completed homework, tasks assigned to them, or failed in some skills, their parents can be informed about their academic progress. Some parents might communicate with me through the platform for more information*. (T11)

With the use of Madrasati, virtual classrooms can be created to provide a secure online learning environment. These virtual classrooms can take two forms – live virtual 'synchronous' lessons and recorded 'asynchronous' lessons – and teachers can interact with their students addressing any concerns, answering questions, and assigning tasks and activities. As pointed out by T16, one of the reasons that motivated him to continue using Madrasati after the pandemic was that the platform has '*the ability to conduct the virtual classes provided by the platform in collaboration with Teams*'. Additionally, T7 shared his experience with virtual classrooms: '*I have created virtual classes on the platform when the in-person attendance at schools is suspended due to weather conditions. These are the only conditions in which virtual classes are actually activated for me, especially after the COVID-19 period*'. Madrasati also offers a virtual computer program that simulates realistic laboratory experiments, including lab tools, equipment, chemicals, glassware, and three-dimensional graphics. These tools enable students and teachers to conduct a wide range of chemical and physical experiments, control experimental procedures, and record findings. T9 highlighted the challenges to acquire certain chemical materials in his school.

> *Sometimes, it can be difficult to obtain some chemical materials, especially in the field of chemistry. For example, the necessary materials for conducting the experiment may be expired or damaged. Therefore, instead of using unsuitable materials, I can conduct a full virtual chemical experiment for my students as if they were watching it in the real lab*. (T9)

Ease of use was perceived one of the most significant factors affecting teachers' intention to continue using Madrasati. The vast majority of teachers found that Madrasati is easy to use. For example, T13 stated, *'I find the platform easy to use. Both teachers and students can use it easily, even if they have not used it before. The use of the platform involves simple steps that are followed smoothly and easily'*. Similarly, T4 asserted that *'In the current education setting, even in the year 2024, the platform has become very easy, and the application, whether for teachers or students, makes things very easy for everyone. So, I think using Madrasati has become very clear and easy'*. T14 agreed with T13 and T4, remarking, *'The platform is very easy for both students and teachers'*. T8 mentioned that the platform is not one of those advanced programs that require much effort to use. Importantly, ease of use has encouraged most teachers to continue using the platform after the pandemic. T1 remarked *'During the pandemic, we thought that e-learning would be temporary and would end one day. However, after the pandemic, the ease of use influenced us to continue using it, even*

*with in-person learning settings, even after the pandemic'*. She further added, *'If the platform had required much effort, the teacher would not have been able to continue using it'*.

During the COVID-19 crisis, half of the participants encountered challenges and difficulties using the platform, as Madrasati was a new environment for most of them. However, with time, teachers have gained experience and became proficient in managing teaching tasks through the platform. T5 explained:

> *The idea of using technology and e-learning was not common or known. But now, there has been a significant qualitative leap in education technology after the COVID-19 period. In other words, the mandatory use of the platform during the COVID-19 period helped many teachers, making them learn and overcome their lack of awareness about using technology in education. Most teachers, after using Madrasati, discovered that it is easier and better to adopt technology tools in educational environments*. (T5)

Similarly, T12 elaborated, '*The experience of using Madrasati during the COVID-19 period opened up horizons for teachers in general. Also, even teachers who are not technology users or are not familiar with technology, now face a situation where they have to keep up with the times and learn this technology*'. Prior to the crisis, some schools implemented a platform named 'Classera' as part of the planned transition towards digital learning (see Future Gate initiative, section 2.4.4). It was trialled in some schools, while others did not apply it, and this trail played a role for some teachers in the sample to accept Madrasati during the pandemic.

> *A group of teachers and I worked on Classera before the COVID-19 pandemic. Initially, it was something new for us. But we got used to using it and noticed the difference in using technology in education. After that, Madrasati came, and we were ready to use it. So, the impact, surely, would have a positive effect. But honestly, Classera helped us to accept Madrasati during the days of the COVID-19 crisis.* (T13)

Within the current educational setting, as confirmed by T6 and T13, *'Teachers are skilful at using the platform'.*

While teachers generally expressed positive attitudes towards Madrasati, the findings of my study also indicate notable variations across subject areas. Science teachers, including those in mathematics, physics, biology, and chemistry, emphasised that the platform effectively facilitated flipped classroom strategies and promoted student self-directed learning. As T3 explained, *'Madrasati allowed me to upload explanations and resources in advance, so students could come prepared, and class time was then used for problem-solving and discussion'*. Similarly, T9, a chemistry teacher, observed that *'Madrasati helped my teaching by giving students materials outside class, so they could get an idea about what we will study in the next class'*. He further elaborated with a practical example, noting that *'in chemistry, students watched experiment demonstrations on the platform and then repeated them in the classroom with better understanding'*. Likewise, mathematics teachers also valued the platform, particularly for its efficiency in lesson delivery and its support for addressing individual differences, with T5 stating that *'it helped me in addressing the lower academic achievement of some students'.* These insights suggest that Madrasati was perceived by science and mathematics teachers as a tool that not only enhanced instructional efficiency but also created opportunities for more active and engaging forms of learning.

In contrast, some theoretical subject teachers such as English, Arabic, and social studies teachers expressed dissatisfaction with the content provided on Madrasati. They noted that the materials often failed to engage students and did not meet the pedagogical needs of their subjects. T16 commented, *'the content within the platform has become boring for some students'*, while T15 observed, *'the way lessons are explained on iEN channels is not attractive'*. In addition, an English language teacher T10 reported, *'I checked the educational content on the platform, especially for English, and I found nothing. I didn't find any educational activities that could help me in the teaching process'*. These perspectives indicate that, unlike in the sciences and mathematics, the perceived value of Madrasati in these disciplines was limited, highlighting the need for content that is more interactive, engaging, and tailored to subject-specific learning objectives.

Several teachers acknowledged that Madrasati enhanced communication and improved accessibility, making it easier for students and teachers to interact beyond the classroom. Teachers particularly highlighted the platform's value for students facing health or mobility challenges. For example, T5 noted that it allowed students with health issues to *'submit the important tasks required without being physically present at the school'*. Similarly, T8 explained that Madrasati *'enabled students who are absent due to illness or travel to stay up*

*to date with lessons and assignments'*, demonstrating the platform's capacity to reduce learning disruptions.

At the same time, teachers expressed concerns about potential drawbacks associated with prolonged digital exposure. T10 pointed out *'health concerns related to excessive use of electronic devices'* and the potential *'loss of handwriting skills'* due to the extensive reliance on digital tools. Others also highlighted challenges in maintaining student focus and engagement during online activities, with T12 noting, *'some students get distracted while using the platform, which limits the effectiveness of learning'*. These reflections indicate that while Madrasati offers significant accessibility and communication benefits, careful management is needed to mitigate health risks and ensure that students remain actively engaged.

### 7.2.2 Influence of Educational Content Quality on Teachers' Decisions to Use Madrasati

Initially, I categorised this theme as a code under the teachers' attitudes towards Madrasati theme. However, as it includes several fundamental underlying sub-codes, I separated it and treated it as an independent theme. Educational content refers to the digital learning content available on Madrasati, including electronic lessons, educational enrichments, digital textbooks, assignments, videos, and short exams. The educational content on Madrasati is different depending on the subjects taught in the curriculum. Teachers were questioned about the available content on Madrasati and whether it was sufficient and suitable for teaching and learning. The findings revealed evidence that teachers in this group expressed positive attitudes towards the Madrasati's content, which led to an improvement in their perceptions regarding the platform's usefulness. This theme includes four codes: efficient educational content, Insufficient e-textbooks, external educational content, and iEN educational channels. Table 7.6 shows each code, alongside its definition and an example extracted from the transcripts.

*Table 7.6 Codes, definitions, and examples for educational content theme*

| **Educational Content Quality on Teachers' Decisions to Use Madrasati** | | |
|---|---|---|
| **Code** | **Definition** | **Example** |
| Efficient educational content | This means the perceptions of teachers regarding the educational content integrated into Madrasati are that it is efficient and adequate for teaching and learning. | *'The platform serves as an archive for lessons. Each lesson on the platform includes lesson objectives, concepts, new vocabularies, educational enrichments, and some links to help students understand the lesson through videos. These resources are stored on the platform for a whole semester for the benefit of students.'* |
| Insufficient e-textbooks | This means the expressions teachers made about the textbooks being integrated into Madrasati. | *'There are some textbooks in Madrasati that are not updated. For example, students have the 2023 edition of their hard-copy textbooks, which were delivered to the school, while the platform provides the 2022 edition. In the digital textbooks on Madrasati, there are different topics, or the subjects may not be up-to-date with the current lesson topics, which is a minor issue in Madrasati.'* |
| External educational content | This code refers to the additional resources and materials integrated into Madrasati, which could include ready-made resources or educational enrichments that teachers can design and add to the platform. | *'Personally, I sometimes need to add experiments that are not shown or not included in the lesson content. I have to conduct the experiment, and add it as an enriching link, whether from YouTube or from any other website.'* |
| iEN educational channels | It means the expressions of teachers about the 'iEN' channels, which offer explanations from multiple teachers specialising in the same subjects. | *'There is a useful service on the platform called 'iEN' channels which is linked to the Ministry of Education. These channels contain explanations from people who work as teachers in the MoE. Consequently, the channels are very suitable for the students and for the platform as well. I find their presentations to be brilliant.'* |

Most teachers from the sample indicated that the content on Madrasati covers each subject in the curriculum, and the platform provides a wide range of educational materials, resources, and electronic textbooks. Thus, most basic needs are met, and there are supplementary educational enrichments available. However, in the case of unsuitable content, teachers have the choice to add external educational enrichments to the platform. Furthermore, the platform offers a useful service linked to specific educational channels, such as 'iEN' channels, which offer explanations from multiple teachers specialising in the same subjects.

Overall, Madrasati is considered a primary resource for the lessons taught in schools, providing comprehensive knowledge that both teachers and students can access at any time. As T9 expressed, '*the platform serves as an archive for lessons. Each lesson on the platform includes lesson objectives, concepts, new vocabularies, educational enrichments, and some links to help students understand the lesson through videos. These resources are stored on the platform for a whole semester for the benefit of students*'. Additionally, T3, T4 and T8 agreed that '*the content on Madrasati covers the curriculum*'.

> *The platform offers a variety of educational content. Students may find explanations for some lessons on the platform that they did not have the opportunity to attend during the school hours, either due to their absence or lack of attention in class. When they return to the educational content within the platform, they find explanations for these lessons in the form of video clips*. (T8)

However, in literary subjects like management and sociology, T15 noticed, there was a shortage related to these subjects: '*As for the subject I teach, there are available videos and PowerPoint presentations. But activities, test questions, and questions bank are very limited, especially in the subjects I teach. It depends on the specialisation*'.

A few participants shared their opinions and thoughts on certain aspects regarding the digital textbooks integrated into Madrasati. It was noticed that the versions of the e-textbooks were not updated to align with the current academic year. For instance, T6 highlighted, *'There are some textbooks in Madrasati that are not updated. For example, students have the 2023 edition of their hard-copy books which were delivered the schools, while the platform provides the 2022 edition. In the digital textbooks on Madrasati, there are different topics,*

*or the subjects may not be up-to-date with the current lesson topics, which is a minor issue in Madrasati'.* Another concern was expressed by T1, who stated, *'there are still some shortages because the content is copied from the textbook. If a teacher wants to add external educational enrichments, he/she must add them on his/her own'*. She illustrated her point by giving an example: *'the educational content on the platform shows the textbook as copied and printed images'.* Importantly, it was observed that students are not willing to read digital textbooks, which causes frustration for some teachers, particularly for elective subjects where the MoE planned to reduce the use of hard-copy books, as mentioned by T17 and T18. T17 elaborated: *'I conducted a survey among my students across different classes, asking them about the digital textbook. I found that none of them had browsed it. Not a single student had read the digital textbook on the platform, and I don't know why'.*

Moreover, the analysis of the interviews revealed that Madrasati offers teachers the option to add external resources and content to the platform. Teachers in the interviews referred to this feature as educational enrichments. Occasionally, teachers need to design, record, or include resources that are not already integrated into the platform. Instead of relying on the content available on Madrasati, teachers can incorporate specific content into the platform. As explained by T8, *'For me, I designed them myself because I have my own way of delivering knowledge to my students efficiently. Each teacher has his/her own approach to his/her students. Therefore, I tailored the PowerPoint presentations to align with my goals and the needs of my students. These presentations can be saved on the platform for future use'*. Another example was provided by T19, who stated, '*If I have a specific lesson today, I record the video the day before the lesson I want to teach, and then I add it to the educational enrichments on the platform. During the lesson, I tell my students that there is an explanatory video for the lesson in the educational enrichments on the platform*'. Furthermore, the content of educational enrichments may include a variety of resources, such as files, PDF documents, video or audio clips, and links to certain websites. T4 elaborated: *'Personally, I sometimes need to add experiments that are not shown or included in the lesson content. I have to conduct the experiment and add it as an enrichment link, whether from YouTube or another website'*.

Furthermore, the analysis found that video clips integrated into Madrasati are among the most beneficial resources, as stated by most teachers during the interviews. These videos are linked to the iEN channels and were recorded by specialist teachers in the same subjects as those provided in the curriculum. T3 explained:

*There is a useful service on the platform called the 'iEN' channels which is linked to the Ministry of Education. These channels contain explanations from people who work as teachers in the MoE. Consequently, the channels are very suitable for students and for the platform as well. I find their presentations to be brilliant*.

T15 clarified further: *'The iEN channels are a great educational resource for Madrasati. It contains a wonderful number of videos from different teachers. So, you find diversity in teaching methods; you have the choice to choose the teaching method through the videos that suits you'*. Conversely, T13 criticised the iEN channels, stating, *'I see that the videos or lessons on the platform rely on indoctrination. The educational content does not improve or provide knowledge to the students. I've noticed this on the videos on the iEN channels. I hope they improve in this aspect'*. Another concern was raised by T14 regarding the length of most iEN videos:

*Some students, to be honest, complain that iEN channels contain long videos, meaning that a teacher explains for about an hour. So, I think, some videos could be reduced, so that students can watch the whole video and capture all the points. For example, if it is possible to make video clips about half an hour or less, this would provide more benefits, in my opinion.*

He added, *'I believe one of the most effective resources a teacher can offer to students is to choose a video that doesn't exceed five minutes. I consider five minutes appropriate for video clips on the platform to increase the likelihood of students watching the full video'*. A further concern was highlighted by a digital technology teacher, who revealed that some topics in the practical part require more explanation than what is provided on Madrasati. T19 explained: '*The explanation on the iEN channels is the same as in the textbook, but it does not delve into other parts. Some educational videos or channels specialising in practical parts are excellent. So, I use resources beyond the iEN platform, as educational enrichments*'.

### 7.2.3 Influences on Teachers' Use of Madrasati Within the School Community

This theme represents the impact of the opinions and suggestions of school members regarding teachers' use of Madrasati. Teachers were asked how they perceive the attitudes or impressions of others in the school community towards their usage of Madrasati. The school community here includes three aspects: school leader, colleagues, and students. The interview findings indicated that teachers in this group might be influenced by school leaders, peers, and students to use Madrasati. The following table, Table 7.7, presents each code with its definitions and quotes selected according to each code.

*Table 7.7 Codes, definitions, and examples for school community influence theme*

| **Influences on teachers' use of Madrasati within the school community** | | |
|---|---|---|
| **Code** | **Definition** | **Example** |
| School leader influence | This means the influence of school leaders on teachers' decisions whether to use Madrasati. | *'The school leader encourages all teachers to activate the platform.'* |
| Peer influence | This refers to the influence of colleagues on teachers' decisions whether to use Madrasati. This influence could involve sharing opinions, exchanging experiences, or collaborating with others in using Madrasati. | *'Of course, any successful experience mentioned by any teacher regarding the students' benefits from the platform or the educational content will have a positive impact on me. In other words, this successful experience is a realistic and verified experience in getting benefits from the platform, and naturally, this will encourage me to continue using the platform.'* |
| Student influence | This code refers to how students' engagement, participation, and feedback about Madrasati influence teachers' decisions to use the platform. | *'When I find students excited about the platform, it definitely motivates me to use it more because now they are showing that they are benefiting from it.'* |

The teachers interviewed agreed that positive opinions about Madrasati, whether from school leaders, colleagues, or students, would motivate and encourage them to use the

platform. However, seven teachers indicated that the influence of school leaders was not important, clarifying that using the platform is a matter of personal conviction since it is not mandatory. On the other hand, sharing experiences and opinions among colleagues were found to be the most significant factors in encouraging teachers to use Madrasati. Furthermore, the data show that students' participation and engagement on the platform play an essential role in motivating teachers to use Madrasati.

The influence of the school leader was one of the social factors that influences teachers to use Madrasati. There was a general agreement that teachers would keep using the platform when they received encouragement from school leaders. T8 said, *'When I receive encouragement from the school leader, I will keep using the platform'.* Similarly, T15 noted that *'The school leader encourages all teachers to activate the platform'.* According to T8, the school leader provided encouragement, either directly to each teacher or through meetings held in schools. However, a few teachers expressed that the opinions of the school leader do not affect them.

> *It's ultimately a matter of personal conviction. Of course, the school leader encourages and motivates teachers to continue using the platform because it's one of the MoE projects. So, its usage and the use of technology have become essential. But as for the influence aspect, it's a personal matter as the platform is not mandatory. If someone is convinced of this thing, he will continue using it.* (T12)

In tandem with this, T9 believed, *'The benefits may be apparent to teachers who use the platform effectively, while those who are less involved with it, such as the school leader, may not recognise its benefits. So, their opinions don't affect me'.* Furthermore, some school leaders do not want to activate Madrasati in schools, as highlighted by T3 and P7. T3 explained, *'The school leader is not convinced about e-learning. She does not want to use it at all and prefers paper-based methods. Speaking for myself, I am not affected by her perception because I know the goals I can achieve through the platform. So, no matter what she says, it does not affect my opinion regarding Madrasati*'.

Additionally, peer influence was found to be an important factor in encouraging teachers to use Madrasati. During the interviews, teachers highlighted how sharing opinions and experiences among colleagues contributed to motivate teachers to use the platform. This

process involves exchanging knowledge, practices, and strategies through different tools and applications offered by Madrasati.

> *Of course, any successful experience mentioned by any teacher regarding the students' benefits from the platform or the educational content will have a positive impact on me. In other words, this successful experience is a realistic and verified experience of getting benefits from the platform, and, naturally, this will encourage me to continue using the platform*. (T7)

Likewise, T1 expressed, *'teachers, including those who have a new idea, can propose using programs like Form or OneNote to others to accomplish a task for a student or for a teacher. Sharing experiences among teachers gives them a strong push to continue using the platform'*. T17 shared his experience of how, even throughout the pandemic crisis, teachers struggled with using Madrasati: '*as school members, we relied on collaboration among ourselves. We created a group on WhatsApp, and teachers exchanged practices and experiences with each other'*. Conversely, teachers discussed the negative opinions voiced by colleagues related to Madrasati, stating that such opinions did not affect them.

> *Each teacher has her own idea and usage for the platform. Some teachers see themselves as not obligated to use Madrasati and do not find it useful, so they stopped using it. If they continued to use the platform and realised the benefits of using it, they would see differences in terms of the benefits. Would this affect me? No, not at all*. (T16)

In addition, most teachers mentioned that the impact of students' participation on the platform was one of the main reasons for using Madrasati. Using Madrasati is not mandatory for either teachers or students. Therefore, when students engage with the platform and interact with its content and activities, it demonstrates that students gain benefits from using Madrasati. This engagement motivates some teachers to use the platform, as T16 stated, *'When I find students excited about the platform, it definitely motivates me to use it more because now, they are showing that they are benefiting from it'.* Moreover, T12 provided further clarification on why students use Madrasati:

> *The students are somewhat interactive on the platform because Madrasati moves them away from the traditional patterns in the educational process. Technology is*

*now used primarily in all aspects of life, and when I employ technology in the educational process, I find students very active because technology and its use have become essential for them.*

However, five teachers in the sample noticed that students' participation on the platform had decreased, which affected some teachers' intentions towards using the platform. T8 commented, *'When I assign homework on the platform, even if I extend the deadline, I often notice that the number of students is below the average. In this case, my motivation to continue using the platform reduces'.* During the pandemic, students were using the platform extensively, which motivated some teachers to adopt the platform. T8 articulated, *'From my perspective, students were more engaged and used the platform more during the COVID period when it was mandatory. This was the biggest motivator for me to use the platform because the students relied on it and on the content within the platform'.* However, with the current education setting, he stated, *'there are assignments in books, notebooks, and on the platform. So, the motivation from the students has changed and decreased'.* This could be explained by the fact that some students may view completing tasks and activities on the platform as additional work. T5 elaborated, *'When students accomplish homework and tasks assigned to them through books, notebooks, or worksheets in the classrooms, they think of tasks on the platform as an additional responsibility. They feel they can't complete tasks on the platform along with the tasks in the school*'.

### 7.2.4 External Influences on Teachers' Decisions Regarding the Use of Madrasati

This theme explores the impact of other factors outside the school environment on teachers' use of Madrasati. Interviewees were asked about the IT support and training courses provided by the MoE regarding Madrasati. Data analysis revealed that more than half of the interviewees had attended training programmes during the crisis, when Madrasati was initially introduced. Moreover, teachers were questioned about resources available for using Madrasati, such as time, internet access, and suitable electronic devices. Most teachers indicated that time is not a significant factor, while the primary considerations are the availability of electronic devices and internet access, which are fundamental for using the platform. Two codes were identified under this theme, as presented in Table 7.8, with relevant examples.

*Table 7.8 Codes, definitions, and examples for external influences*

| **External influences on teachers' decisions regarding the use of Madrasati** | | |
|---|---|---|
| **Code** | **Definition** | **Example** |
| IT support and training | This code focuses on the training courses that teachers received during and after the crisis, and how these courses helped them to use Madrasati. It also sheds light on the importance of the IT team that supports teachers in using Madrasati. | *'I attended some training courses via Zoom during the early days of the COVID-19.'* |
| Resources availability | This code focuses on the availability of three key resources (time, internet access, and electronic devices) to support teachers in using Madrasati. | *'Honestly, the only obstacle for teachers, in my view, is the internet access. For the rest of the resources, everything is available.'* |

The interviewees indicated the importance of training courses and IT support, highlighting some negative aspects of some courses they received. Additionally, most teachers implied that time is not a significant factor, explaining that Madrasati can be used during school hours or after. Furthermore, teachers expressed that the internet access could be an obstacle for using the platform in some rural areas, while the availability of suitable electronic devices did not prevent most teachers from using Madrasati.

The sudden transition to e-learning during the crisis was unplanned, as most teachers were not adequately skilled well in using such a platform. During that time, the MoE offered some courses and initiatives virtually, helping educators in all school levels to successfully adopt e-learning. T3 stated, '*The platform during the COVID-19 time was something strange for us at the beginning. But after training and learning how to use it, we found it very easy. Now, dealing with the platform is not difficult at all'*. T5 revealed, '*Before the COVID-19 period, I noticed that most teachers had a limited interest in utilising technology and e-learning in any form. In my belief, part of the reason is that some teachers did not receive sufficient training courses in using technological tools*'. She further added, '*I attended some courses, especially at the beginning of the launch of the Madrasati platform, when we did not know how to use Madrasati*'. T18 clarified that most of the training courses offered to educators were under the general topic of e-learning, and Madrasati was mentioned within these programmes. He stated, *'There are no training courses specifically titled Madrasati. All of*

*training programmes are related to e-learning or distance learning. During these training courses, the Madrasati platform is discussed'.*

On the other hand, some teachers expressed dissatisfaction with training programmes they received. T11 revealed frustration after a course he attended, stated, '*I attended a course, but to be honest, I did not find the trainer to be an expert. This discouraged me, and I withdrew from taking any more courses, as I did not find them beneficial*'. Another teacher mentioned that a course delivered by the National E-learning Center was conducted in English:

> *The National E-Learning Center has made a significant effort, to be honest. They offered free courses. However, their courses were delivered in English. I remember taking a course through the National E-Learning Center, and it lasted for three months. But when I joined the course, I found that I need a translation for it.* (T17)

Furthermore, T16 tried to reach out to IT support through the icon when logging into the platform failed. He explained, '*I tried contacting IT support, but there was no response. The call signal continues a few times, then no one answers'.* The role of the MoE in implementing Madrasati during the crisis was evident, as many training courses were conducted to help teachers use the platform at that time. However, the need for additional training courses and IT support remains crucial in the current educational setting, as Madrasati continues to be developed and its icons are updated, helping teachers to use the platform without difficulties.

Time availability was one factor confirmed by most of the participants in the interviews, demonstrating that using Madrasati does not require a significant amount of time. For example, T3 explained, '*If we specifically mention time, Madrasati does not require a lot of time. For instance, I use Madrasati during my teaching sessions while I'm with my students. We watch a video, view pictures, or upload specific worksheets. So, I don't think time hinders the continued use of Madrasati*'. Additionally, T4 asserted that time is not considered a barrier to continue using the platform: '*Personally, I do not consider time to be a significant factor. Even when adding external educational resources, if these resources have been previously prepared by a teacher, they can simply be uploaded to the platform. I don't believe that doing these things takes much time*'.

Likewise, the availability of electronic devices was proved by most teachers, clarifying that Madrasati can be even accessed via a phone application. T15 mentioned the successful experience of using the platform during the pandemic, as most teachers used Madrasati for about two and a half years: '*Most teachers absolutely have the capability to afford electronic devices. The proof of that is the success of the Madrasati experience during the COVID-19 crisis for about two and a half years*'.

However, internet access was flagged up by almost half of the participants. Some areas in the Asir region still suffer from lack or weak internet connection. For instance, T4 explained, *'We have problems with the internet access. This is the only issue I can see, and it has a significant impact. It's the only primary tool of communication'*.

> *Through internet access, teachers can reach students via the platform and vice versa. Also, teachers can prepare lessons, take attendance, and show educational videos using 'iEN' channels. So, if there is a weakness or interruption in the internet access, the entire platform system becomes unavailable*. (T4)

T18 also agreed with this point: *'Honestly, the only obstacle for teachers, in my view, is the internet access. For the rest of the resources, everything is available'*. However, a few teachers asserted that the platform does not require a high-speed internet connection, claiming that any brief interruption of internet connection would not stop the use of Madrasati.

> *A brief internet interruption, in my opinion, does not affect it. The reason is that the platform is equipped by the Ministry of Education with proper preparation for the three academic semesters, including schedules, textbooks, and presentations. So, no matter how long a teacher or a student is away from the platform, they will find all the content still available.* (T3)

## 7.3 Discussion of the Qualitative Results

The interviews aimed to discuss in depth the survey results and delve into teachers' perceptions regarding the factors influencing the continued use of Madrasati in current teaching and learning environments. In Chapter 4, this study proposed a model suggesting that attitude, subjective norm, and perceived behavioural control are the main factors

affecting teachers' intentions to continue using Madrasati. Therefore, themes were developed based on these components to provide extensive explanations for each factor and shed light on some areas that need more nuanced information regarding the study question. Four themes and their related codes were identified as key factors for what could encourage, minimise, or prevent teachers' continuing to use Madrasati. Each theme will be discussed, with more explanation and evaluation with respect to the existing literature.

One of the key themes that emerged from the analysis was **teachers' attitudes towards Madrasati**. Previous studies focused on the fact that attitude towards technology is a crucial factor in revealing successful technology adoption (Alibrahim, 2024; Liu & Szabo, 2009; Njiku et al., 2019; Parlakkılıç, 2014). The significance of integrating modern technology into education was emphasised by the teachers in the current study during their interviews. The use of general terms such as e-learning, technology, and Madrasati, rather than focusing on a single phrase, demonstrated that teachers viewed technology more broadly as an essential educational tool. Technology had a positive impact on education during the COVID-19 pandemic, changing educators' opinions about its adoption. Although initially, the use of distance learning during the closures of schools during the COVID-19 associated lockdown was mandatory, over time teachers developed a favourable attitude towards incorporating technology into their current teaching practices. In line with this, Alibrahim (2024) concluded that the experience of using Madrasati during the pandemic opened opportunities for teachers to incorporate technology more effectively into their regular teaching practices. Furthermore, Winter et al. (2021) noted that the increased use of technology among teachers after the COVID-19 emergency was due to reliance on technology during the crisis.

In this study, teachers showed positive attitudes towards Madrasati, and these positive perceptions were mostly derived from them continuing to use Madrasati after the pandemic, as the platform was considered a primary support for teachers in the current educational context. The results are in line with those of previous studies carried out on Madrasati. For instance, Al Mahmud and Saqlain (2023) investigated motivation towards teaching English using Madrasati and found that all participants had positive perceptions of using the platform. Another study that examined the perspectives of secondary and middle school teachers concluded that teachers had favourable attitudes towards using Madrasati (Alqahtani, 2022). The analysis revealed that teachers were satisfied with using Madrasati, holding positive attitudes towards it. These findings, although specifically looking at

evaluating Madrasati, are consistent with international work examining different learning management systems. For example, Ehighae and Okoh (2024) shown that Nigerian teachers in Delta State showed a favourable attitude towards using LMS in teaching for secondary school classes. Additionally, Alhumaid et al. (2020) revealed that teachers expressed a positive perception of using e-learning during the COVID-19 crisis and its potential impact on students' learning performance in Pakistan. It was evident that most teachers in this study would keep using Madrasati due to their positive perceptions of the platform, suggesting that teacher attitude is an essential motivational factor to continue using Madrasati.

In addition, the perceptions of Madrasati's benefits were captured within this theme. Most teachers emphasised usefulness as a key factor that positively influenced their intentions to continue using the platform. Its greatest advantages, as determined by the interviews, are lesson preparation, supporting the teaching process, using different teaching strategies, ease of communication, and implanting virtual learning environments. This finding is in line with earlier studies. For example, Alkinani and Alzahrani (2021) reported significant improvements in lesson preparation among teachers using Madrasati. In addition, Alabdulaziz and Alhammadi (2024) demonstrated how the platform assists teachers in teaching mathematical concepts effectively, resulting in enhanced understanding and motivation to learn among the students. Moreover, Al Mahmud and Saqlain (2023) found that teachers wanted to continue using Madrasati due to its advantages in supporting various online teaching strategies, while Daraghmeh et al. (2021) noted that communication was perceived as one of the key advantages that Madrasati offers to teachers and students. Furthermore, Alibrahim (2024) indicated that a virtual environment was one of the teaching practices implemented by digital skills teachers after the pandemic, presenting lessons for absent students and providing additional knowledge that was not covered in school. These findings support the various uses of LMSs discussed by Liu et al. (2019) and Zakaria et al. (2020), who argued that LMSs enable diverse teaching and learning activities to be conveniently conducted on a single platform, which can facilitate the efficient management of the teaching and learning process. It was noted in this study that most teachers recognised many advantages of using Madrasati, which likely influenced their perceptions of the platform and led them to continue using it.

Perceived ease of use was a crucial factor for teachers to continue using the platform. Many studies in the literature have identified this as a key motivational factor for using Madrasati, as identified in studies such as those by Alenezi (2023a), Aldhafeeri and Alhedabi (2023),

Daraghmeh et al. (2021), and Sulaymani et al. (2022). The analysis revealed that Madrasati's ease of use was particularly significant for teachers who had little or no prior experience with educational platforms. Ensuring that the platform remains user-friendly is particularly important, as teachers might stop using Madrasati any time if they find it difficult. As mentioned by some teachers, the MoE is consistently working to develop and enhance the platform, making it easier than before. Interviewees noted that Madrasati requires only a few simple steps to accomplish teaching tasks such as lesson preparation, implementing educational strategies, and accessing office programmes. It was obvious that most of the teachers in this sample found Madrasati easy to use, which clearly influenced their perceptions of the platform and led them to continue using it.

Most teachers expressed confidence in using Madrasati, particularly referencing their experiences with the platform during the pandemic. The data show that teachers felt assured in their ability to use Madrasati and its tools, believing that this experience enhanced their capability to continue engaging with the platform. Considering the time that teachers have been using the platform, this level of confidence is reasonable, as Madrasati had been used for approximately four years. This finding is consistent with Alqahtani (2022), who reported that teachers became more familiar with technology after using Madrasati during the pandemic. Similarly, Moorhouse (2023) found that the experience with online platforms during the pandemic improved digital competence and confidence among Chinese primary school teachers, leading them to embed technology into in-person teaching practices. It was obvious that most of the teachers in this sample were confident about their skills when using Madrasati, which positively influenced their perceptions of the platform and encouraged them to continue using it. These findings may reflect the experiences of other teachers in different contexts of Saudi Arabia, as Madrasati was used extensively by all teachers during the COVID-19 crisis for about two years, which might affect teachers' perceptions about LMS platforms.

Another important theme that emerged from the interview transcript was the **influence of the quality of the educational content on teachers' decisions to use Madrasati**. Interviewees elaborated that the content on Madrasati is sufficient and suitable for teaching and learning and that the platform provides a wide range of content, including educational materials, additional resources, e-textbooks, and videos. Teachers mentioned that the content adopted for Madrasati covers the traditional curriculum. This aligns with a study conducted by Alsubaie (2024) with high school teachers in Jazan, who confirmed that Madrasati

effectively supports curriculum goals and delivers content efficiently. According to the report published by the MoE (2020), during the pandemic, the ministry supported digital learning by providing different educational resources. The initial steps in the curriculum design process involved establishing objectives, defining the structure, and selecting appropriate materials. Educational specialists in the same subjects provided in the curriculum then created videos, recorded audio, revised the content, and selected the best delivery strategies for each lesson. Nevertheless, some teachers noted a shortage of some content in theoretical subjects. Literary subject teachers interviewed in this study justified this by noting that scientific subjects need questions and interactive activities to be provided for students, whereas literary subjects are considered more theoretical in content.

The opinions of the participants regarding the e-textbooks integrated into Madrasati highlight some important issues that can affect teachers' adoption of online content. Although the MoE plans to reduce some printed books in certain subjects and make them available online in the future (Alharbi, 2024), one of the concerns raised in the interviews was that the e-textbooks were not updated to align with the hard-copy books distributed in schools during the current academic year. This misalignment raises questions from the participants about the reliability and applicability of the digital books offered, leading teachers to be reluctant to rely on them in the future. Another issue declared was that the e-textbooks on Madrasati were presented in a copy-based format similar to hard-copy books, making it difficult to highlight, take notes, and bookmark. This limitation may contribute to the reluctance among students to read e-books, as mentioned by an elective subject teacher in a survey conducted with his students. Similar concerns have been raised in the literature, where Evans (2017) highlighted that students often prefer print books due to limitations in the e-book format, such as difficulty in highlighting and note-taking, which could contribute to reluctance towards effectively using digital books. This suggests the necessity for ongoing updates and improvements to the content in Madrasati, particularly e-textbooks, while also focusing on some features that teachers and students perceive as useful and recognising that some resources may still need to remain in physical form. Addressing these issues is crucial not only for enhancing the quality of educational content but also for ensuring that teachers are motivated to integrate these online materials into the teaching process, thus creating a more effective and relevant digital learning environment.

Notably, the platform allows teachers to incorporate external resources, such as PDF documents, website links, videos, and activities, making lessons more comprehensive and

interactive. As highlighted by some interviewees, PowerPoint presentations sometimes need to be tailored to align with both teachers' objectives and students' needs, giving flexibility in lesson delivery. With this feature, teachers are able to enrich educational content on Madrasati in ways that might assist students in fully grasping all aspects of the lesson. This result is consistent with Josué et al.'s (2023) study, which highlighted that one of the greatest advantages of educational platforms is the flexibility they provide to teachers in incorporating external resources, thereby enhancing students' academic progress. Despite the fact that the iEN channels include a comprehensive collection of recorded lessons and were developed over several years prior to the pandemic (Alharbi, 2024), some interviewees criticised the iEN educational videos, stating that most of the videos focus on presentation and it requires time to watch each lesson in a full video. This might offer indications to the point that teachers might stop relying on the content at Madrasati and instead add external educational resources to the platform. In line with this, Laparra et al. (2023) revealed that there is an impact between students' academic performance and watching educational videos through LMS platforms, arguing that these videos can help in supporting students' learning and enhancing their outcomes. It can be concluded that the role of the MoE in providing and improving the digital material on Madrasati is a significant factor that can affect teachers' decisions whether to continue using it.

Additionally, as outlined in the theme of the **influence on teachers' use of Madrasati within the school community**, the interviews findings revealed evidence that teachers in this group might be influenced by school leaders, colleagues, and students in their decision to continue using Madrasati. These results reflect the findings of Masmali and Alghamdi (2021), who found that social influence is a key factor influencing teachers' intentions to continue using online learning. When teachers discussed the influence of school leaders, the data show that half of the participants were not affected by school leaders. Some teachers pointed out that using Madrasati was not mandatory, viewing it as a matter of personal conviction. A math teacher even mentioned that her leader was not convinced about activating e-learning with the conventional approach, stating that a school leader cannot recognise the benefits of using the platform in the teaching and learning process. This perception from school leaders might influence teachers' decisions to continue using Madrasati, as a study conducted by Alwani and Soomro (2010) found that limited support from school administrators partially contributed to the lack of e-learning implementation among Saudi teachers in Yanbu.

However, the influence of colleagues was perceived as a major factor that could affect teachers' intentions to continue using Madrasati. The interview transcripts show that any successful experience mentioned to teachers could encourage and motivate colleagues to adopt Madrasati. This result is consistent with a study conducted by Cheung and Vogel (2013), who identified a significant relationship between peer influence and attitudes towards technology. The exchange of experiences and discussions among colleagues was found to be an effective factor in motivating teachers to use the platform. Most teachers interviewed mentioned that they relied on collaboration with their colleagues, discussing their experiences via WhatsApp groups or even in person at schools. Even teachers who had no prior experience with technology tools and e-learning identified that sharing experiences was beneficial.

Moreover, students' engagement and attendance on the platform can positively motivate teachers to continue using Madrasati. The data show that when teachers observe high levels of student participation on the platform, they are more likely to continue using it. Although students were interactive when Madrasati was used to teach English in a study by Oraif and Elyas (2021), one English teacher interviewed reported that he has started to reduce his use of Madrasati because his students' attendance on the platform has fallen below average. According to Alubthane (2021), students sometimes need to be motivated by teachers to engage and participate in the platform, even those who lack enthusiasm for e-learning. It can be summarised that positive motivation from school leaders and colleagues, along with active participation from students on the platform, can encourage teachers to continue using Madrasati. However, this impact is limited, as teachers are more influenced by their colleagues than by school leaders and students.

The final theme that emerged as a factor behind teachers' intentions to continue using the platform was the theme of the **external influences on teachers' decisions regarding the use of Madrasati**. Although most of the teachers in the interviews attended training courses during the launch of Madrasati, a few were not satisfied with the training they received. One teacher expressed disappointment with the trainer, stating that he was not qualified to deliver such a course, while another teacher criticised the content of the course, noting that it focused on traditional classroom settings rather than on Madrasati. In line with this, Al Mahmud and Saqlain (2023) and Alenezi (2023b) asserted that teachers should be provided with professional training courses that enable them to effectively use Madrasati. Regarding the support that teachers need when encountering issues while using the platform, two teachers

commented on attempts to contact the technical support team through the icon on the platform, stating that there was no response. Providing help and support from the MoE is a crucial factor for teachers to continue using Madrasati, as highlighted by Alzahrani and Joseph (2024), who emphasised that government support is a key factor for the effective use of online education. The interview transcripts provide clear evidence of the insufficient support provided to training programmes for teachers in the use of Madrasati and its tools. This suggests that the MoE should re-evaluate its training policies regarding Madrasati in order to enhance teachers' abilities, which would directly motivate teachers to continue using the platform.

The availability of resources has a significant impact on the use of Madrasati, as highlighted by teachers in the interviews. Teacher perceptions about the viability and efficacy of delivering online lessons can be influenced by these resources, which can also affect how valuable they believe this new teaching method to be (Khong et al., 2023). The resources identified encompass three key aspects: time, internet access, and electronic devices. Firstly, participants mentioned that they did not consider time to be an issue when using Madrasati. Most teachers stated that they had enough time to work on the platform, believing that Madrasati can provide opportunities to manage and save time efficiently. According to Alasmari (2022), one of the factors that could encourage teachers and students to continue using Madrasati after the pandemic is the advantage of the platform to save time. Secondly, poor internet access was recognised as a significant factor that could hinder teachers from continuing to use Madrasati. Participants uncovered that internet access is limited in some areas, particularly in the Asir region, and some teachers stated that they would stop using Madrasati due to this limited access. However, three teachers mentioned that any brief interruptions of the internet did not prevent them from using the platform, as the content is retained and can be accessed at any time during the academic year. Thirdly, electronic devices were found to be an insignificant factor for most participants. Teachers mentioned that electronic devices are generally affordable for most teachers, and the platform can even be accessed through phone apps. This suggests that teachers can use the Madrasati application on their phones, in agreement with Alqahtani (2022), who noted that using Madrasati for tasks such as communication and recording attendance via phone was convenient. Furthermore, a few teachers attributed the success of the Madrasati experience during the COVID-19 crisis, which lasted for approximately two and a half years, to the way teachers relied on their own personal devices during that time. It was clear that internet

access is a primary factor regarding continuing to use Madrasati, while time and electronic devices are available for most teachers.

To conclude, although teachers in this study have favourable attitudes towards Madrasati, this phase shed light on other factors that might encourage or hinder teachers' intentions to continue using the platform. Among these factors, teachers expressed concerns about certain challenges that could obstruct the successful use of Madrasati such as shortage in the content of some theoretical materials, insufficient e-textbooks, dissatisfaction with provided training courses, and limited internet access. This study not only emphasised the important factors but also highlighted how other factors, such as educational content and previous e-learning experience, could motivate teachers to continue using the platform. Therefore, these results contribute significantly to understanding how teachers perceive the factors that might impact their intentions to continue using Madrasati.

## 7.4 Chapter Summary

In this chapter, I presented the details and outcomes of the qualitative phase of this study. This phase involved conducting semi-structured interviews with a sample of teachers who completed the survey and who indicated that they continue using the Madrasati platform. The purpose of these interviews was to provide a deeper understanding of teachers' experiences and perceptions of using Madrasati, and a deeper interpretation and clarification of the obtained quantitative results. A total of 19 secondary school teachers were recruited to participate in the follow-up interviews. Certain factors were investigated that could potentially encourage or hinder teachers' intentions to continue using Madrasati. Ultimately, four themes were identified, each with its corresponding codes, and examples were provided to illustrate each code. Notably, despite minor differences, the analysis revealed similar perceptions across teachers.

The findings contribute to a better understanding of the factors influencing teachers' perceptions and intentions to continue using Madrasati in the post-pandemic period. Teachers generally showed positive attitudes towards the platform and reported multiple benefits from integrating it into their teaching practices. Most teachers found Madrasati easy to use, which positively affected both their views of the platform and their intentions to continue using it. Many expressed confidence in using the platform, particularly based on their experiences during the pandemic. The content available on Madrasati was considered

sufficient and suitable for teaching and learning, offering a wide range of resources, including educational materials, e-textbooks, videos, and additional materials. However, some limitations were identified, such as shortages in theoretical subjects, e-textbooks not updated to align with the hard-copy books distributed in schools, and iEN videos that primarily focus on presentation and require significant time to watch in full. Teachers' decisions to continue using Madrasati were also influenced by colleagues and students. While most teachers had adequate time and owned electronic devices needed to use the platform, internet access remained a primary challenge in SA, particularly in rural areas. Furthermore, interview transcripts highlighted insufficient support through training programmes and IT support, underscoring areas for improvement to sustain effective use of Madrasati.

# Chapter 8 General Discussion: Integration of Quantitative and Qualitative Findings

In this study, data collection was performed using mixed research methods in an explanatory sequential approach, wherein quantitative data were gathered first, followed by a qualitative method. Triangulation will occur by integrating quantitative results with qualitative insights, highlighting where the findings converge, complement, or diverge. This approach allows for a nuanced discussion of teachers' intentions to continue using Madrasati, ensuring that interpretations are informed by both numerical patterns and participants' perspectives. Data analysis in the quantitative phase was accomplished using SEM to examine teachers' intentions to continue using Madrasati based on the proposed model. Additionally, to gain a deeper understanding and to discuss areas that were unclear in the survey, follow-up interviews were conducted and analysed using the reflexive thematic approach. In this chapter, I will combine the findings of both phases and present them using the weaving approach proposed by Fetters et al. (2013) to acquire a more comprehensive understanding of the study topic.

## 8.1 Synthesis Approach

The main objective of this study is to investigate the factors influencing secondary school teachers' intentions regarding continuing to use Madrasati in Saudi Arabia. To fully address the research question, this study will delve into the similarities and differences among the quantitative (numbers) and qualitative data (descriptions) gathered through a synthesis approach. Through this approach, a wider understanding of teachers' perspectives regarding Madrasati adoption can be achieved and hence assessing how Madrasati can be used effectively in the educational process. It can be helpful to use the strengths of one approach to clarify the ambiguities and weaknesses of another (Othman et al., 2020). By combining and presenting both phases, quantitative and qualitative results, three possible insights may emerge (Fetters et al., 2013). The first, confirmation, arises when findings from each data type support those of the other. The second, expansion, occurs when results differ, offering unique perspectives and covering different aspects of the topic. Lastly, discordance happens when findings conflict, which, though contradictory, still requires further exploration to understand the differences (Fetters et al., 2013; Morgan, 2019). In this study, the first case

applies as most of the qualitative findings confirm the quantitative findings, adding more in-depth understanding of the research problem.

By examining both types of data simultaneously, I can generate new ideas, such as clarifying the obtained quantitative findings. For instance, the qualitative analysis identifies different aspects of the IT team helping teachers to use the platform effectively. Therefore, qualitative/quantitative synthesis may provide insights into the different perspectives that school teachers have about Madrasati, as well as a broader understanding of their motivations and enablers to continue using Madrasati successfully.

At this stage, data synthesis was achieved by presenting the key findings from both phases in parallel, organising them according to the factors in the proposed model. The weaving technique was employed to seamlessly integrate and narratively report the main results. This approach was clarified by Fetters et al. (2013), involving integrating and reporting both qualitative and quantitative findings based on themes or concepts in a single or multiple reports. The choice of this integration method stems from the way qualitative and quantitative data interweave around shared concepts, with the results connected to each other through these concepts. In the following sections, I will present the combined results from both phases, along with relevant studies for each concept.

## 8.2 The Novel Combined Framework

The findings of this study were synthesised using the proposed model, further interpreted through the Technological Pedagogical Content Knowledge (TPACK) framework to provide a deeper understanding of how teachers' knowledge dimensions influence their behavioural intention towards using Madrasati in the post-pandemic era. The combination of the two models can offer a new and inclusive perspective of the continuance intention of teachers to use Madrasati. Whereas the proposed model focuses on the behavioural determinants of intention as determined by attitude, subjective norm, and perceived behavioural control, TPACK describes the multidimensional base of knowledge that teachers need to have in order to be effective technology integrators. The merged model acknowledges that the technological, pedagogical, and content knowledge (TK, PK, and CK) of teachers not only affect the nature of their attitudes towards using technology but also determine their perceived control level and their perceived normative beliefs in the teaching and learning practices. This model provides a link between the behavioural intention theories and the

pedagogical competence models by integrating TPACK into the proposed model. It emphasises that the further use of technology in digital learning conditions not only relies on the beliefs in behaviours but also on the abilities of teachers to substantially associate the technology with pedagogical approaches and content transmission. This integration, therefore, provides a more comprehensive explanatory insight that reflects both the reasons for its adoption by teachers to persist with the use of Madrasati and the capabilities of their professional knowledge that allow such prolonged use of Madrasati. Figure 8.1 illustrates the integration of the proposed model and the TPACK framework, explaining teachers' intention to continue using Madrasati.

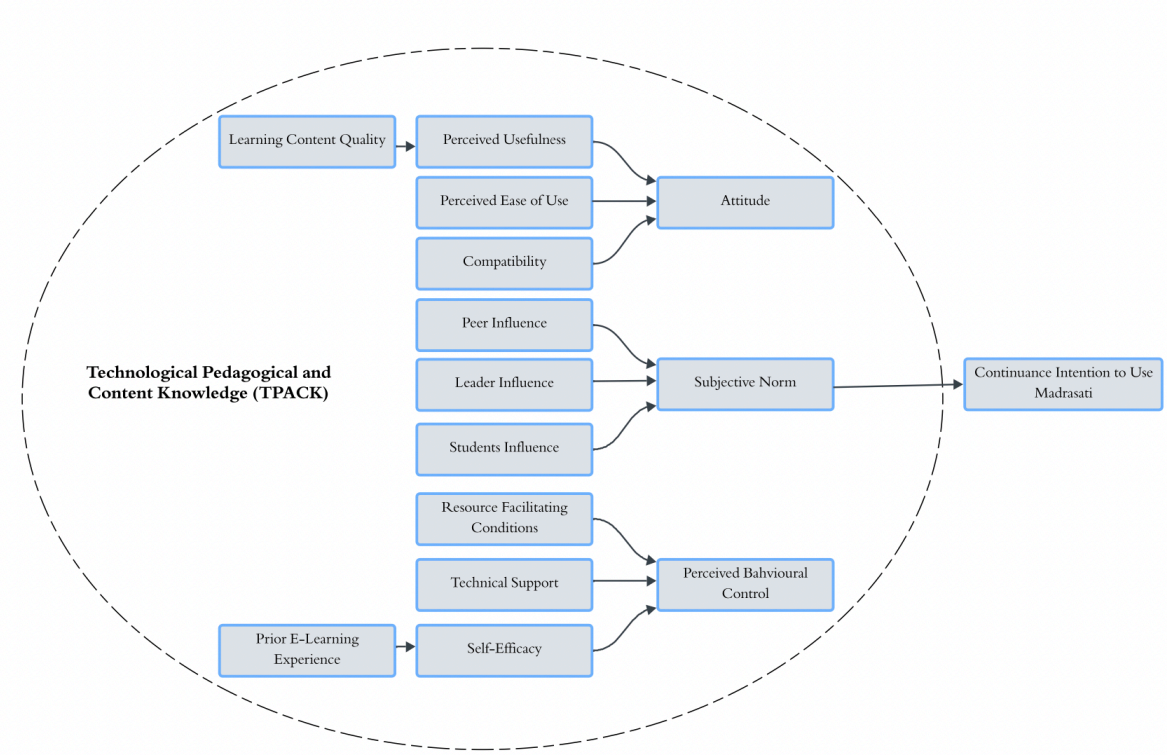


*Figure 8.1 The combined framework (the proposed model and TPACK)*

The three primary components of the proposed model include attitude, subjective norm, and perceived behavioural control. Each dimension provides insights gathered from the analysis conducted in this study. In the quantitative phase, SEM was employed to statistically analyse the collected data and test the hypothesised paths presented in Chapter 4. Accordingly, the findings illustrate the relationships between the factors, where some relationships are more significant than others, and these factors are more likely to influence teachers to continue using Madrasati (see Chapter 6, Table 6.20 and Figure 6.8). Additionally, during the qualitative analysis, several themes emerged from the follow-up interviews, confirming the

previously obtained data, and offering further understanding about the employment of Madrasati in teaching and learning contexts (see Chapter 7, section 7.2). The next sections will delve deeper into each factor in the proposed model, drawing from findings obtained from both phases, further interpreted through the TPACK framework to provide a deeper understanding of how teachers' knowledge dimensions influence their intentions to continue using Madrasati.

### 8.2.1 Attitude

Attitude (ATU) refers to teachers' perceptions of their Madrasati usage, whether positively or negatively. Data analysis from the questionnaire phase revealed that ATU significantly influences continuance intention (CIM) ($\beta$ =0.454), supporting hypothesis H1 presented in Chapter 4. Moreover, ATU emerged as the second most influential factor after social norm (SN). Compared to the perceived behavioural control (PBC) factor, teachers' attitudes towards Madrasati have a greater impact on their intentions to continue using it. In other words, a more positive perception towards Madrasati usage increases teachers' intentions to continue using the platform. In general, the majority of teachers in the quantitative phase have positive attitudes towards Madrasati, leading them to continue using it.

The qualitative findings support the questionnaire results regarding ATU. Most participants in the interviews showed a favourable attitude towards Madrasati, and most teachers in the sample emphasised the significant role of technology adoption in education, considering Madrasati one of the latest platforms in the Saudi education system. Moreover, the platform enables teachers to apply some pedagogical approaches, thereby making the learning environment more effective and attractive. The interviewees stated that using Madrasati was a key goal to increase their efficiency and productivity levels, and most teachers mentioned how Madrasati can help students improve their learning and explore new alternatives to the traditional learning method. All these data indicate teachers' satisfaction with the adoption of Madrasati in the teaching and learning environment.

The results can be explained with the help of the TPACK model, which provides an understanding of the knowledge background that informs teachers' positive attitudes towards using Madrasati. The positive attitude of teachers demonstrates their capacity to integrate technological knowledge (TK)—the knowledge of how to use and navigate the platform—with pedagogical knowledge (PK)—the knowledge of how they should organise

and teach their lessons—and content knowledge (CK)—the knowledge of how they should master the subject matter. Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) can be viewed through the observations offered by teachers concerning Madrasati, increasing the interaction level in the classrooms, which creates new pedagogies and higher learning results. When teachers integrate these areas, it is noted that they are building TPACK, and therefore can make significant relationships between technology, pedagogy, and content in order to achieve successful learning experiences. As such, their disposition in relation to Madrasati is not only an affirmative gesture but also a show of their career competencies and trust in the application of combined knowledge to facilitate technology-based teaching.

A number of recent studies have explored teachers' attitudes towards technology. For instance, Hoq (2020) investigated the rapid adoption of e-learning in Saudi Arabia during the pandemic and observed a growing positive attitude among teachers towards this mode of education. Another study examined teachers' intentions to continue using online tools after the pandemic period and found that a positive attitude is a significant factor encouraging Indian teachers to adopt these tools in their teaching practices (Bajaj et al., 2021). Additionally, Wang et al. (2020) explored the attitudes of K-12 teachers in China towards online learning platforms during the COVID-19 crisis, indicating that more than 60% of teachers showed a positive attitude towards using e-learning. Based on the questionnaire results, interview findings, and supporting studies, it can be concluded that attitude plays a critical role in motivating and encouraging teachers to continue using Madrasati.

Three factors influence ATU: perceived ease of use (PEU), perceived usefulness (PU), and compatibility (COM). The results show separate path coefficients for each element, with PU being the most influential factor ($\beta = 0.344$), followed by PEU ($\beta = 0.249$) and then COM ($\beta = 0.213$). The only path that affects PU is learning content quality (LCQ) with a path coefficient of ($\beta = 0.619$). Further details on these factors will be explained in the following sections.

### 8.2.2 Perceived usefulness

Perceived usefulness (PU) refers to the extent to which teachers believe that utilising Madrasati will enhance their performance as well as enhance their effectiveness. The data

analysis from the questionnaire phase shows that PU significantly impacts teachers' attitudes towards using Madrasati, with a path coefficient of ($\beta = 0.344$). Therefore, the hypothesised path H2 in Chapter 4 was supported, indicating that teachers' attitudes towards using Madrasati are heavily influenced by their perceptions of its usefulness. The findings from the quantitative phase show that most teachers benefit from adopting Madrasati, resulting in positive perceptions towards it.

In the qualitative phase, the findings concurred with the results obtained from the quantitative phase relating to PU. Most teachers illustrated how using Madrasati enables them to organise educational tasks and achieve the most planned objectives. Through lesson preparation, Madrasati offers teachers valuable tools, including objectives, materials, assignments, and short tests. Previously, lesson preparation was done manually, often in a notebook, and some teachers noted that lesson preparation was often ignored before Madrasati was implemented. However, with Madrasati, teachers emphasised how useful lesson preparation on Madrasati is for organising objectives, materials, and lesson structure to help students learn more effectively.

This perceived usefulness is in line with the Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) elements of the TPACK framework. The fact that teachers are capable of using the digital tools provided by Madrasati to plan their lessons proves that they are knowledgeable about the way in which technology can be used to simplify pedagogical planning and content delivery. Through the platform, to organise objectives, resources, and assessment, teachers combine their technological knowledge (TK) with their pedagogical skills (PK), creating coherent and effective lessons for teaching students better. In addition, this integration indicates aspects of TPACK since educators do not use technology as an LMS tool only but as a strategy to develop content- or pedagogically based learning conditions. Therefore, their acknowledgment of the utility of Madrasati when it comes to lesson preparation can be taken to mean that TPACK has found a useful place in making the processes of teaching more streamlined and better in quality.

Among the benefits mentioned in the interviews with teachers regarding the use of Madrasati was the implementation of various teaching strategies in the current educational context. During these interviews, half of the teachers highlighted several teaching strategies facilitated by the platform. The first method mentioned was the flipped classroom approach. This method, according to the participants, is the most effective strategy to employ through

Madrasati. However, it requires students to be reminded to access and prepare for the lesson on the platform a day before. Subsequently, on the following day, the teacher can explain the topic utilising another strategy since students have been familiar with the lesson through the platform. Another strategy mentioned was the KWL strategy, which revolves around three questions: what do students know, what do they want to learn, and what have they learned (Ogle, 1986). One teacher explained this method by uploading a sheet through the platform containing three squares. In the first square, students write what they know, what prior knowledge they have. In the second square, they write what they should know. In the last square, they note what they learned from the lesson. This strategy helps students organise their thoughts before, during, and after learning a lesson.

This finding demonstrates a clear manifestation of Technological Pedagogical Knowledge (TPK) and Pedagogical Content Knowledge (PCK) within the TPACK framework. The application of Madrasati by teachers to introduce teaching methods like the flipped classroom and KWL shows that they can align technology with the right pedagogical instruction to increase students' interest and understanding of the concepts. The flipped classroom practice demonstrates teachers' awareness of the role of technology (TK) as a means of facilitating pedagogical sequencing (PK) through the implementation of higher-order activities that occur in class after students are exposed to information pre-class. Analogously, the KWL strategy created on the platform also shows that teachers are aware of the technological nature of organising reflective learning processes that can mediate between known information and emerging knowledge, and that manifest PCK and TCK. Therefore, the fact that teachers assign practical value to Madrasati in implementing varied measures in the teaching and learning process demonstrates the active interplay of technological, pedagogical, and content knowledge on which fruitful digital learning is based.

Another benefit stated by the interviewees was how Madrasati facilitates independent learning. This method enables students to learn in a real personalised learning environment using the platform's resources. Students can access full lessons through the iEN channels available on Madrasati in case of a class suspension or absence due to weather fluctuations or emergency situations. In other words, the platform serves as an alternative tool for teachers when students are unable to attend school. The experience of using the platform during and after the COVID-19 crisis has opened opportunities to encourage students to adopt self-directed learning, as some of them have shown a preference for this new method.

Previously, many students lacked the skills and ability to engage in self-learning, as they were used to waiting for teachers to begin classes at 7:30 a.m., with one teacher following another until the end of the school day. However, with Madrasati, students now can review, attend, or watch previous lessons at home, allowing them to plan and prepare for upcoming lessons. Additionally, some topics in the digital technology subject, especially at the high-school level, require the self-learning method. Using this strategy allows teachers to upload content to the platform, enabling students to learn through interactive content, exploration, and self-assessment. Even if students do not attend school regularly, such as external students who attend school only during final exams, they can learn through the self-learning strategy via the platform.

This benefit reflects teachers' growing skill in Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) within the TPACK framework. The use of Madrasati to facilitate self-directed learning provides insights into how teachers may use technology to transform conventional teacher-centred learning into learner-centred environments. Their ability to create and post interactive and exploratory online material portrays TCK, with teachers taking advantage of technology in depicting subject matter in a manner that enables independence and more meaningful understanding. Moreover, through the opportunities for personalised learning and self-assessment, teachers demonstrate TPK, showing an understanding of how pedagogical practices, including self-paced or blended learning, can be effectively implemented with the help of technology. With this combination of technological, pedagogical, and content knowledge (TPACK), teachers can help students become more independent and adaptive, once again asserting the perceived usefulness of the platform as a sustainable form of continuing and flexible learning.

Along with the benefits mentioned above, the effectiveness and usefulness of communication through Madrasati were key advantages of adopting the platform in the current educational environment. It has facilitated both quick and formal communication between teachers and students. Teachers today tend to avoid informal communication with students, preferring instead to use official platforms. In this regard, Madrasati offers a convenient and positive experience, avoiding technical complications that may arise with other platforms not specifically designed for educational purposes. Furthermore, the platform supports student learning by enhancing effective interaction between students and teachers. Specifically, Madrasati allows teachers to engage with individual students, particularly those with low academic achievement, to support their learning. For instance,

the limited time available during school sessions can make it challenging to assist students struggling with certain subjects, such as mathematics. However, Madrasati enables teachers to interact with students and provide tailored exercises to improve their understanding. Another useful feature of Madrasati is that it keeps parents informed about their children's academic progress, especially when students' performance falls below expectations.

This observation shows how Technological Pedagogical Knowledge (TPK) and Pedagogical Content Knowledge (PCK) can be embodied in the TPACK framework. The enhanced communication provided by Madrasati is an example of how teachers make strategic use of technology to mediate effective pedagogical interactions and provide individualised support. When teachers engage students through the platform and its communication tools to meet their various academic needs, especially the needs of those experiencing academic issues, it is clear that teachers have a sound knowledge of how Technology Knowledge (TK) can be used to bolster Pedagogical Knowledge (PK) to help students master the material (CK). The fact that the technology tools are correlated with pedagogical purpose and content delivery, and that they enable the development of follow-up activities, performance monitoring, and progress reporting to parents, reflects the integration of TPACK. Thus, teachers' perception of Madrasati as a useful communication platform underscores their capacity to employ integrated knowledge to create inclusive, interactive, and supportive learning environments.

Additionally, with the use of Madrasati, virtual classrooms can be created to provide a secure online learning environment. Virtual classrooms can take two forms: live virtual 'synchronous' lessons and non-virtual 'asynchronous' ones. Teachers can interact with their students, address any concerns, answer questions, and assign tasks and activities. As pointed out by some teachers in the interviews, Teams is used to create virtual classrooms and study rooms to explain lessons and certain parts at mutually agreed times between students and teachers. Also, Madrasati offers a virtual computer program that simulates realistic laboratory experiments. This program comprises tools, equipment, chemicals, glassware, and three-dimensional graphics, enabling students and teachers to conduct a wide range of chemical and physical experiments, control experimental procedures, and record findings. One chemistry teacher highlighted the challenges of acquiring certain chemical materials in his school, emphasising the usefulness of conducting full virtual chemical experiments through the platform.

This result reveals how Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK) operate within the TPACK framework. The fact that teachers use Madrasati to establish both synchronous and asynchronous online classrooms shows that they have knowledge of the extent to which technological applications can be used to improve content delivery and engagement through the assistance of various pedagogical modalities. The use of virtual labs highlights TCK, as teachers integrate technology to simulate real scientific experiments and represent complex content in accessible and interactive forms. At the same time, the design and facilitation of online lessons that allow a balance between live teaching and independent learning are a manifestation of TPK, reflecting the fact that the pedagogical frameworks of teachers are appropriately modified to correspond to the technological medium. The combination of these knowledge areas shows how TPACK can be put into practice, as teachers integrate their technological, pedagogical, and content knowledge to give resource-efficient learning experiences that reflect real-world applications.

Although some benefits of integrating Madrasati into the teaching and learning environment have been highlighted in this study, several drawbacks have also mentioned. One significant issue, as noted by a few participants in the interviews, is the value of visual and physical communication. The importance of students' feelings and teachers' movements within the physical classroom was emphasised, highlighting their unique value. One comment raised around this topic was that real communication cannot be replaced by anything else, further elaborating on how interactions with students during regular face-to-face classes differ significantly from those in virtual classrooms. This concern aligns with Shu and Gu's (2018) study, which concluded that face-to-face interaction is generally more in-depth and effective than interaction in an online environment. Teachers can adopt Madrasati when interaction in schools is impossible, such as during weather conditions that lead to student absences. They also still have the option to use it for different functionalities, such as reaching additional resources, submitting homework, and utilising many tools provided by the platform, which can foster students' learning in the current educational settings.

This limitation might be seen in the light of Pedagogical Knowledge (PK) and Technological Pedagogical Knowledge (TPK) as concepts of TPACK. The limitation concerns are revealed in the teacher reflection, which can be observed in the realisation that technology-mediated pedagogy reduces the richness of face-to-face communication, emotional signs, and bodily classroom interactions. Their recognition of these limitations indicates their understanding

of the interplay between pedagogy and technology. Teachers realise that a certain number of the learning outcomes, including affective engagement and non-verbal feedback, will be better attained with traditional pedagogical practices. This implies that teachers are not rejecting technology but rather evaluating its pedagogical affordances and boundaries. It highlights the essentiality of integrated moderation—taking advantage of Madrasati where it improves the learning process without losing the traditional approaches to elements of teaching that rely on physical and emotional communication.

Additionally, some interviewees revealed a potential decline in handwriting skills among students, attributed to extensive engagement with technology which can distract them from traditional writing and reading methods. As stated by an English teacher, education fundamentally relies on acquiring knowledge through reading and writing skills. However, with the full usage of e-content on Madrasati in some elective subjects, there is a growing concern among interviewees that students' handwriting skills have declined. The frequent use of digital devices for note-taking and assignments means that students are less likely to practice traditional handwriting, which can impact their ability to write legibly and fluently by hand. Accordingly, some teachers noted, through a survey distributed to some students, that the widespread adoption of technology has resulted in decreased skill levels in reading among their students. Furthermore, two teachers agreed that the extensive use of technology, possibly influenced by platforms like Madrasati, has led to a diminished inclination for reading and writing among students nowadays. It has been noted by Osman (2023) that technology could potentially contribute to the impact on students' writing, showing how the evolution of technological tools could play a role in decreasing students' handwriting. It is important to preserve a balance between the use of digital tools and the development of basic handwriting skills to ensure that students benefit from both technological advancements and traditional writing methods.

This perceived drawback is associated more with Content Knowledge (CK) and Technological Pedagogical Knowledge (TPK) in the TPACK model. The issue of the decrease in students' handwriting and reading skills, as expressed by some teachers in the interviews, indicates their awareness of the influence of an excessive rate of technological use on the development of core content-based capabilities. These are traditionally implemented through direct, manual interactions with learning materials. Their considerations point to a conflict within the context of TPACK trading the benefits of digital technologies for maintaining foundational literacy skills. The fact that teachers are aware of

this matter is also a strong manifestation of pedagogical reasoning (PK), as they do not only consider what to do with technology to teach effectively but also when it might negatively affect important learning outcomes in unintended ways.

Different studies align with the results above. For instance, Alqahtani (2022) examined English teachers' views on using Madrasati after the crisis and highlighted several benefits, such as promoting self-directed learning, enhancing learner autonomy, and enabling the acquisition of knowledge beyond traditional classroom settings. In light of the survey responses and interview findings, it can be inferred that using Madrasati has been observed positively in the current educational settings, as most teachers in the sample gained various advantages from the platform, motivating them to continue using it.

### 8.2.3 Learning Content Quality

Learning content quality (LCQ) is defined as the suitability of digital resources and content prepared on Madrasati for the teaching and learning process, and this content involves lessons, assignments, quizzes, and educational videos. The statistical results from the questionnaire phase revealed a significant positive impact of LCQ on PU, with a path coefficient of ($\beta$=0.619). Consequently, the hypothesised path H5 in Chapter 4 was supported, representing that the perceived usefulness is positively influenced by the learning content quality. This suggests that teachers hold favourable attitudes towards the content on Madrasati, implying that Madrasati provides useful, complete, and adequate digital content for teaching and learning process.

The data collected from the follow-up interviews align with the above results. Most teachers expressed positive attitudes towards the content available on Madrasati, emphasising that the content provides various educational materials such as PowerPoint presentations, assignments, tests, and e-books. According to the participants, the platform effectively meets the fundamental elements required for education, and additional supplementary materials are also accessible. In light of this, to address the issue of unavailable content, teachers have the choice to add external educational enrichments to the platform. However, a social studies teacher highlighted that while there are available videos and PowerPoint presentations for the subject he teaches, the range of activities, interactive exercises, and questions bank is very limited. This limitation, as he mentioned, is particularly noticeable in literary subjects, which are considered to have theoretical content.

Such results in the quality of learning content align directly with the Technological Content Knowledge (TCK) and Technological Pedagogical Content Knowledge (TPACK) domains. The fact that teachers positively rate the digital content of Madrasati is based on the fact that it is possible to assess how the subject knowledge can be represented using technology. The acknowledgment of educational materials provided by the platform, including e-books, presentations and assignments, proves that teachers are aware of the ability that technology (TK) can assist and enrich content knowledge (CK) through structured and multimedia materials. Simultaneously, this does not disprove the fact that teachers have criticised the lack of interactive and content specific resources, as that demonstrates that they understand that they need to match the pedagogical approach (PK) to technological application to encourage more engagement, especially in theoretical or text-based courses. This commentary indicates that educators are applying the TPACK logic, and it is determining which of the technological possibilities of Madrasati address content demands and what further pedagogical development is needed. Therefore, the wisdom by teachers underscores the fact that successful technological integration lies not in content access only, but in teachers' capacity to modify and complement such access using their integrated technological, pedagogical, and content knowledge.

In addition, the platform provides a valuable service connected to specific educational channels, such as the iEN channels, which provide explanations from multiple teachers specialising in the same subjects. Nevertheless, one teacher from the sample stated that the iEN channels consist of pre-recorded content and employ a teaching method identical to traditional classrooms. These channels involve a teacher standing in front of a camera with a whiteboard behind him, explaining lessons in a conventional manner, without using graphics or creative approaches to present the materials. Another teacher highlighted the length of videos recorded on the iEN channels, suggesting that shorter clips would be more beneficial for students to watch full lessons. It is important to take these considerations into account to ensure that teachers perceive the educational content on Madrasati as useful so that they decide to continue using it.

This finding reflects the strong association between Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK) in the TPACK framework. The application of the educational streaming channels like iEN is an indication that technology can complement content delivery. The fact that teachers can value these features

demonstrates that they are conscious how these tools might facilitate content comprehension (CK) using effective pedagogical design (PK). On the other hand, teachers raised some issues such as unattractive presentations and lengthy videos. This suggests that teachers are assessing the quality of content together with its pedagogical integration in Madrasati. Therefore, the digital content should combine interactive elements, concise delivery, and creative visualisation. Hence, this aspect will enhance the platform's alignment with TPACK principles, making it seem more useful and increasing its continuance adoption among teachers to apply them during their teaching processes.

Prior studies stressed the importance of the online learning content quality. For example, Shishah (2021) recommended improvements to certain scientific materials on Madrasati, including assignments and tests, to enhance their accessibility and quality. Similarly, Almaiah et al. (2022) examined factors impacting students' attitudes towards using Madrasati during the COVID-19 crisis, highlighting the importance of content quality in enhancing its effectiveness and ensuring the successful use of the platform. More broadly, LCQ was widely recognised as a critical component of LMS success, as several studies identified content quality as a key factor influencing user satisfaction with LMS platforms. For instance, Otto et al. (2022) found that information quality generally impacts user satisfaction towards using LMS, and this information quality includes the accuracy, relevance, and up-to-date nature of content. Additionally, Naveh et al. (2012) found that five essential success factors are important in enhancing student satisfaction with LMS: content currency, content completeness, user-friendly interface, accessibility, and instructor's support. The first two factors are directly related to the quality of learning content, emphasising its importance in the success of LMS platforms.

To conclude, Madrasati is considered a primary resource for the lessons taught in schools, providing comprehensive knowledge that both teachers and students can access at any time and from anywhere. This association is reinforced by the study's quantitative findings, with the majority of teachers highlighting the importance of the learning content in terms of usefulness. Consequently, these explanations demonstrate that the platform provides useful e-content, which appears to increase teachers' positive perceptions of the platform and encourages them to continue using it.

### 8.2.4 Perceived Ease of Use

Perceived ease of use (PEU) is defined as the degree to which teachers believe that utilising Madrasati's tools would be free of effort. The data analysis from the quantitative phase shows that PEU is determined to be the second influential factor affecting teachers' attitudes towards using Madrasati, with a path coefficient of ($\beta = 0.249$). Therefore, the hypothesised path H3 in Chapter 4 was supported, indicating that teachers' attitudes towards using Madrasati are influenced by their perceptions of the platform's ease of use. This implies that teachers' attitudes are affected by the usability of the platform's tools. In other words, if Madrasati is easy to use, teachers' attitudes will be more inclined towards continuing to use it. Madrasati was perceived as easy to use by the majority of teachers based on the survey items, indicating that using the platform and its tools involves little effort.

The results of the teachers' interviews support these findings. Most teachers highlighted that Madrasati is easy to use, expressing satisfaction with its usability and indicating that they continue to use it. Furthermore, with the assistance of programs and collaboration with Microsoft, teachers were able to easily conduct various educational tasks through Microsoft Office 365, Teams, OneNote, and Forms, such as communication, lesson planning, short quizzes, and tracking students' progress. The MoE has dedicated efforts, aiming to implement regular updates to ensure that the platform remains easy to use. According to some teachers interviewed, progressive improvements have been made to the platform, exceeding its previous versions. Initially, during the COVID-19 crisis, the platform had limited usage for a period of time, but now the platform receives constant updates, introducing new features to improve the current educational process. This ease of use has played an important role in motivating most teachers to continue using Madrasati. In other words, if the platform had been perceived as an exhausting experience, teachers would not be able to continue using it.

The perceptions of teachers about the use of Madrasati as being easy to use align with the Technological Knowledge (TK) and Technological Pedagogical Knowledge (TPK) components of TPACK. The fact that teachers can operate and use a range of integrated tools, such as Teams and OneNote, indicates that they possess a high level of technological ability, which forms the foundation of their competence to design, communicate, and manage pedagogical processes effectively. The constant updates from Madrasati's developers to its interface and tools have also contributed to the enhancement of TPK among

teachers, enabling them to incorporate these tools into their teaching methods without encountering difficulties that may cause cognitive or technological overload. This integration indicates that usability can make teachers more confident in adopting technology to achieve pedagogical objectives, which is a critical foundation for the successful implementation of TPACK. This means that the perceived ease of use not only encourages teachers to remain engaged with Madrasati and its tools but also enhances their understanding of how technology can be adopted to enhance the teaching and learning processes.

In this study, it was found that some teachers have a busy school schedule—a teaching load—in current educational settings (see Table 6.6). This necessitates that any new technological tools be straightforward, seamlessly integrated, and compatible with teachers' daily routines. Time constraints are consistently identified as a significant barrier to technology adoption in the literature. For instance, Francom (2020) carried out a study with K–12 teachers in public schools in a North Midwestern U.S. state, with a survey that lasted over three years, finding that time was the most persistent and stable challenge for teachers in integrating technology. Although the access to technological tools and resources was significant during that time, the limited time remained a major obstacle for teachers. Additionally, a qualitative study on the classroom routines of Dutch secondary school teachers highlighted the need for educational technologies to be seamlessly adopted into teachers' daily tasks, emphasising that understanding teachers' existing tasks is important for designing technologies that require minimal effort, thereby facilitating smoother integration into daily activities (An et al., 2017).

As mentioned in the literature, a study by Alkinani and Alzahrani (2021) discovered that Madrasati was considered easy to use by most teachers, suggesting that the platform still receives constant developments and improvements over time in terms of its tools and interface. Another study involving secondary and middle school teachers revealed that those teachers perceived Madrasati as easy to use, even though they had not received any prior training courses in utilising the platform (Alqahtani, 2022). Concerning LMS more broadly, Waris and Hameed (2023) expanded TAM to examine Pakistani faculty members' intention to use LMS during COVID-19, concluding that user-interface design, perceived ease of use, and teachers' innovativeness have a positive influence on their intention to use it. To summarise, the survey results, interview findings, and supporting studies indicate that Madrasati was perceived as easy to use, suggesting that the platform should continue to be

improved and developed to ensure that teachers remain motivated and encouraged to continue using it.

### 8.2.5 Compatibility

Compatibility (COM) is defined as the extent to which Madrasati fits with the tasks and subjects taught by teachers in schools. The data analysis from the quantitative phase revealed that COM has a slight impact on teachers' attitudes towards using Madrasati, with a path coefficient of ($\beta = 0.213$). The hypothesised path H4 in Chapter 4 was supported, indicating that teachers' attitudes towards using Madrasati are influenced by their perceptions of the platform compatibility. This means that Madrasati, with its tools and content, is compatible with the subjects that teachers deliver in their classrooms. The findings from the questionnaire indicate that most teachers found that Madrasati is compatible with the nature of the curriculum and the goals of subjects, thus causing a positive effect on teachers' attitudes towards adopting it.

In the follow-up interviews, most teachers highlighted that Madrasati aligns with the curriculum goals, covering all topics found in the students' books. However, a vocational education teacher pointed out that some subjects, such as Arabic language, life skills, and professional education, are not adequately designed on Madrasati. Teachers need to search and add materials to the platform with relevant content to be compatible with the curriculum they teach. A digital technology teacher also mentioned that the questions bank lacks some questions and not all homework assignments are available on the platform. Some lessons do not include homework, so teachers must add them manually. In contrast, subjects like science, mathematics, physics, chemistry, and English language are effectively used by most teachers due to their alignment with the curriculum. It was noticed that teachers have recognised the importance of curriculum compatibility in Madrasati in getting positive attitudes towards using the platform. This compatibility is crucial as it can impact teachers' intentions to continue using Madrasati.

Curriculum compatibility also indicates the interaction between Technological Content Knowledge (TCK) and Technological Pedagogical Content Knowledge (TPACK). The fact that teachers acknowledge that Madrasati can be used to meet the goals and resources of some subjects, such as science and mathematics, proves how the platform facilitates the integration of technology into specific disciplinary materials. Having such digital tools and

resources that align with curricular objectives, teachers can also apply pedagogical strategies more effectively and easily to fit their school subjects, resulting in a combination of technology, pedagogy, and content. On the other hand, missing content in some subjects, such as Arabic and vocational education, highlights areas where TCK is not as developed and efficient as it should be. The efforts of teachers to manually enrich and enhance the materials illustrate their active engagement in TPACK-based practice, as they modify educational resources in order to maintain curricular compatibility with the platform.

Compatibility is an important element that could influence teachers' perceptions towards Madrasati. However, there are notable variations in how this is achieved across different subjects, with some curricular areas being better supported than others. For instance, science topics, including mathematics, physics, and chemistry, are well-prepared in Madrasati, while literary and humanities subjects receive less attention from the platform's developers. This may suggest that either a) Madrasati needs to be updated, or b) teachers may need to accept that the platform is better suited to support learning and teaching in some areas but not in others. In line with this, a study by Gamage et al. (2022) conducted a systematic review of one of the most popular LMS platforms, Moodle, covering the period from 2015 to 2021, revealing that over 60% of studies mentioned this platform in association with the STEM field. This suggests that LMS might be used more in science and technology disciplines compared to literary and humanities subjects.

### 8.2.6 Subjective Norm

Subjective norm (SN) refers to the influence of opinions and suggestions from school members on teachers' decisions regarding the use of Madrasati, and school members represented in this factor include school leaders, colleagues, and students. Data analysis from the quantitative phase shows that SN significantly impacts the continuance intention (CIM), with a path coefficient of ($\beta$ =0.501). This result supports hypothesis H6 presented in Chapter 4, indicating that a teacher's intention to continue using Madrasati is significantly affected by SN. Precisely, the low standard deviation score in SN (SD = 0.884) indicates limited variability around the mean, meaning that the teachers generally held similar opinions and expressions regarding the survey items. Furthermore, SN emerged as the most influential factor on CIM when compared it to attitude and perceived behavioural control. These explanations imply that the opinions of others in the school community have a significant effect on teachers' decisions concerning the continuance use of Madrasati.

In the follow-up discussions, participants explained that teachers' intentions towards using Madrasati can be influenced by the opinions of school members, indicating that the school community has an impact on teachers, and therefore, the SN can influence teachers' intentions to use Madrasati. Moreover, most interviewees mentioned that exchanging successful practices among teachers can encourage them to use Madrasati effectively. The engagement of students and participation on the platform positively influences teachers' use of Madrasati, although, in the absence of support from school leaders, teachers were still willing to continue use the platform.

The school community plays a crucial role, as teachers support and encourage each other in adopting new tools for teaching and learning. The influence of peers and students appears to be particularly significant; when teachers recognise the value a new tool offers learners and have the support of colleagues—who are often undergoing the same learning journey—they are more willing to invest effort into adopting it. This occurs even in the absence of clear guidelines, policies on e-learning, and support from leadership. Despite this, there should be ongoing support from the school administration or even broader educational authorities to facilitate collaboration among school members, as this study has shown it to be the most influential factor affecting teachers' willingness to use the platform. This perspective aligns with previous research, such as that of Rahman (2019), who explored the gap between teachers' perceptions and the actual practice of peer support in the educational environment in Bangladeshi primary schools. The study reveals that teachers recognise the importance of peer support for professional development. However, the implementation of these collaborative practices is often less active due to some challenges such as time constraints, lack of institutional support, and resistance to collaboration. The study also highlights the need for more structured and institutionalised peer support programs to enhance teaching practices and teacher development.

In the proposed model, there are three factors impacting SN: leader influence (LI), peer influence (PI), and student influence (SI). The quantitative analysis revealed that there was no significant impact from LI on SN, whereas PI and SI significantly affected SN, with path coefficients (β) of 0.324 and 0.524, respectively. Further details on these factors will be clarified in the following sections.

### 8.2.7 Leader Influence

The leader influence factor (LI) concerns the effect of the principal of a school on teachers' intentions towards using Madrasati. It was used in this study to examine the influence of headteachers on encouraging teachers to use Madrasati, aiming to improve students' learning. In the quantitative analysis, the relationship between LI and SN was found to be negative and insignificant (p-value = 0.286 > 0.05), thereby the hypothesis H8 in Chapter 4 was not approved. This result shows that most teachers from the survey sample did not feel encouraged and motivated by school leaders to use Madrasati.

In teachers' interviews, some of the participants indicated that the school administration, whether the school leader or vice principal, encourages and motivates teachers to continue using Madrasati, considering it one of the MoE latest projects to integrate technology into the teaching and learning process. This encouragement is provided by the school leader, either directly to individual teachers or to all teachers through formal meetings or WhatsApp groups. On the other hand, most teachers realised that using Madrasati is a matter of personal conviction since the platform is not mandatory in the present educational environment. They feel convinced about the platform and observe the benefits Madrasati offers students, prioritising their perspectives on this matter. Furthermore, using the platform for virtual classes is not something some school leaders want to encourage, and this reluctance, as explained by a few teachers, stems from the potential for facing questions and criticism from external parties, such as the MoE or the Center of Educational Supervision, who may monitor virtual classes and session performances as well as the attendance of students and teachers. This could deliver useful insights to the MoE and call for the need for clear policy and guidance regarding the usage of virtual classes alongside the current conventional approach.

The role of school leadership in teachers' use of Madrasati can be explained through both Pedagogical Knowledge (PK) and Technological Pedagogical Knowledge (TPK). When leaders encourage the integration of Madrasati, they create a technological educational environment that supports the development of TPACK among teachers. Such leadership helps to bridge the gap between teachers' pedagogical knowledge (PK) and their technological knowledge (TK) by promoting technology integration through formal meetings conducted in schools or through regular communication.

The role of the school leader is crucial in facilitating the effective use of Madrasati and its tools within the current educational settings, and school leaders should encourage and support both teachers and students in adopting this new style of education. Consistent with previous studies, Sadaf and Gezer (2020), in their study on the factors influencing teachers' use of technology, emphasised that support from school administration is essential for the integration of digital literacy among teachers. Furthermore, Schiller (2003), in his investigation of how elementary school principals facilitate change through ICT integration, identified several key responsibilities for school leaders: establishing a supportive environment, organising internal training sessions, providing guidance, and consistent monitoring and evaluation. To conclude, this study found that the influence of school leader did not have an effect on SN in relation to teachers' intentions to continue using Madrasati.

### 8.2.8 Peer Influence

Peer influence (PI) represents the opinions and views of colleagues on teachers' intentions towards using Madrasati. PI is a second important factor that affects SN. The relationship between PI and SN was found to be significantly affected in the quantitative analysis, with a path coefficient of ($\beta = 0.324$). Therefore, the hypothesised path H7 in Chapter 4 was supported, indicating that teachers' decisions towards using Madrasati are influenced by their peers. Most responses in the survey statements indicate that teachers in the sample were influenced by their colleagues regarding the use of Madrasati, which means the support and encouragement of colleagues within the school community play an essential role in shaping teachers' decisions to continue using Madrasati.

There was consistency between the qualitative and quantitative phases of the study related to PI. In the qualitative phase, the majority of teachers supported teaching through Madrasati with most encouraging and motivating their colleagues to activate Madrasati for certain tasks such as correcting assignments, taking student attendance, preparing lessons, managing syllabi, and monitoring students with low academic achievement levels. One teacher stated that during the COVID-19 crisis, teachers found some challenges in using Madrasati. Nevertheless, some teachers relied on collaboration by creating a WhatsApp group to exchange practices and share experiences. It was noticed that collaboration among teachers proved effective, facilitating the discussion of successful experiences and practices in implementing Madrasati tools. Furthermore, when considering the influence from a negative perspective, most teachers in the interviews revealed that those negative opinions and

expressions do not affect their usage of the platform. Since the platform is not mandated in the current educational environment, most teachers believe that the benefits of Madrasati are obvious to those who use it regularly, disregarding the negative opinions expressed by some teachers who do not use or engage with the platform.

The findings on peer influence reflect a clear link between Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) within TPACK. The collaborative culture among teachers, such as sharing teaching strategies and developing new approaches, illustrates how social interactions can contribute to collective TPACK development. By observing and learning from colleagues' effective practices, teachers can enhance their understanding of how technology might support both pedagogy and subject content, which improves their confidence and supports sustained engagement with Madrasati. Moreover, the ability of teachers to remain unaffected by negative opinions from some colleagues reflects a mature form of TPACK integration, where competence and understanding of technology's value outweigh external social pressure. This demonstrates that positive peer interactions help not only as a form of social influence (as identified in the proposed model) but also as a source for knowledge exchange and professional learning, which allows teachers to refine and implement integrated technological, pedagogical, and content knowledge effectively in their teaching practices.

In this study, peer influence played a pivotal role in shaping teachers' intentions to continue using Madrasati. This finding aligns with Sangeeta and Tandon (2021), who reported that teachers were generally influenced by their colleagues when adopting e-learning tools in teaching practices during the crisis. Venkatesh et al. (2003) argued that in mandatory cases, such as during the COVID-19 crisis when Madrasati was imposed, social influence becomes a stronger predictor of behaviour. Conversely, in voluntary contexts, social influence tends to diminish over time and eventually becomes nonsignificant. Notably, the findings from this factor show that, even after restrictions were lifted and Madrasati became optional, teachers remained influenced by their colleagues' positive opinions and suggestions, which in turn encouraged them to continue using the platform. This can be interpreted as evidence that successful adoption requires the establishment of a collaborative network among teachers to support one another during periods of change. According to McConnell et al. (2020), educators are more willing to embrace new innovations if they collaborate with their peers often or work in an environment that promotes these innovations. Colleagues can help with the decision to integrate or assist in using Madrasati by offering insightful information.

The likelihood of choosing to adopt Madrasati may also increase with school leadership support, which encourages collaboration among teachers to exchange successful experiences.

### 8.2.9 Student Influence

Student influence (SI) is defined as the impact of students on teachers in using Madrasati, and this influence can stem from students' engagement with Madrasati or the opinions they express about the platform. In the quantitative phase, SN was significantly affected by SI, supporting hypothesis H7 in Chapter 4. The path coefficient for SI is 0.61, indicating a significant influence on SN, and this influence is the strongest predictor among PI and LI. Hence, teachers in the survey sample were highly influenced by their students in adopting Madrasati.

Through the qualitative phase, teachers emphasised the positive aspect of students' interactions with Madrasati, highlighting their role as active partners in using the platform. When technology is employed in the educational process and students are guided in its proper usage, it can have a significant positive impact on students' learning experiences. In this regard, students become eager to check for updates on the platform and anticipate any new activities, and this enthusiasm motivates teachers to continue using the platform, as they observe active engagement from students. On the other hand, some teachers noticed a shift in students' motivation and a decrease in engagement on the platform. During the days of the COVID-19 crisis, students were more engaged and used the platform extensively when the platform was mandatory. This was a significant incentive for some teachers to incorporate Madrasati into their teaching practices, as students relied heavily on the platform and its content during that time. With the current educational context, assignments for some subjects might have been distributed across different methods including books, notebooks, and the online platform. Teachers highlighted that some students perceive tasks on the platform as optional or supplementary, viewing completing assignments on the platform as an additional duty alongside tasks assigned in classrooms. Students might feel unable to manage both sets of tasks simultaneously. Technology can facilitate educational tasks, making them easier. Instead of using traditional methods, such as pen and paper, students can employ different software to create projects and presentations. Accordingly, some of the teachers in the interviews strive to increase student motivation by assigning short exams and delivering them through the platform.

These results have a strong correlation in the interaction between Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK). The teachers' descriptions of students as active, motivated participants illustrate how the effective use of technology enhances learner engagement, which are core aspects of TPK in understanding how technology can support pedagogical goals. In addition, teachers adjust their teaching approaches by creating online presentations and assessments that align with students' digital habits. This reflect a practical implementation of TPACK, in which technology tools are integrated with both content and pedagogy. From teachers' reflections, it becomes clear that they understand the necessity of matching the design of technology with the motivational needs of students.

In line with earlier studies, Sadaf and Gezer (2020) examined the factors impacting teachers' intentions to integrate digital literacy, finding that teachers were influenced by their perceptions of students' attitudes. The author indicated that when teachers perceive students as willing to use technology, they are more motivated to integrate it into their teaching. Teachers can perceive students' engagement and participation on Madrasati in various ways; however, students' use of the platform might not necessarily align with teachers' strategies. Each individual utilises the platform differently. For example, teachers may use it for lesson planning, entering students' grades, or tracking students' progress, whereas students may use it to access additional content, communicate with peers, and design projects using Microsoft Office applications available on the platform. Nevertheless, there are contexts in which teachers can directly perceive students' engagement and participation on the platform, such as during synchronous classes, through assignments and tests conducted via the platform, and through communication and feedback exchanged between them. In line with this, Moskovich and Hershkovitz (2024) investigated teachers' perceptions of student engagement in online learning environments, illustrating how teachers were encouraged to refine or adapt their teaching methods to better support and enhance student engagement.

### 9.2.10 Perceived Behavioural Control

Perceived behavioural control (PBC) in this study refers to teachers' beliefs regarding the required resources and confidence in their ability to use Madrasati. Data analysis from the quantitative phase revealed that PBC has a slight influence on continuance intention (CIM), with a path coefficient of ($\beta = 0.297$). This finding supports hypothesis H10 presented in

Chapter 4, which demonstrates that perceived behavioural control positively influences teachers' decisions to continue using Madrasati. Furthermore, PBC proved to be the least influential factor in terms of CIM compared to ATU and SN. Stated differently, respondents in the questionnaire items indicated their proficiency in using Madrasati. In addition, all the necessary resources, skills, and knowledge for using the platform tools were sufficient and available for most teachers.

The discussions in the follow-up interviews revealed that there was little emphasis on digital learning in schools prior to COVID-19. However, the commitment to using Madrasati during the COVID-19 crisis facilitated a gain of new skills and experiences, thereby leading to a favourable impact on the effective adoption of Madrasati among most teachers. Moreover, participants pointed out that time alone is not typically cited as a reason for not using the platform. The primary considerations included the availability of internet access and electronic devices, which are fundamental requirements for using the platform. Without a suitable electronic device and internet access, teachers were unable to use Madrasati effectively or engage with its features.

The participants' perceptions of this factor, PBC, revealed important points regarding the extent to which teachers intend to use Madrasati. Prior to the COVID-19 crisis which required many teachers to rapidly shift to online learning, many had limited experience with LMS platforms and were using traditional face-to-face methods in their teaching. Trust and Whalen (2021) mentioned that prior to the COVID-19 crisis, technology integration in schools was rarely used and was often limited to basic technological tools and applications. According to Masmali and Alghamdi (2021), teachers' unfamiliarity with technology created initial challenges in adopting Madrasati. However, the response to control the spread of the virus prompted a swift transition to e-learning, leading to significant developments in teachers' knowledge, skills, and perceptions over time. A study by Dindar et al. (2021) examined the digital competence of teachers at a Finnish university during the early stages of the COVID-19 pandemic. The study found that teachers who had no prior experience using LMS evaluated their competence as having increased more than those with previous experience, suggesting that the rapid transition to online teaching during the pandemic significantly developed teachers' digital competence. Having sufficient time to use and adapt to the platform, reliable internet access, and the availability of electronic devices were also critical enablers of online learning. This assumption is consistent with Almahasees et al. (2021), who stated that infrastructural support, including technological resources and

institutional supports, are factors affecting teachers' ability and willingness to utilise online learning platforms. Without these resources, a lack of perceived behavioural control was likely a significant factor influencing teachers' intentions to use the platform. Thus, the current findings support the claim that PBC is influenced by and dependent on external factors that either enable or hinder Madrasati use, and that external factors can shape perceptions of behavioural control, including self-efficacy, resources, and IT support and training.

These results directly reflect the foundational role of Technological Knowledge (TK) and Technological Pedagogical Content Knowledge (TPACK) in shaping the perceived behavioural control of teachers. The experience of COVID-19 was considered as a driving force in enhancing teachers' technological proficiency. It highlighted the importance of external facilitating conditions such as infrastructure, and resource availability in strengthening their integrated knowledge and applying it effectively in practice. In that sense, when teachers have dependable devices and internet connectivity, they can develop and apply their TPACK by creating lessons, managing materials, and teaching through Madrasati. On the other hand, when technology or internet access is limited, teachers will lack the chance to improving their digital skills. Therefore, strong institutional support and adequate resources are essential for teachers to build confidence and effectively use Madrasati in their teaching.

PBC is affected by three factors: resources facilitating conditions (RFC), technical support (TS), and self-efficacy (SE). The only predictor of SE is the prior e-learning experience (PEE). The quantitative analysis results show that only SE significantly influences PBC, while no relationships were observed between RFC and TS to PBC. Therefore, SE has a particularly significant impact on PBC with a path coefficient of ($\beta = 0.524$), while PEE was found to be the strongest predictor among all the factors in the proposed model, with a path coefficient of ($\beta = 0.712$). More details about these factors will be discussed in the following sections.

### 8.2.11 Resources Facilitating Conditions

Resources facilitating conditions (RFC) are concerned with all the required resources that teachers need to use Madrasati, including four elements: time, money, suitable electronic devices, and internet access. The statistical findings from the questionnaire indicate that RFC

did not have any significant impact on PBC, provided the p-value was (0.495 > 0.05). Consequently, hypothesis H10 in Chapter 4 was not supported. Moreover, a high deviation score was observed in RFC (SD=1.177), indicating that teachers held diverse opinions and experiences related to the survey questions concerning this variable. Overall, teachers in the survey implied that certain resources and equipment do not significantly impact the use of Madrasati. For instance, internet access might be important for the platform participation, while other resources, such as time, money, and suitable devices, could be available to most teachers using Madrasati.

Interviewees expressed similar opinions regarding the resources and equipment required for using Madrasati. Firstly, participants mentioned that time is not considered a limiting factor when using the platform with most teachers commenting during their interviews that they have sufficient time. Participants perceived that working on Madrasati did not demand a significant amount of time, as it could afford them opportunities for time management. Moreover, participants highlighted that a teacher's role extends beyond the school's boundaries. Teachers need to dedicate one to two hours daily to perform several tasks such as preparing lessons, grading assignments and tests, and providing feedback to some students. Consequently, Madrasati can assist teachers in dealing with these responsibilities. Secondly, interviewees stated that electronic devices were accessible to most teachers, which was evidenced by the success of the Madrasati experience during the COVID-19 crisis over approximately two and a half years. However, as per the qualitative findings, internet access might be unavailable in some rural areas in Saudi Arabia, hindering the proper use of all the platform features. Through internet access, teachers can contact students using the platform, and vice versa, and teachers can prepare lessons, take attendance, and show educational videos using the iEN channels inside schools. Therefore, if the internet connection is unavailable or interrupted, the platform's entire system becomes inaccessible. Nevertheless, a few teachers believe that brief internet interruptions do not significantly affect their intentions to continue using Madrasati in the future, arguing that such interruptions are too brief to be a major issue.

These results show that Technological Knowledge (TK) and Technological Pedagogical Content Knowledge (TPACK) are important elements in supporting teachers to manage their responsibilities through Madrasati effectively. As teachers reflect on time management and efficiency, this explains how a strong foundation in TK helps them to leverage the platform's tools to streamline pedagogical activities such as lesson preparation, grading, and providing

feedback, reflecting the application of TPK in practice. Additionally, the availability of electronic devices supports teachers' consistent engagement with the platform, while poor internet access highlights the importance of further technical support and infrastructure from the MoE. Therefore, providing appropriate facilitating conditions can help teachers apply and improve their TPACK, ensuring they can use Madrasati efficiently.

Similar to findings reported in earlier studies, Randa (2022) highlighted that one of the advantages of Madrasati is that the method of presenting tools on the platform is very easy to use and it does not require much time to work on them. In addition, Al-Thumali (2021) concluded that Madrasati allows teachers to utilise time more effectively than the traditional approach to delivering physical education lessons in Saudi primary schools. The challenge observed in this study was that, during the school day, some teachers often struggle to balance their teaching responsibilities. Teachers are required to dedicate time outside teaching hours on tasks beyond lesson delivery, such as lesson preparation, grading assignments and tests, and providing individual feedback to students. Accordingly, using technology is one potential approach to assist teachers in better managing these duties. Precisely, LMS platforms, such as Madrasati, may simplify teaching duties, enabling teachers to organise and prepare lessons, automate grading, monitor student progress, and improve communication among teachers and students. According to a study examining teacher workload in England and Wales and how ICT can alleviate this burden, the integration of ICT tools can reduce some teaching tasks, leading to a perceived reduction in workload, which, in turn, increases productivity and provides more time for direct teaching activities (Selwood & Pilkington, 2005). It can be concluded that the platform enables teachers to manage time effectively for various educational tasks, such as preparing lessons, following up with students, and distributing assignments and tests, leading to greater productivity and better time management in their work.

Since internet access is a crucial factor in motivating teachers to effectively use online learning platforms (Masmali & Alghamdi, 2021), most interview participants highlighted it as a significant influence on their intentions to continue using Madrasati. Although the internet infrastructure has been extensively developed across all areas of Saudi Arabia over the past five years (Unified National Platform, 2022), several studies still identify weak or interrupted internet access as a major issue in some regions when using online learning (Al Mahmud & Saqlain, 2023; Alabdulaziz & Alhammadi, 2024; Alalwani, 2022; Alasmari, 2022; Aldossari & Altalhab, 2022; Alenezi, 2024; Alibrahim, 2024; Alsalim, 2021). It is

important to emphasise that limited internet access in some rural areas represents a significant obstacle to the successful use of Madrasati by most Saudi teachers. A collaboration between the MoE and other governmental authorities, such as the Communications and Information Technology Commission, is recommended to address this issue, ensuring that teachers and students can access and use Madrasati effectively.

### 8.2.12 Technical Support

The technical support factor (TS) encompasses all solutions provided by the IT staff to assist teachers in effectively using Madrasati. This factor includes several elements such as training courses on how to use Madrasati, immediate assistance through the IT support icon when teachers encounter difficulties in using the platform, and regular improvements and updates to the platform. In the quantitative data analysis, the relationship between TS and PBC was found to be negative and statistically insignificant (p-value = 0.062 > 0.05), resulting in the rejection of hypothesis H12 outlined in Chapter 4. This suggests that teachers in the survey sample were dissatisfied with the IT solutions, including training programmes and technical assistance. Such dissatisfaction could potentially impact teachers' intentions to continue using Madrasati.

Teachers expressed differing opinions about the training courses and IT support during the follow-up interviews. Initially, during the COVID-19 pandemic, when teachers started using the platform, training courses were available for almost half of the interviewees. These courses covered basic topics, including general information about the Madrasati interface, lesson preparation, and adding educational enrichments. While a few participants found Madrasati easy to use, others turned to watching YouTube tutorial videos offered by voluntary teachers or sought assistance from fellow teachers at their schools. After a while, as a result of the daily usage of Madrasati, a few teachers commented that training courses were no longer needed, as they had become skilled in using the platform and its tools. Furthermore, a few teachers pointed out that if they require guidance on new updates or features added to the platform, they can readily find relevant courses from the educational administrations. However, two teachers were not satisfied with the courses they attended. One teacher claimed that the trainer lacked the necessary qualifications and knowledge to teach technology, while the other commented that the course offered by the National E-Learning Center was conducted in English, which made it difficult for him to understand the whole course. Different studies conducted around Madrasati highlighted the need for further

training courses (Alabdulaziz & Alhammadi, 2024; Aladsani et al., 2022; Aldossry, 2021; Alibrahim, 2024; Alsubaie, 2024). In summary, it was shown that training courses on Madrasati should be reintroduced, expanded, and enhanced to encourage teachers to use the platform more effectively in the current education environment.

Despite some participants in the sample emphasising the simplicity of using Madrasati, two teachers reported attempting to contact the IT team through the IT icon after facing login issues, but they received no response. They noted that the call signal rang several times without being answered. This implies that the MoE should consider improving IT support on the platform to provide effective assistance and guidance for teachers and students who are experiencing any issues in the future.

On the other hand, regular updates and improvements were made to the platform's icons, with the aim to enhancing its usability for both teachers and students. Some participants noted that some icons initially had issues but were updated and improved over time with new icons being added. Furthermore, several teachers recently observed improvements in the platform, elaborating that the platform has now reached an excellent standard. It is evident that the MoE is currently focused on improving the platform beyond its previous limitations. Whereas the use of Madrasati was restricted to limited tasks during the crisis, the platform now experiences constant updates, providing new icons to enhance learning and teaching in the current education environment.

These findings stress the importance of ongoing training, the availability of IT-based support, and frequent updates of the platform in the creation and implementation of Technological Pedagogical Content Knowledge (TPACK) of teachers. Training programmes also improve the Technological Knowledge (TK) of teachers by familiarising them with digital tools. Furthermore, efficient IT support can make teachers confident and capable of problem-solving to maintain regular usage, which implies Technological Pedagogical Knowledge (TPK) in practice. This process is partially facilitated by regular system upgrades performed by the MoE to minimise technical obstacles and raise levels of usability, allowing teachers to avoid operation challenges and concentrate on pedagogical and content integration. Overall, these elements contribute to teachers' ability to merge technology, pedagogy, and content seamlessly in their practice, leading to higher perceived behavioural control and stronger continuance intentions towards using Madrasati effectively and innovatively in the classroom.

### 8.2.13 Self-Efficacy

Self-efficacy (SE) refers to the extent to which teachers believe in their own abilities to use Madrasati tools in order to support their teaching process. Data analysis from the questionnaire phase indicates that SE has a significant effect on PBC ($\beta = 0.524$). Therefore, the hypothesised path H13 in Chapter 4 was supported, showing that the skills and abilities teachers possess in using Madrasati contribute to their confidence in continuing to use the platform. The quantitative findings demonstrate that most teachers have the skills, knowledge, and ability to feel confident to effectively utilise Madrasati.

In the interviews, teachers expressed a high level of self-confidence in terms of using Madrasati. Initially, many teachers faced difficulties in using the platform as it was a new environment for them, and some teachers mentioned how they had low self-efficacy and a negative attitude when they first started using Madrasati. Over time, however, through attending training courses and sharing experiences with colleagues, teachers became more skilled and familiar with the platform, and most teachers agreed that their confidence in using Madrasati was one of the leading factors that enabled them to continue using the platform. These findings emphasise how teachers' abilities to use Madrasati tools might increase their self-efficacy, thereby enhancing the effectiveness of their teaching and encouraging them to continue using the platform.

This observation points to the growth of Technological Knowledge (TK) and Technological Pedagogical Knowledge (TPK) as per TPACK. With experience, teachers felt more confident about using Madrasati, and their increasing TK enabled them to use digital tools more effectively. Moreover, their increased TPK enabled them to apply this knowledge to pedagogical contexts meaningfully. The progressive increase in self-efficacy through training and peer collaboration shows how the integrated technological and pedagogical knowledge can help to enhance TPACK competency. Teachers' improved confidence reflects not only technical skills but also an awareness of how and why technology can be effectively combined with pedagogy and content to enhance teaching and learning. Thus, self-efficacy emerges as both an outcome and a driver of TPACK development, supporting teachers' continued intention to use Madrasati in innovative and pedagogically purposeful ways.

Different studies align with these findings. For instance, Alasmari (2022) investigated teachers' attitudes towards e-learning and found that over 70% of participants reported improved technical skills after using Madrasati. Similarly, Alibrahim (2024) examined the use of Madrasati after the pandemic from the perspective of digital skills teachers and reported that teachers acquired and enhanced digital skills through the platform. In addition, a study by Ma et al. (2021) investigated changes in online teaching self-efficacy among Chinese teachers during the crisis, finding that teachers' self-efficacy for technology application was significantly improved, even though their self-efficacy for online instruction did not show any significant change.

It is evident that teachers with skills and experience in using Madrasati tend to show higher levels of self-confidence, which suggests that the MoE should focus on providing more training courses to help increase teachers' self-efficacy and technical skills, supporting them in continuing to use the platform. In line with this, Dolighan and Owen (2021) examined the self-efficacy of Ontario secondary school teachers for online teaching during the COVID-19 pandemic, assessing confidence in some areas such as instructional strategies, student engagement, classroom management, and technology use. The findings revealed that teachers who had previously completed online professional development reported higher levels of self-efficacy. Furthermore, prior experience with technology, such as LMS, was significantly associated with greater confidence in teaching online. This indicates that teachers who engaged with technology, either through the support from training programmes or using LMS, are likely to have a higher self-efficacy compared with those who did not use online technology.

### 8.2.14 Prior E-Learning Experience

Prior e-learning experience (PEE) is defined as the experience of using e-learning technology tools in education before and during the COVID-19 pandemic and its impact on the current use of Madrasati. Analysis of the survey data indicated a significant influence of prior e-learning experience on self-efficacy, with a path coefficient of ($\beta = 0.712$). This result aligns with hypothesis H14 presented in Chapter 4, showing that teachers with prior experience using technology tools tend to have higher levels of self-efficacy.

The qualitative analysis reveals that a notable level of self-efficacy is evident among teachers who had prior experience using technological approaches with some teachers utilising the

resource room, projectors, and the Classera platform to explain some parts of the curriculum. However, teachers who had not adopted such technology tools before reported a lack of technological knowledge and practice, resulting in low confidence and a negative attitude towards Madrasati during the crisis. Nevertheless, the experience of using Madrasati during the COVID-19 pandemic contributed to a shift in teachers' beliefs regarding the adoption of technology in education. According to some teachers in the interviews, the traditional educational pattern has become a thing of the past, as technology now plays an essential role in the current education environment. This experience helped many teachers improve their technological skills and abilities, thereby increasing their self-efficacy and leading them to continue using Madrasati.

The results from both phases highlight the role of prior experience in increasing teachers' self-confidence in terms of using Madrasati, which significantly influenced their intentions to continue using the platform. These findings confirm that the prior technology experience has a strong impact on teachers' self-efficacy, illustrating how it shapes their intentions to adopt and continue using the platform.

These findings demonstrate the development of Technological Knowledge (TK) and Technological Pedagogical Knowledge (TPK) as core elements of TPACK. Teachers who possess previous experience with technology tools, joined the Madrasati environment with a foundational understanding of how technology can facilitate both content delivery and pedagogy. On the other hand, teachers who lack technological experience faced low self-efficacy. This emphasises the role of the experience in developing combined technological, pedagogical, and content knowledge. Furthermore, the COVID-19 experience was considered as a driving force in enhancing teachers' technological proficiency and expanding TPK, as teachers learned how to use technology an essential pedagogical medium not as an instructional supplement. Therefore, pre-existing digital experience elevated self-confidence and adaptability in teachers towards utilising their TPACK in a technology-oriented learning experience.

## 8.3 Chapter Summary

The key findings from both quantitative and qualitative data were synthesised in this chapter, presenting similarities and differences across the results obtained from the two phases. Through triangulation of the quantitative and qualitative results, I identified areas of

convergence and divergence, providing a more robust understanding of teachers' intentions to continue using Madrasati. Using the weaving approach, the proposed model was utilised to present factors as findings, demonstrating how teachers' interviews provided clear explanations for the survey responses. The proposed model was adopted as the main theoretical framework for this study, complemented by the TPACK model to interpret the pedagogical and knowledge-based dimensions of teachers' technology adoption and continuance. This integrated approach provides both behavioural and pedagogical insights into teachers' intentions to continue using of Madrasati.

Teachers identified some factors impacting their intentions to use Madrasati, and they have generally demonstrated positive attitudes towards the platform. These positive perceptions were derived from the following key factors: the advantages Madrasati provides, the satisfaction with Madrasati's usability, and the quality of the content available on the platform. Nevertheless, teachers highlighted issues with the content integrated into Madrasati, such as the lack of some theoretical content and the reliance on traditional presentation methods in the iEN channels videos.

In terms of the social impact, teachers highlighted that exchanging experiences and participating in discussions with colleagues is the most influential factor motivating them to use Madrasati, while students' engagement with the platform also encourages them to continue using it. However, some teachers pointed out that the influence of school leaders was not significant, arguing that the use of the platform is a matter of personal conviction, as its adoption is optional within the current education settings.

Additionally, teachers noted that training courses and IT support need be improved. Regarding the resources required to use Madrasati, the only factor that could hinder the use of the platform was identified as limited internet access, while the required time and electronic devices were generally available to most teachers using the platform. Finally, teachers demonstrated a high level of self-efficacy and technical ability, with prior e-learning experience during the pandemic playing a key role in increasing teachers' confidence, motivating them to continue using Madrasati.

# Chapter 9 Conclusion and Future Work

This chapter provides a comprehensive summary of the research, outlining its key phases and presenting the main findings in response to the main research question. The chapter proceeds to discuss the broader implications of the findings, offering specific recommendations for Saudi policymakers and developers of the Madrasati platform to enhance its adoption and encourage teachers to continue using it. Furthermore, it outlines the study's contributions to the field of educational technology and digital learning environments. Finally, the chapter identifies the study's limitations and offers some recommendations for future research.

## 9.1 Summary of the Research

After the COVID-19 restrictions were lifted and in-person education resumed across the Saudi education system, Madrasati was introduced to public education as an optional technological tool for school teachers to integrate e-learning within the conventional teaching method. Although the MoE has launched various initiatives and projects to integrate technology into education over the past decade, some teachers remain hesitant to adopt this technology and incorporate it into their teaching practices. Various research highlights the importance of exploring the factors that contribute to the successful implementation of e-learning in SA. Since teachers are the primary facilitators of Madrasati in the education process, this study investigated the most potential factors that influence teachers' intentions to continue using Madrasati in the post-pandemic period. This is aimed to facilitate the effective implementation of Madrasati in Saudi public education and to promote its adoption among teachers in the current educational environment.

To achieve this, a proposed model was developed based on the DTPB and validated using a concurrent mixed-methods approach. Figure 9.1 illustrates a broad overview of the research activities. Initially, the study introduced the Saudi context and the adoption of Madrasati during and after the crisis. Then, the concepts of e-learning, TPACK, e-pedagogy, and learning management systems were discussed. An in-depth review of different models and theories addressing technology acceptance/continuance was then provided, examining how scholars have approached this phenomenon from various perspectives. The first stage of the research involved online questionnaires, detailing their structure, analysis, findings, and

discussion, with statistical analysis performed using AMOS and SPSS. Moving to the next phase, the second stage of this research involved follow-up interviews, including their structure and thematic analysis, to deepen understanding and explore participants' perceptions of the key factors influencing their decisions to continue using the platform. The results from both phases were then integrated and presented using the weaving approach to provide comprehensive insights into each factor. Finally, the study was concluded with a chapter summarising the findings, contributions, recommendations, limitations, and potential future work.

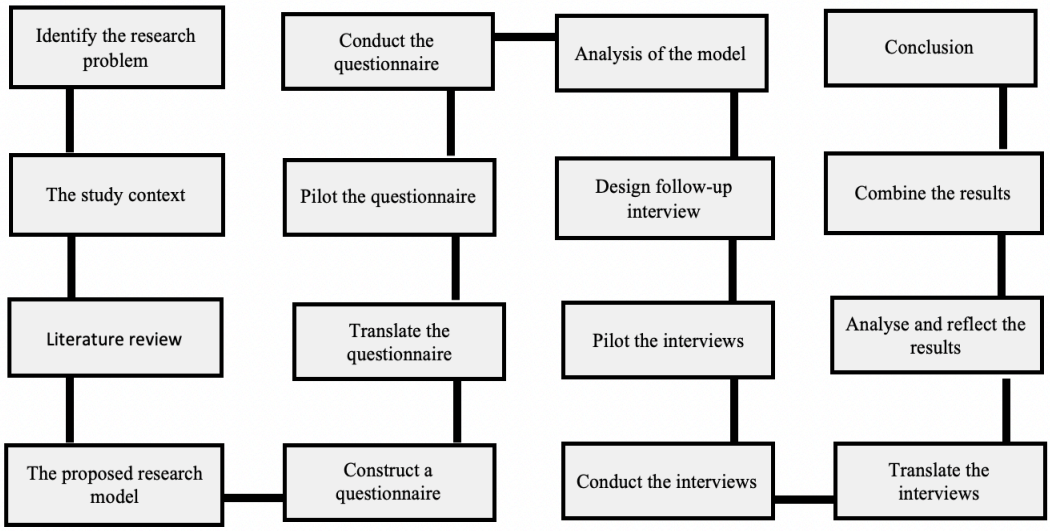


*Figure 9.1 Detailed outline of the research activities*

Initially, a brief background of Saudi Arabia was provided in Chapter 2, along with an overview of the evolution of the education system over time, and different school stages were introduced to specify the school level that was the focus of this study. To facilitate a smooth transition to Madrasati, which is the main focus of this study, several projects initiated by the MoE were briefly explained, along with how Madrasati has emerged as an essential technological tool in advancing the country's educational development. In addition, the implementation of e-learning in Saudi Arabia, both before and during the COVID-19 pandemic, was discussed, along with a review of previous studies on e-learning in the target country prior to Madrasati, and the most recent studies related to it were presented. The chapter included an explanation of Madrasati and its planned usage during the pandemic, supported by data from the MoE report, followed by a definition of Madrasati and an outline of its features as identified in relevant studies. Moreover, an analysis of Madrasati from different perspectives was provided, drawing on key findings and highlighting the main

challenges faced by teachers and students during the COVID-19 period. Finally, the advantages of adopting Madrasati were emphasised in this chapter.

In Chapter 3, an overview of e-learning and its implementation during the COVID-19 pandemic was provided. It began with a background on e-learning, followed by a discussion of how educational institutions worldwide responded to the transition to e-learning, highlighting both the positive aspects and challenges encountered at that time. The chapter also introduced the TPACK framework and e-pedagogy. Finally, it addressed LMS, discussing their use during the crisis and their continued relevance thereafter.

To identify the factors that influence secondary school teachers to continue using Madrasati, Chapter 4 introduced and examined the most significant models and theories used to investigate the factors influencing a user to accept and continue using technology. Additionally, it outlined the proposed conceptual model, based on the DTPB, designed to explore these factors in the context of this study. Each factor in the model was thoroughly discussed, supported by relevant literature from similar studies, and accompanied by a proposed hypothesis path.

Chapter 5 outlined the research paradigms and the methodology employed in this study to validate the suggested model empirically, providing a comprehensive overview of the research design employed in this thesis. Mixed sequential methodology was employed in this study and was accomplished through three phases: developing the proposed model, conducting an online questionnaire, and holding follow-up interviews with Madrasati users.

During the empirical phase, the proposed model was validated statistically through an online questionnaire, as detailed in Chapter 6. The sample comprised 304 participants, with 138 males and 166 females, then as an initial analysis, a t-test was performed to compare the reported answers. The model was next assessed and validated using the SEM statistical approach, including two phases: the measurement and structural models. Various statistical tests were employed to assess the reliability and validity of the instruments, the size and strength of the relationships between the instruments in the model, and the impact of age and gender was also explored, to understand how teachers' intentions might be influenced by these moderators.

In Chapter 7, the final stage of the study focused on gaining an in-depth understanding of the outcomes of the online questionnaire. Follow-up interviews were crafted and carried out with 19 teachers who actively use Madrasati in the conventional education with the aim to explain the statistical findings and gain a deeper understanding of teachers' perceptions regarding the implementation of Madrasati in current teaching and learning environments. This exploration served to shed light on the practical considerations influencing teachers' decisions and perceptions of using the platform.

The combination of key findings from the quantitative and qualitative data was delivered in Chapter 8, highlighting similarities and differences between the results obtained from these phases. Using the weaving approach, the proposed model was utilised to present factors as results, demonstrating how teachers' interviews provided clear explanations for the survey responses in each factor. Teachers identified several factors impacting their intentions to use Madrasati. Overall, teachers hold positive attitudes towards Madrasati, which stem from their views on Madrasati's usefulness, usability, and the quality of its integrated e-content. The influence of colleagues and students' participation on the platform was found to be effective in encouraging teachers to continue using it. However, the influence of school leader was not supported as a motivating factor for teachers to use Madrasati, indicating that its use is based on personal conviction since it is not mandatory in the current educational settings. Although the teachers exhibit a high level of self-confidence, improvement in IT support, training courses, and internet access are essential to further motivate teachers to actively use Madrasati in the current educational context. Ultimately, such insights contribute to improving Madrasati and identifying the key factors that encourage teachers to use and effectively activate it in their teaching processes.

## 9.2 Key Research Question

This study aimed to answer the following primary research question:
Q: What are the factors that influence secondary school teachers' intentions towards using the Madrasati e-learning platform beyond the pandemic?

To address this question, the research successfully identified three factors that significantly and positively influence the continuance intention to use the Madrasati platform. These factors, ranked according to their level of influence, are subjective norm, attitude, and perceived behavioural control. Additionally, attitude was positively influenced by three

factors: perceived usefulness, perceived ease of use, and compatibility. Learning content quality was the only factor found to influence perceived usefulness. Regarding social influence, two key elements were identified: student influence and peer influence. Perceived behavioural control was influenced solely by self-efficacy, which, in turn, was affected only by prior e-learning experience.

The primary question was categorised into three sub-questions, which served as a plan to guide the research in providing an accurate and comprehensive answer to the main question. In this study, each of these sub-questions was addressed, and in the following sections, each sub-question will be discussed, providing a clarification of how each question was answered in this study.

1- What is the appropriate framework to investigate secondary school teachers' continuance intention towards using the Madrasati platform?

This question was covered by reviewing the most prominent theories that investigate a user's intention to accept and continue using technology, aiming to select the theoretical foundation best suited for investigating teachers' continuance intentions towards using Madrasati. The Decomposed Theory of Planned Behaviour (DTPB) was adopted for this research, with the model expanded to include additional factors that enhance its ability to predict what motivates teachers to continue using the platform. Ultimately, the proposed model was developed to include three primary variables: attitude, subjective norm, and perceived behavioural control. Three further elements were identified as affecting attitude: perceived usefulness, perceived ease of use, and compatibility. An additional variable, learning content quality, was incorporated into the model, with the aim of exploring its impact on perceived usefulness. In terms of social influence, three factors were proposed: school leader influence, peer influence, and student influence. Lastly, looking at perceived behavioural control, three factors were selected: resources facilitating conditions, technical support, and self-efficacy. To account for teachers' prior experience with technology, e-learning experience was included in order to examine its impact on teachers' confidence in continuing to use the platform.

2- To what extent and why do the factors in the model explain the variance in the continuance intention to use Madrasati among Saudi secondary school teachers?

The aim of this question was to determine the most appropriate research methodology for investigating the factors proposed in the model. A mixed-methods approach was employed in this study, integrating quantitative and qualitative techniques to comprehensively address both the extent (quantitative analysis) and the reasons (qualitative analysis) underlying the main research question in a sequential manner. Furthermore, triangulation was adopted by integrating findings from both phases to enrich the understanding of teachers' intentions to continue using Madrasati.

The study began with a questionnaire distributed to some secondary school teachers in SA. After completing the data analysis of the quantitative phase, follow-up interviews were designed and then conducted with some teachers who had consented in the survey to be part of one-on-one subsequent discussions. Thereafter, results from both phases were combined and presented, through triangulation, in order to provide a complete picture of the main research question.

Based on these phases, the study identified the most motivational factors influencing teachers' intentions to continue using Madrasati. Teachers demonstrated a positive attitude towards Madrasati. Additionally, three factors were found to affect teachers' perceptions of the platform: perceived usefulness, perceived ease of use, and compatibility. The content integrated into Madrasati was positively perceived among teachers, as this factor was the only one significantly influencing the perceived usefulness. Teachers were motivated by their colleagues and students, whereas school leaders did not show any significant impact on teachers' motivation to use the platform. Teachers expressed a high level of self-efficacy, with previous experience in e-learning playing a role in enhancing teachers' confidence and skills in using technology. Teachers also highlighted issues related to important resources, noting that while time and electronic devices were available to most teachers, internet access could hinder the proper use of the platform. Regarding technical support, there were inadequate professional training programmes for teachers around Madrasati, and the available IT support did not show any motivation to teachers in using the platform.

3- What are the relationships between the factors that impact secondary school teachers' continuance intentions to use Madrasati?

After collecting the survey responses related to the constructs in the first phase, it is essential to examine the hypothesised relationships between the dependent and independent latent variables. SEM was employed to statistically assist in examining the relationships in the proposed model. As shown in Table 6.17, ATU and its sub-factors, PU, PEU, COM, and LCQ demonstrate a significant and positive direct impact on CIM. With the exception of the negative and indirect relationship between LI and SN, SN and its sub-factors, PI and SI, have strong, positive, and direct relationships with CIM. Additionally, the relationships between RFC and TS to PBC were found to be non-significant and rejected. The relationships between SE and its sub-factor, PEE, were strong, positive, and direct towards CIM. Moreover, moderation variables, such as gender and age, were assessed during this stage in order to examine how these variables might affect the relationships between the variables in the model. The only path affected by gender was RFC to PBC. Two paths affected by age were SE to PBC and PEE to SE.

4- What are the perceptions of Saudi secondary school teachers regarding the factors that impact the continuance of Madrasati usage?

This question aimed to explore the reasons behind teachers' responses in the survey, shedding light on the factors that motivate, minimise, or hinder the continuance use of Madrasati in the current education settings. To gain deeper insights, semi-structured interviews were conducted with teachers who agreed to participate in follow-up interviews, and reflexive thematic analysis was used to analyse the collected data. Therefore, four themes were identified, with each theme providing a comprehensive explanation of each factor in the proposed model.

Results from this phase demonstrated that most factors, such as perceptions towards Madrasati, the quality of educational content, the influence of the school community, and technological skills, influenced teachers' intentions to continue using Madrasati. Furthermore, several concerns were flagged that could impact the successful application of Madrasati, such as the lack of content in some subjects, ineffective training courses and IT support, and poor internet connection in some areas.

## 9.3 Research Implications

This research aims to deepen understanding of teachers' perceptions regarding the use of Madrasati beyond the pandemic. Specifically, it seeks to illuminate the decisions teachers made and make to adopt and continue using Madrasati in current educational settings. The theoretical implications of this study encompass the following elements:

- This research explores teachers' perceptions regarding the adoption of Madrasati, highlighting that attitude is an essential motivational factor when considering using a new LMS.
- The quality of digital content and its compatibility with the curriculum and educational goals are significant factors that may influence teachers' perceptions of the benefits provided by Madrasati.
- Positive motivation from school leaders and colleagues, combined with active participation from students on the platform, constitutes a significant factor influencing teachers' decisions to continue using the platform.
- Internet access plays an important role in using the platform, while time and electronic devices are generally available for most teachers.
- The availability of training courses and IT support was observed to be limited following the platform's introduction as an option for teachers to adopt it in regular face-to-face education. This limitation might negatively affect teachers' confidence and the skills required to effectively use Madrasati.
- Prior experience with technology significantly influences self-efficacy, demonstrating its role in shaping teachers' intentions to continue using the platform.

Recognising the impact associated with these perspectives, it is advisable for the MoE's policymakers and Madrasati's developers to:

1. Deliver clear policies and guidance on the usage of Madrasati within the context of the current conventional approach.
2. Provide regular updates and enhancements to the integrated content on Madrasati, ensuring its quality, to maintain teachers' motivation to incorporate this content and continue using the platform.
3. One suggested approach to enhance the quality of the content is to regularly collect feedback from teachers. For instance, providing teachers with the opportunity to rate the content within the platform and offer feedback on any necessary updates. This

collaborative approach ensures that Madrasati remains relevant and effective in supporting educational goals.

4. School leaders can create an environment in schools where teachers are motivated and supported in using Madrasati effectively through the following strategies:

    a. Sharing successful examples from within the school or district can inspire teachers to use the platform more effectively.
    b. Teachers who use the platform effectively should be recognised through formal recognition, such as awards, certificates, or even public acknowledgment during teachers' meetings.
    c. Encouraging collaboration among teachers who use Madrasati can create a supportive environment where they can share ideas, best practices, and solutions.
    d. Making Madrasati an integral part of the school's culture, where the use of digital tools is expected and normalised.

5. Teachers should receive ongoing training and support to build their confidence and competency in using the platform, including not just initial training but continuous professional development that addresses new features and advanced functionalities of the platform.
6. Constant updates and development on the platform, ensuring that it remains user-friendly, through several key methods:

    a. Teacher feedback: teachers can submit feedback via surveys, forums, or direct communication, highlighting areas for improvement, content updates, or features they find useful or lacking.
    b. Data analysis: analysing user activity and performance data can help identify areas where the platform needs improvement, such as content relevance or feature functionality.
    c. Regular updates: the platform's development team can schedule regular updates based on feedback and evolving educational needs, ensuring continuous improvement to the platform.

## 9.4 Research Contributions

This study contributes to expanding the literature of the adopting technology in the context of education as follows:

- Providing and validating a model that incorporates the DTPB constructs, along with additional factors relevant to the education field, such as learning content quality, student influence, and prior e-learning experience. This model can be applied to various online educational platforms across different countries to examine the factors influencing educators to continue using such technology.
- An extensive review of the literature revealed that there were limited published studies examining the factors impacting teachers' intentions to continue using Madrasati in Saudi Arabia, as the platform was introduced abruptly during the pandemic and is currently used in public education as an optional tool to support both teachers and students. In comparison to other LMS platforms, such as Google Classroom and Moodle, the role of Madrasati remains crucial, as it was designed and developed with various features and educational content that align with the Saudi curriculum. This study can help educational policymakers to understand the most influential factors that motivate teachers to continue using Madrasati.
- Evidence was provided of the current usage of Madrasati among secondary school teachers in the conventional education, whereas previous studies in Saudi Arabia focused on the acceptance and use of Madrasati during the COVID-19 crisis, e-learning in higher education, or e-learning in general.
- Light was shed on the benefits of adopting modern technology in education. First, technology enables teachers to implement different teaching strategies to explain complex parts and lessons in various ways. Second, with the online platforms, teachers can follow up easily with students, sending announcements, assignments, and short examinations. Third, both teachers and students gain access to a wide and extensive selection of resources, thereby enriching the curriculum and enhancing the effectiveness and comprehensiveness of lessons.

## 9.5 Research Limitations and Future Suggestions

Although this study was conducted comprehensively, it is not without limitations. Data collection was conducted in 2023. Since Madrasati was established during the COVID-19 pandemic in 2020, its features, learning content, IT support, and training plans may still be under development. Consequently, the results of this research, based on teachers' use of the platform, may become less applicable as the platform continues to evolve. Repeating the model is advisable to capture new and evolving perceptions. In addition, this study focused exclusively on secondary school teachers in the Asir region, which may limit the

generalisability of the findings to other districts or educational levels, such as primary or intermediate school levels. Furthermore, since the study only examined secondary schools in one region, future research could benefit from including a broader range of public schools across multiple regions, including both urban and rural areas, to provide a more comprehensive understanding, particularly as Madrasati is the sole platform utilised across these schools.

The interviews were conducted with teachers who regularly use Madrasati alongside the conventional approach. This was the underlying purpose of the study, exploring why teachers still use it. However, this approach presents a limitation, as it excludes the perspectives of teachers who stopped using the platform after the pandemic. Including interviews with these teachers could provide valuable insights into the factors that influenced their decision to discontinue using the platform. Investigating the reasons behind their disengagement would offer a more comprehensive understanding of the factors affecting teachers' intentions to continue or discontinue using Madrasati, potentially revealing barriers that may not be apparent among those who still use it. Additionally, this study focuses only on teachers. Future research could examine students' perceptions, satisfaction, and engagement with Madrasati, providing valuable insights into the platform's effectiveness in the current educational settings.

Translating the qualitative data also presented several challenges. Since I conducted all the interviews in Arabic, I first transcribed the data in Arabic and then translated them into English. Two Arabic researchers compared both versions, making slight adjustments to clarify certain expressions, and another researcher back-translated three random English versions into Arabic to ensure reliable and unbiased results. This process required considerable time and effort from me and the other team members. One possible solution is that I could translate two to three full Arabic transcripts into English to check translation quality and develop initial codes. Then, I conduct thematic analysis on the full Arabic data, with key themes and illustrative quotes later translated into English to compare both versions and write a report.

## 9.6 Future Work

The findings of this study underscore the importance of expanding inquiry beyond teachers' perspectives to include the voices of students, who are the ultimate beneficiaries of using

Madrasati. Understanding how students perceive and experience e-learning in terms of engagement, motivation, and academic outcomes would provide a more comprehensive picture of the system's effectiveness. Equally, the role of school leadership in shaping the success of digital transformation warrants greater emphasis. Strong leader–teacher communication and supportive relationships can enhance teachers' confidence, foster innovation in practice, and ensure that challenges are addressed collaboratively. Building on these insights, I can identify several pathways for future actions: the development of targeted professional training for secondary teachers; the establishment of structured feedback loops that integrate both teacher and student input into platform refinement. Furthermore, attention should be directed to reducing regional disparities in access and connectivity, particularly in rural areas, to ensure equity across the Saudi educational landscape. Taken together, these considerations highlight the broader real-world impact of this work, which contributes not only to improved teaching and learning practices but also to advancing the Ministry of Education's digital readiness agenda under the Vision 2030 framework.

## 9.7 Final Remarks

In summary, this thesis has identified the key factors influencing teachers' intentions to continue using Madrasati beyond the pandemic. In addition, it attempted to explore teachers' perceptions regarding the implementation of Madrasati within the current traditional teaching methods. This study sheds light on several aspects that may impact teachers' intentions to continue using Madrasati, such as the quality of learning content, the role of school members, and the availability of IT support and training courses related to Madrasati.

The study proposed that attitudes, subjective norms, and behavioural controls influence teachers' decisions to continue using Madrasati, both directly and indirectly, and the findings revealed that the intention to continue using Madrasati was significantly influenced by teachers' perceptions of the platform. Additionally, teachers were highly influenced by their colleagues and students, whereas school leaders' views were less impactful. Moreover, despite the negative impact of resources availability and IT support, teachers remained confident in their ability to continue using the platform.

The discussions with teachers revealed several important factors. The content integrated into Madrasati was greatly emphasised as a significant factor affecting the platform's effectiveness. Sharing educational practices among teachers and student participation on the

platform were key motivators for teachers to continue using Madrasati. However, the lack of adequate content in certain subjects, ineffective training courses, and limited access to the platform due to poor internet access may discourage teachers from utilising it in the future.

Through the process of triangulation, both quantitative and qualitative results were combined to substantiate the convergence between the two sets of findings, reinforcing the robustness of the study's conclusions. It can be concluded that most teachers generally exhibited positive attitudes towards the platform, attributing this to its advantages, usability, and content quality. However, concerns were raised regarding incomplete content and ineffective methods on the iEN channels' videos. Teachers' collaborations and student participation on the platform emerged as significant motivators for teachers deciding to use the platform, while the influence of school leaders was considered minimal. Teachers also highlighted the need for enhanced training and IT support, with limited internet access identified as the primary resource-related challenge. Encouragingly, most teachers reported high self-efficacy and technical ability, which were bolstered by their e-learning experiences during the pandemic, thereby boosting their confidence in using Madrasati.

These findings suggest several recommendations for future research. It is advisable to conduct empirical studies explicitly aimed at identifying factors not yet documented in the existing literature. Additionally, when investigating the continued use of Madrasati, it is recommended to include both teachers and students, offering a comprehensive understanding of the factors affecting each group. Furthermore, researchers should explore the reasons behind the discontinuation of the platform by those who stopped using it after the pandemic, as this would provide valuable insights.

I hope that this research has emphasised the importance of the factors influencing teachers' intentions to continue using Madrasati. By integrating key variables into a single model, I aimed to provide a comprehensive perspective that future studies can build upon when exploring technology acceptance and adoption in education. Finally, I hope that the findings and insights from this study will inform the design and development of Madrasati, ensuring it better support teachers' needs and encourage their continued use in the future.

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# Appendices

## Appendix A Questionnaire Documents

### A.1 Ethical Documents

#### *Appendix A.1.1 Ethical approval*

University of Glasgow
College of Social Sciences

01 March 2023

Dear Fiasal Assiri

**College of Social Sciences Research Ethics Committee**

**Project Title:** The Factors Impacting Secondary School Teachers' Continuance Intention to Use Madrasati Platform in Saudi Arabia

**Application Number:** 400220163

The College Research Ethics Committee has reviewed your application and has agreed that there is no objection on ethical grounds to the proposed study. It is happy therefore to approve the project, subject to the following conditions:

- Start date of ethical approval: 01/03/2023
- Project end date: 01/10/2024
- Any outstanding permissions needed from third parties in order to recruit research participants or to access facilities or venues for research purposes must be obtained in writing and submitted to the CoSS Research Ethics Administrator before research commences: socsci-ethics@glasgow.ac.uk
- The research should be carried out only on the sites, and/or with the groups and using the methods defined in the application.
- The data should be held securely for a period of ten years after the completion of the research project, or for longer if specified by the research funder or sponsor, in accordance with the University's Code of Good Practice in Research: (https://www.gla.ac.uk/media/media_490311_en.pdf)
- Any proposed changes in the protocol should be submitted for reassessment as an amendment to the original application. The **Request for Amendments to an Approved Application** form should be used: https://www.gla.ac.uk/colleges/socialsciences/students/ethics/forms/staffandpostgraduateresearchstudents/

Provided on behalf of: College of Social Sciences Research Ethics Committee
The University of Glasgow
socsci-ethics-lead@glasgow.ac.uk

College of Social Sciences
University of Glasgow
Glasgow G12 8QF

*Appendix A.1.2 The General Administration of Education in Asir*



المملكة العربية السعودية
وزارة التعليم
الإدارة العامة للتعليم بمنطقة عسير
إدارة التخطيط والتطوير

وزارة التعليم
Ministry of Education

الرقم : ٤٤٠٠٨٣٩١٥٨
التاريخ: ١٤٤٤/٨/٩
المشفوعات: ٧

**الموضوع: تسهيل مهمة الباحث فيصل عسيري.**

**سعادة المساعد/ة للشؤون التعليمية** **وفقهم الله**

السلام عليكم ورحمة الله وبركاته

بناءً على خطاب وكيل الوزارة للتخطيط والتطوير المكلف رقم ٤٤٠٠٨٣١٩٩٢ وتاريخ ١٤٤٤/٨/١هـ المتضمن الموافقة على قيام طالب الدكتوراه/ **فيصل عبدالله حسن عسيري** بجامعة قلاسكو إجراء دراسة بعنوان (دراسة العوامل المؤثرة في استمرار معلمي المدارس الثانوية في استخدام منصة مدرستي في المملكة العربية السعودية) في الفترة من ١٤٤٤/٨/١هـ الى ١٤٤٤/٩/١هـ.

آمل تسهيل مهمة الباحث في تطبيق أداة البحث المرفقة.

| | |
|---|---|
| أداة البحث | مرفق |
| عينة البحث | معلمو ومعلمات المرحلة الثانوية |
| مجتمع البحث | مدارس المرحلة الثانوية بمنطقة عسير (بنين/بنات) |
| (جهة تسهيل البحث)<br>الإدارة/مكتب التعليم/مدرسة | مكاتب التعليم بمنطقة عسير (بنين/بنات) |

والله يرعاكم،،،

**مدير عام التعليم بمنطقة عسير**

*Appendix A.1.3 Statistics on secondary school teachers in Asir*

المملكة العربية السعودية
وزارة التعليم
الإدارة العامة للتعليم بمنطقة عسير
إدارة التخطيط والتطوير

وزارة التعليم
Ministry of Education

الرقم : ٤٤٠٠٩١٦٧٩٣
التاريخ: ١٤٤٤/٨/١٦
المشفوعات:

الموضوع: بشأن طلب احصائية للباحث فيصل عسيري.

**المكرم /المشرف العام على مركز خدمات الابتعاث بوزارة التعليم وفقه الله**

السلام عليكم ورحمة الله وبركاته

بناءً على خطاب وكيل الوزارة للتخطيط والتطوير المكلف رقم ٤٤٠٠٨٣١٩٩٢ وتاريخ ١٤٤٤/٨/١هـ المتضمن الموافقة على قيام طالب الدكتوراه/ **فيصل عبدالله حسن عسيري** بجامعة قلاسكو إجراء دراسة بعنوان (دراسة العوامل المؤثرة في استمرار معلمي المدارس الثانوية في استخدام منصة مدرستي في المملكة العربية السعودية)

ونظراً لحاجة الباحث لإحصائية بعدد معلمي ومعلمات المرحلة الثانوية بمنطقة عسير، تجدون المطلوب أدناه:

| | |
|---|---|
| عدد المعلمين بمدارس المرحلة الثانوية بمنطقة عسير | ٢٠٤٤ |
| عدد المعلمات بمدارس المرحلة الثانوية بمنطقة عسير | ٢٦٨٨ |

والله يرعاكم،،،

**مدير عام التعليم بمنطقة عسير**

University of Glasgow

College of Social Sciences

## Plain Language Statement

### The Factors Impacting Secondary School Teachers' Continuance Intention to Use Madrasati Platform in Saudi Arabia

Fiasal Assiri

f.assiri.1@research.gla.ac.uk

University of Glasgow

School of Education

*You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read information on this page carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.*

*Thank you for reading this.*

#### What is the purpose of the study?

This research is required as a part of the researcher's PhD degree in education. It aims to explore the factors influencing secondary school teachers' intention to continue using Madrasati platform. Such investigation would help the Ministry of Education to gain better understanding of the main motivators and challenges of adopting Madrasati platform among teachers. This research is under the direction of the School of Education, University of Glasgow, UK, and is fully funded by Saudi Arabian Cultural Bureau.

#### Why have I been chosen?

This study focuses on understanding teachers' perceptions towards Madrasati platform usage. You are invited to participate because your opinion as a teacher will help to gain better understanding. We need to reach out a minimum of 200 secondary school teacher to be able to complete the study.

### Do I have to take part?

Your participation in voluntary and it is entirely up to you to take part in this study or not. If you decide to take part, you are free to withdraw at any time and without any justification and any data collected up to that point will be deleted.

### What will happen to me if I take part?

You will be asked to read the plain language statement carefully, and if you agree to participate, you will need to tick the box at the bottom of the page and begin answering the questions, which will take approximately 10 minutes. General demographic information and your views on Madrasati usage will be collected first. At the end of the survey, participants who are willing to take part in a short interview at a later date can (OPTIONALLY) provide their email addresses. We aim to interview a small number of secondary school teachers who completed the questionnaire. The interview, lasting 30 to 45 minutes, can be conducted via Zoom or phone at a mutually convenient time and will be audio recorded with your consent.

### Will the information that I give you in this study be kept confidential?

Yes, the information you provide in this study will be securely stored and used exclusively for research purposes. Your responses are voluntary and will not be linked to your email or username. All data will be aggregated and analysed collectively to ensure confidentiality. In addition, you will be asked to provide your email (optional) if you are willing to participate in a follow-up interview. Email addresses will be stored separately, so you can be assured that your responses will not be linked to your email. For the interviews, users will be referred using letters such as T1, T2, T3, and so on to retain anonymity. The results of this study will be shared only with the project supervisors (names and contacts below). The collected data will be stored securely and shall be destroyed in line with university requirements 10 years after completion of the study.

### What will happen to the results of this study?

The finding of the research will be presented in the researcher's thesis which will be available on the university website. The results might be reported in journal articles and presented at conferences. The collected data will be stored securely and shall be destroyed in line with university requirements 10 years after completion of the study.

### Who has reviewed the study?

This study has been reviewed and agreed by the College of Social Sciences, University of Glasgow

### Essential statement on confidentiality as required by University Ethics Committee:

Please note that confidentiality will be maintained as far as it possible, unless during data collection we learn anything which make us worried that someone might be in danger of harm, we might have to inform relevant agencies of this.

**Contact for further Information**

If you require further information or additional details, you may contact either me or my study supervisors, Dr. Joanna Wincenciak and Dr. David Morrison-Love

Fiasal Assiri (f.assiri.1@research.gla.ac.uk)

Joanna Wincenciak (Joanna.wincenciak@glasgow.ac.uk)

David Morrison-Love (David.morrison-love@glasgow.ac.uk)

To pursue any complaint about the conduct of the research, please contact the College Ethics Lead: email socsci-ethics-lead@glasgow.ac.uk

University of Glasgow

College of Social Sciences

## دليل المعلومات للمشاركين في الدراسة

عنوان الدراسة: دراسة العوامل المؤثرة في نية استمرار معلمي المدارس الثانوية في استخدام منصة مدرستي في المملكة العربية السعودية

**رقم تصريح لجنة الأخلاقيات:** ٤٠٠٢٢٠١٦٣

أنت مدعو للمشاركة في دراسة بحثية. قبل أن تقرر، من المهم أن تفهم سبب إجراء البحث وما الذي سيتضمنه. يرجى تخصيص بعض الوقت لقراءة المعلومات الواردة في هذه الصفحة بعناية ومناقشتها مع الآخرين إذا كنت ترغب في ذلك. اسألني إذا كان هناك أي شيء غير واضح أو إذا كنت ترغب في مزيد من المعلومات. خذ وقتك لتقرر ما إذا كنت ترغب في المشاركة أم لا.

ما هو هدف البحث؟

يهدف هذا البحث لدراسة العوامل التي تؤثر على نية معلمي المدارس الثانوية في الاستمرار في استخدام منصة مدرستي. دراسة هذه العوامل سيساعد وزارة التعليم على اكتساب فهم أفضل للدوافع والتحديات الرئيسية لاستخدام منصة مدرستي بين المعلمين. هذا البحث تحت إشراف كلية التربية بجامعة قلاسكو، المملكة المتحدة.

لماذا تم اختياري؟

ترتكز هذه الدراسة على فهم تصورات المعلمين في استخدام منصة مدرستي. أنت مدعو للمشاركة لأن رأيك كمعلم سيساعدنا على الحصول على فهم أفضل.

هل يجب علي المشاركة؟

مشاركتك بشكل تطوعي والأمر متروك لك تمامًا للمشاركة في هذه الدراسة أم لا. إذا قررت المشاركة، فلا يزال لديك الحرية في الانسحاب في أي وقت وبدون أي مبرر وسيتم حذف أي بيانات تم جمعها حتى تلك النقطة.

ما الذي سيحدث إذا شاركت؟

سيُطلب منك قراءة دليل المعلومات للمشارك بعناية، وإذا وافقت على المشاركة في الاستبيان، فسيُطلب منك تحديد المربع الموجود أسفل الصفحة والبدء في الإجابة على الأسئلة، والتي تستغرق حوالي ١٠ دقائق. سيتم أيضًا جمع المعلومات العامة ورأيك بشأن استخدام مدرستي، بالإضافة إلى عناوين البريد الإلكتروني (اختياري) للمشاركين الذين يرغبون في المشاركة في مقابلة قصيرة في تاريخ لاحق. يمكن إجراء المقابلة إما عن طريق برنامج زوم أو الهاتف أو وجهاً لوجه لمدة ما بين ١٥-٢٠ دقيقة في وقت مناسب للطرفين.

هل ستكون مشاركتي سرية؟

نعم بالطبع. سيتم تخزين المعلومات الخاصة بك واستخدامها على أنظمة آمنة وسوف تستخدم لأغراض هذا الدراسة فقط. مشاركتك تطوعية ولن يتم ربطها بريدك الإلكتروني، وسيتم تجميع جميع الردود وتحليلها معاً كمجموعة.

ماذا سيحدث لنتائج هذا الدراسة؟

سيتم عرض نتائج البحث في أطروحة الدكتوراه والتي ستكون متاحة على موقع الجامعة، كما يمكن نشر النتائج في المجلات أو عرضها في المؤتمرات. سيتم تخزين البيانات بشكل آمن وسيتم إتلافها بما يتماشى مع متطلبات الجامعة بعد ١٠ سنوات من الانتهاء من الدراسة.

من قيم هذه الدراسة؟

تم مراجعة هذه الدراسة والموافقة عليها من قبل لجنة أخلاقيات البحوث في العلوم الاجتماعية/ كلية التربية بجامعة قلاسكو، المملكة المتحدة.

أين يمكنني الحصول على مزيد من المعلومات؟

للمزيد من التفاصيل، يرجى الاتصال إما بالباحث أو بالمشرفين. الدكتورة جوانا وينسينسياك والدكتور ديفيد موريسون-لوف.

- فيصل عسيري (f.assiri.1@research.gla.ac.uk)
- الدكتورة جوانا وينسينسياك (Joanna.wincenciak@glasgow.ac.uk)
- الدكتور ديفيد موريسون-لوف (David.morrison-love@glasgow.ac.uk)

إذا كانت لديك أية مخاوف بشأن إجراء هذا البحث، فيمكنك الاتصال بمسؤول الأخلاقيات في كلية العلوم الاجتماعية.

(socsci-ethics-lead@glasgow.ac.uk)

*Appendix A.1.5 Consent form*

University of Glasgow

College of Social Sciences

## Consent Form

**The Factors Impacting Secondary School Teachers' Continuance Intention to Use Madrasati Platform in Saudi Arabia**

**Name of Researcher:** Fiasal Assiri, **email:** f.assiri.1@research.gla.ac.uk

| | |
|---|---|
| I agree ☐ I do not agree ☐ | I confirm that I have read and understood the Plain Language Statement for the above study and have had the opportunity to ask questions. |
| I agree ☐ I do not agree ☐ | I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. |

**Confidentiality/Anonymity**

| | |
|---|---|
| I agree ☐ I do not agree ☐ | I acknowledge that participants will be referred to by pseudonym. |

**Dependent Relationships**

| | |
|---|---|
| I agree ☐ I do not agree ☐ | I acknowledge that there will be no effect on my employment arising from my participation or non-participation in this research. |

**Data Usage and Storage**

| | |
|---|---|
| I agree ☐ I do not agree ☐ | The material will be treated as confidential and kept in secure storage at all times. |
| I agree ☐ I do not agree ☐ | The material will be destroyed once the project is complete. |
| I agree ☐ I do not agree ☐ | I agree to waive my copyright to any data collected as part of this project. |
| I agree ☐ I do not agree ☐ | I understand that other authenticated researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form. |
| I agree ☐ I do not agree ☐ | I acknowledge the provision of a Privacy Notice in relation to this research project. |

**Consent**

| | |
|---|---|
| I consent ☐ I do not consent ☐ | I consent to take part in the questionnaire |
| I consent ☐ I do not consent ☐ | I consent to take part in the interview |
| I consent ☐ I do not consent ☐ | I consent to interviews being audio-recorded |

Name of Participant .....

Signature .....Date .....

If you would like to take part in the interview, please leave a contact tel. number or email:
.....

## A.2 Online Questionnaire

### *Appendix A.2.1 Welcome page*

**Greeting!**

**Thank you very much for expressing interest in completing this survey. I value your participation and time, and the survey is expected to take approximately 10 minutes.**

This study aims to examine the factors affecting teachers' use of the Madrasati platform as a tool to support the education process. Studying these factors helps us to understand the needs of teachers, which contributes to better use of the Madrasati platform. This research is under the direction of the School of Education, University of Glasgow, UK (Ethical Approval number: 400220163).

If you wish to participate in a follow-up interview, kindly provide your email address at the conclusion of the survey. Rest assured, your email will be kept entirely separate from your survey responses, ensuring no connection between your answers and your contact email.

**You can access the Plain Language Statement through the following link:**
**https://docs.google.com/forms/d/1GD5R_mfQ5SWCrohJyCrfew_tk6x-gCsvyCPSe3xjuFQ/edit**

**Please mark the box to signify your consent to participate in this survey** ☐

**مرحبا !**

**شكراً جزيلاً على اهتمامك بالمشاركة في هذه الاستبانة، أُقدر وقتك ومشاركتك القيمة، يستغرق الاستبيان حوالي ١٠ دقائق.**

يهدف هذا البحث لدراسة العوامل التي تؤثر على استخدام المعلمين لمنصة مدرستي كأداة لدعم العملية التعليمية. دراسة هذه العوامل يساعدنا على فهم احتياجات المعلمين مما يُسهم في استخدام منصة مدرستي بشكل أفضل. هذا البحث تحت إشراف كلية التربية بجامعة قلاسكو، المملكة المتحدة.
تصريح لجنة الأخلاقيات: ٤٠٠٢٢٠١٦٣

إذا كنت ترغم في المشاركة في مقابلة حول الموضوع، فستحتاج إلى تقديم عنوان بريدك الإلكتروني في نهاية الاستبيان. سيتم فصل هذا تماماً عن إجابات الاستبيان، لذا لن تكون هناك طريقة لربط عنوان بريدك الإلكتروني بإجابتك وسيتم التواصل بك عبر البريد الإلكتروني لاحقاً.

**يمكنك الاطلاع على معلومات البحث والمشاركة في الدراسة من خلال هذا الرابط:**

معلومات البحث في الدراسة

الرجاء وضع علامة صح للموافقة على المشاركة في هذه الاستبانة ☐

*Appendix A.2.2 Online Questionnaire*

| ***Section A: Demographic details:***<br>***القسم الأول: المعلومات الشخصية:*** | |
|---|---|
| **1- What is your gender:** ١- ما هو جنسك؟ | • Male ذكر • Female أنثى |
| **2- What is your age range (years):**<br>٢- ما هو عمرك؟ | • 25-29 • 30-34 • 35-39<br>• 40-44 • 45-49 • 50-54<br>• 55-59 |
| **3- By the end of this school year, how many years will you have been teaching altogether:**<br>٣- بنهاية هذا العام الدراسي، كم عدد سنوات خدمتك في التدريس؟ | • 1-4 • 5-9 • 10-14<br>• 15-19 • More than 20 أكثر من ٢٠ |
| **4- What is the highest level of education you have completed:**<br>٤- ما هو أعلى مستوى تعليمي أكملته؟ | • Diploma دبلوم<br>• Bachelor degree (non-educational)<br>بكالوريوس غير تربوي<br>• Bachelor degree (educational)<br>بكالوريوس تربوي<br>• Master degree ماستر • PhD دكتوراة |
| **5- Subject currently taught:**<br>٥- ما هو التخصص الذي تقوم بتدريسه حالياً؟ | • Computing (ICT) تقنيه رقمية<br>• Mathematics رياضيات<br>• Arabic Language كفايات لغوية<br>• English Language لغة انجليزية<br>• Science (Chemistry, Physics or Biology) (كيمياء، فيزياء، أحياء) مادة علمية<br>• Social Science (History-Geography) علوم اجتماعية (تاريخ، جغرافيا)<br>• Islamic Education دراسات اسلامية • Physical Education تربية صحية و بدنية<br>• Art Education تربية فنية<br>• Family and consumer science (traditionally called Home Economics or Home Science)<br>تربية مهنية (الاقتصاد المنزلي أو العلوم المنزلية)<br>• Other .....<br>أخرى (الرجاء ذكر التخصص) |
| **6- Currently, how many contact hours in front of the class do you teach per week?**<br>٦-حالياً: كم يبلغ نصاب جدولك الأسبوعي من الحصص؟ | • Less than 5 hours • 5-9 hours<br>• 10-14 hours • 15-19 hours<br>• 20-24 hours |
| **7- Thinking about all the classes you teach, what is the average number of students in your class:** | • Less than 20 • 21-30 |

| | |
|---|---|
| ٧- فيما يخص جميع الفصول التي تقوم بتدريسها، ما هو متوسط عدد الطلاب التقريبي في الصف؟ | • 31-40 • More than 40 |
| **8- Which best describes the area in which your school is located:**<br>٨- ما هو أفضل وصف للمنطقة الي تقع فيها مدرستك؟ | • Urban area (Medium size city or larger)<br>• Rural area (village or remote area)<br>• منطقة حضرية (مدينة متوسطة الحجم أو أكبر)<br>• منطقة ريفية (قرية أو منطقة نائية) |

| ***Section B: Madrasati usage Questions:***<br>***القسم الثاني: أسئلة متعلقة باستخدام منصة مدرستي:*** | |
|---|---|
| **1- Currently, are you using Madrasati platform?**<br>١- في الوقت الحالي: هل تستخدم منصة مدرستي؟ | • Yes نعم • No لا |
| **2- How many daily hours on average do you spend on Madrasati platform in home and school?**<br>٢- كم معدل عدد الساعات التي تقضيها على منصة مدرستي في المنزل والمدرسة؟ | • Less than one hour اقل من ساعة<br>• One to two hours ما بين ساعة الى ساعتين<br>• More than two hours أكثر من ساعتين |
| **3- Have you received any training courses on the use of Madrasati:**<br>٣- هل تلقيت أي دورات تدريبية على استخدام منصة مدرستي من قبل؟ | • Yes نعم • No لا |
| **4- Which the following programs and tools provided by Madrasati do you use for teaching (Tick all that applies)?**<br>٤- ما هي البرنامج والأدوات التي تقدمها منصة مدرستي والتي تستخدمها في التدريس (قم باختيار كل ما ينطبق)؟ | • Microsoft Teams مايكروسوفت تيمز<br>• Email service البريد الإلكتروني<br>• Office 365 أوفيس 365<br>• E-books (المقررات الإلكترونية)<br>• E-assessment (including exams and assignments) (الواجبات و الاختبارات الإلكترونية)<br>• Additional sources (بنك الإثراءات التعليمية)<br>• iEN National Education Portal (بوابة عين التعليمية)<br>• School schedule (الجدول الدراسي)<br>• Learning activities (الأنشطة التعليمية)<br>• Virtual classes (الفصول الافتراضية)<br>• School announcements (تنبيهاتي ورسائلي) |

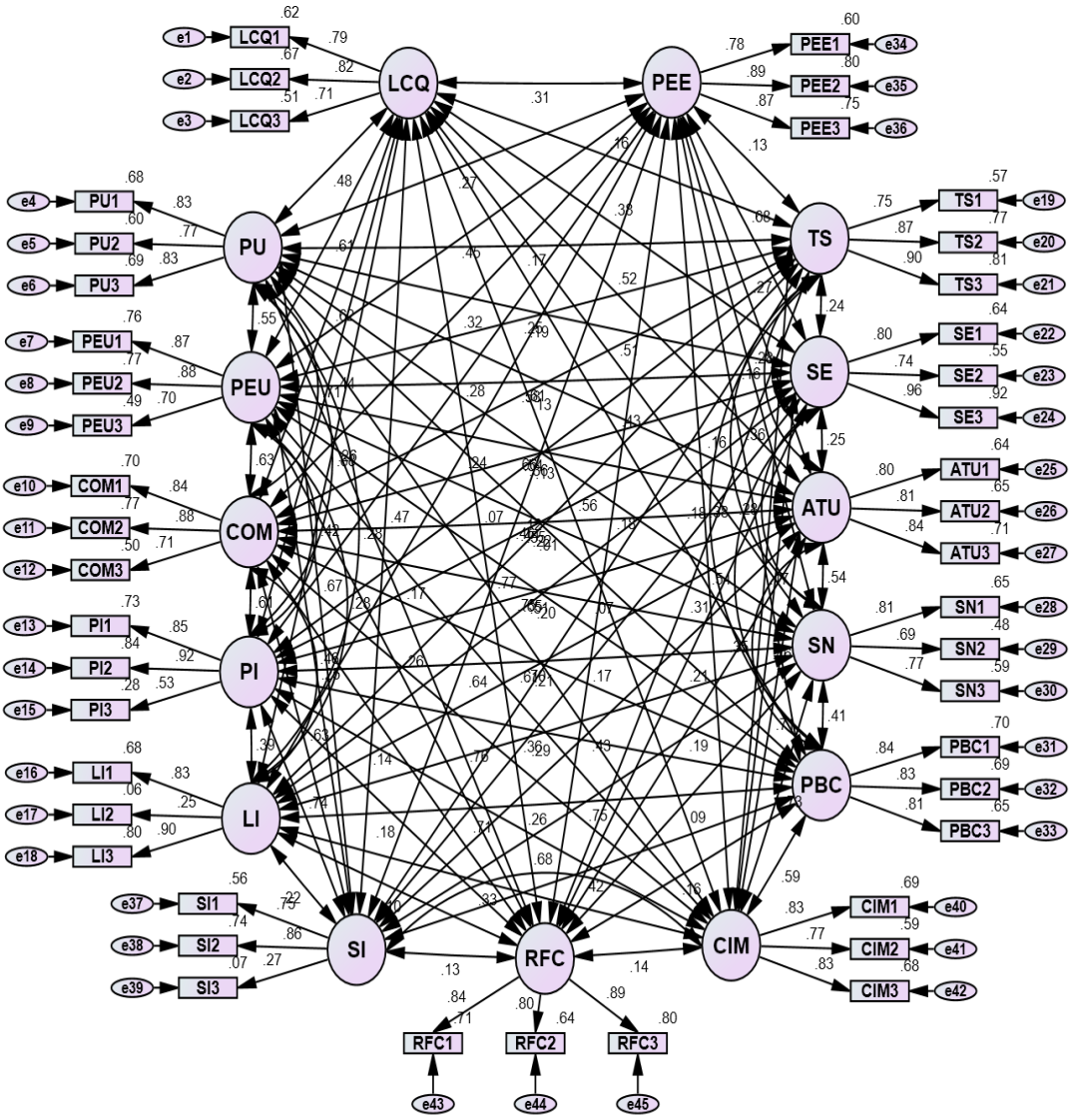
| | |
|---|---|
| ***Section C: Measure the factors in the proposed model:***<br>***القسم الثالث: أسئلة متعلقة بالعوامل التي المؤثرة على استمرار استخدام منصة مدرستي:*** | |
| **Based on your experience in Madrasati platform, please indicate your level of disagreement / agreement on the following statements that correspond to your personal opinion. Please answer each statement by selecting only one answer per phrase.**<br>**بناءً على خبرتك في منصة مدرستي، يُرجى الإشارة إلى درجتك في عدم الاتفاق/ الاتفاق على العبارات التالية التي تتوافق مع قناعتك ورأيك الشخصي. الرجاء الإجابة على كل عبارة عن طريق اختيار إجابة واحدة فقط لكل عبارة.** | |
| **Part 1: Attitudinal beliefs المعتقدات السلوكية** | |
| **Learning Content Quality**<br>**جودة المحتوى التعليمي** | 1- Madrasati provides complete digital content including courses, assignments, quizzes, and educational videos.<br>١- توفر منصة مدرستي محتوى رقمياً متكاملاً بما في ذلك المقررات والواجبات والاختبارات ومقاطع الفيديو التعليمية. |
| | 2- Madrasati provides adequate content for my teaching purposes.<br>٢- المحتوى الذي توفره منصة مدرستي مناسب لأغراض التدريس الخاصة بي. |
| | 3- Madrasati provides different forms of teaching contents tools such as text, audio and video.<br>٣- - تتيح منصة مدرستي استخدام أدوات مختلفة لعرض المنهج التعليمي مثل النصوص والأصوات والفيديوهات. |
| **Perceived Usefulness**<br>**فائدة منصة مدرستي في التعليم** | 4- I believe that using Madrasati would enhance my teaching performance.<br>٤- أعتقد أن استخدام منصة مدرستي سوف يطور من أدائي في التدريس. |
| | 5- Using Madrasati would improve my students' learning achievement (ex: additional resources and learning activities are available for my students through Madrasati platform).<br>٥- استخدام منصة مدرستي يسهم في تحسين التحصيل الدراسي لطلابي: (على سبيل المثال: تتوفر مصادر إضافية قيمة وأنشطة تعليمية لطلابي من خلال منصة مدرستي). |
| | 6- I find using Madrasati is useful for teaching and learning.<br>٦- أجد أن استخدام منصة مدرستي مفيد في التدريس والتعليم. |
| **Perceived Ease of Use**<br>**سهولة استخدام منصة مدرستي** | 7- Operating and using Madrasati is easy for me.<br>٧- استخدام منصة مدرستي أمر سهل بالنسبة لي. |
| | 8- Using Madrasati and the interaction with it is clear and understandable.<br>٨- استخدام منصة مدرستي والتفاعل معها واضح ومفهوم. |
| | 9- There are some features of Madrasati, that I find difficult to use. *R<br>٩- أجد صعوبة في استخدام بعض الأدوات المتاحة في منصة مدرستي. |
| **Compatibility**<br>**توافق منصة مدرستي** | 10- Using Madrasati fits well with my teaching development needs.<br>١٠- استخدام منصة مدرستي يتماشى مع احتياجاتي التدريسية. |
| | 11- Madrasati is compatible with my education goals.<br>١١- منصة مدرستي تتوافق مع أهدافي التعليمية. |
| | 12- Madrasati is compatible with the nature of the curriculum, which I teach.<br>١٢- منصة مدرستي تتوافق مع طبيعة المنهج الذي أقوم بتدريسه. |
| **Attitude**<br>**الموقف اتجاه منصة مدرستي** | 13- I have a generally favourable attitude towards using Madrasati.<br>١٣- بشكل عام لدي موقف إيجابي تجاه استخدام منصة مدرستي. |
| | 14- I believe that using Madrasati is a good idea.<br>١٤- أعتقد أن استخدام منصة مدرستي فكرة جيدة. |
| | 15- I believe that using Madrasati is beneficial.<br>١٥- أعتقد أن استخدام منصة مدرستي مفيد. |

| | |
|---|---|
| **Part 2: Normative beliefs المعتقدات المعيارية** | |
| **Peer Influence تأثير زملائي في المدرسة** | 16- My colleagues would think that I should use Madrasati.<br>١٦- زملائي في المدرسة يعتقدون أنه يجب أن استخدم منصة مدرستي. |
| | 17- My colleagues, who use Madrasati, encourage me to use it.<br>١٧- زملائي الذين يستخدمون منصة مدرستي يشجعونني على استخدامها. |
| | 18- The opinion of my colleagues is important to me.<br>١٨- أعتبر رأي زملائي مهم بالنسبة لي. |
| **Leader Influence تأثير مدير المدرسة** | 19- My principal requires me to use Madrasati.<br>١٩- مديري يطلب مني استخدام منصة مدرستي. |
| | 20- I do not feel encouraged to use Madrasati by my principal. *R<br>٢٠- لا أشعر بالتشجيع من قبل مديري على استخدام منصة مدرستي. |
| | 21- The opinion of my principal is important to me.<br>٢١- أعتبر رأي مديري مهم بالنسبة لي. |
| **Students Influence تأثير طلابي** | 22- My students would think that I should use Madrasati.<br>٢٢- طلابي يعتقدون أنه يجب أن استخدم منصة مدرستي. |
| | 23- I want to use Madrasati because my students think that they would benefit from it.<br>٢٣- أريد استخدام منصة مدرستي لأن طلابي يعتقدون أنهم يستفيدون منها. |
| | 24- The opinion of my students is important to me.<br>٢٤- - أعتبر رأي طلابي مهم بالنسبة لي |
| **Subjective Norms معيار تأثير الأشخاص المقربين** | 25- Peers who are important to me would think that I should use Madrasati.<br>٢٥- زملائي في المدرسة الذين يهمني رأيهم يعتقدون بأنه يجب أن استخدم منصة مدرستي. |
| | 26- People who have an influence in my annual report would think that I should stop using Madrasati. *R<br>٢٦- الأشخاص الذين لديهم تأثير في تقريري السنوي (الآداء الوظيفي) يعتقدون بأنه يجب التوقف عن استخدام منصة مدرستي. |
| | 27- Students who have an influence in my work would think that I should use Madrasati.<br>٢٧- الطلاب الذين لديهم تأثير على عملي يعتقدون بأنه يجب أن استخدم منصة مدرستي. |
| **Part 3: Control beliefs معتقدات التحكم** | |
| **Prior E-Learning Experience الخبرة السابقة في استخدام تقنيات التعليم** | 28- I had used some of technology tools in my school before establishing Madrasati platform (ex: computer, smartboard or projector).<br>٢٨- سبق وان استخدمت بعض أدوات التكنولوجيا في المدرسة قبل إنشاء منصة مدرستي (على سبيل المثال: الحاسوب أو السبورة الذكية أو جهاز العرض البروجكتر). |
| | 29- I used Madrasati effectively in teaching during the schools' closure period (COVID-19 period).<br>٢٩- سبق وان استخدمت منصة مدرستي بشكل فعّال في التدريس خلال فترة إغلاق المدارس (فترة جائحة كورونا). |
| | 30- I have enough prior experience to deal with Madrasati platform.<br>٣٠- لدي خبرة سابقة كافية للتعامل مع منصة مدرستي. |
| **Self-Efficacy القدرة الذاتية** | 31- I feel confident using Madrasati on my own.<br>٣١- أشعر بثقة عندما استخدم منصة مدرستي بفردي. |
| | 32- There is a gap between my existing skills and knowledge and those required to work on Madrasati. *R<br>٣٢- يوجد فارق كبير بين المهارات التي أمتلكها ومستوى المهارات المطلوبة لاستخدام منصة مدرستي. |
| | 33- I have knowledge and ability to make use of Madrasati advantages.<br>٣٣- لدي المعرفة والقدرة الكافية للاستفادة من مزايا منصة مدرستي. |

| | |
|---|---|
| **Facilitating Conditions**<br>**تسهيل ظروف الاستخدام** | 34- The equipment (electronic hardware, software and communication network) is available to me to work on Madrasati.<br>٣٤- التجهيزات (على سبيل المثال: أجهزة، برامج، شبكة اتصالات) متوفرة لدي لتسهيل استخدام منصة مدرستي. |
| | 35- The resources (ex: time and money) are available to me to work on Madrasati.<br>٣٥- المصادر (على سبيل المثال: الوقت والمال) متوفرة لدي لاستخدام منصة مدرستي. |
| | 36- Madrasati is compatible with the electronic device I already use (ex: computer, iPad, phone).<br>٣٦- منصة مدرستي تتوافق من الجهاز الإلكتروني الخاص بي (على سبيل المثال: حاسوب، آيباد، جوال) |
| **Technical Support**<br>**الدعم الفني** | 37- Madrasati training courses are available for me.<br>٣٧- تتوفر دورات تدريبية أو ورش تأهيلية عن استخدام منصة مدرستي. |
| | 38- Support staff is available to help me at any time to use Madrasati.<br>٣٨- الدعم الفني متوفر في أي وقت لمساعدتي في استخدام منصة مدرستي. |
| | 39- When I encounter difficulties in using Madrasati, I know where to seek assistance.<br>٣٩- عندما اواجه مشاكل تقنية خلال استخدام منصة مدرستي، أعرف أين أطلب المساعدة. |
| **Perceived Behavioural Control**<br>**تصور السيطرة نحو استخدام منصة مدرستي** | 40- Using Madrasati is entirely within my control.<br>٤٠- لدي الإرادة والتحكم التام لاستخدام منصة مدرستي. |
| | 41- My knowledge of how to seek assistance and advice in using Madrasati tools is insufficient and needs training. *R<br>٤١- معرفتي بكيفية طلب المساعدة في استخدام أدوات منصة مدرستي غير كافية وتحتاج إلى تدريب. |
| | 42- All the resources necessary for the use of Madrasati are available to me from hardware, software, time and money.<br>٤٢- جميع المصادر اللازمة لاستخدام منصة مدرستي متاحة لي من الأجهزة والبرامج والوقت والمال. |
| **Part 3: Examine the continuance intention to use Madrasati دراسة نية الاستمرار في استخدام منصة مدرستي** | |
| **Continuance Intention to Use Madrasati**<br>**نية الاستمرار في استخدام منصة مدرستي** | 43- I intend to continue using Madrasati platform in the future.<br>٤٣- أنوي الاستمرار في استخدام منصة مدرستي في المستقبل. |
| | 44- I plan to continue using Madrasati platform in the future.<br>٤٤- أخطط للإستمرار في استخدام منصة مدرستي في المستقبل. |
| | 45- I can see how Madrasati platform could benefit my teaching in the future.<br>٤٥- أستطيع أن أرى كيف يمكن لمنصة مدرستي أن تفيد تدريسي في المستقبل. |

*R: Reverse items

*Appendix A.2.3 Original measurement model with all items*



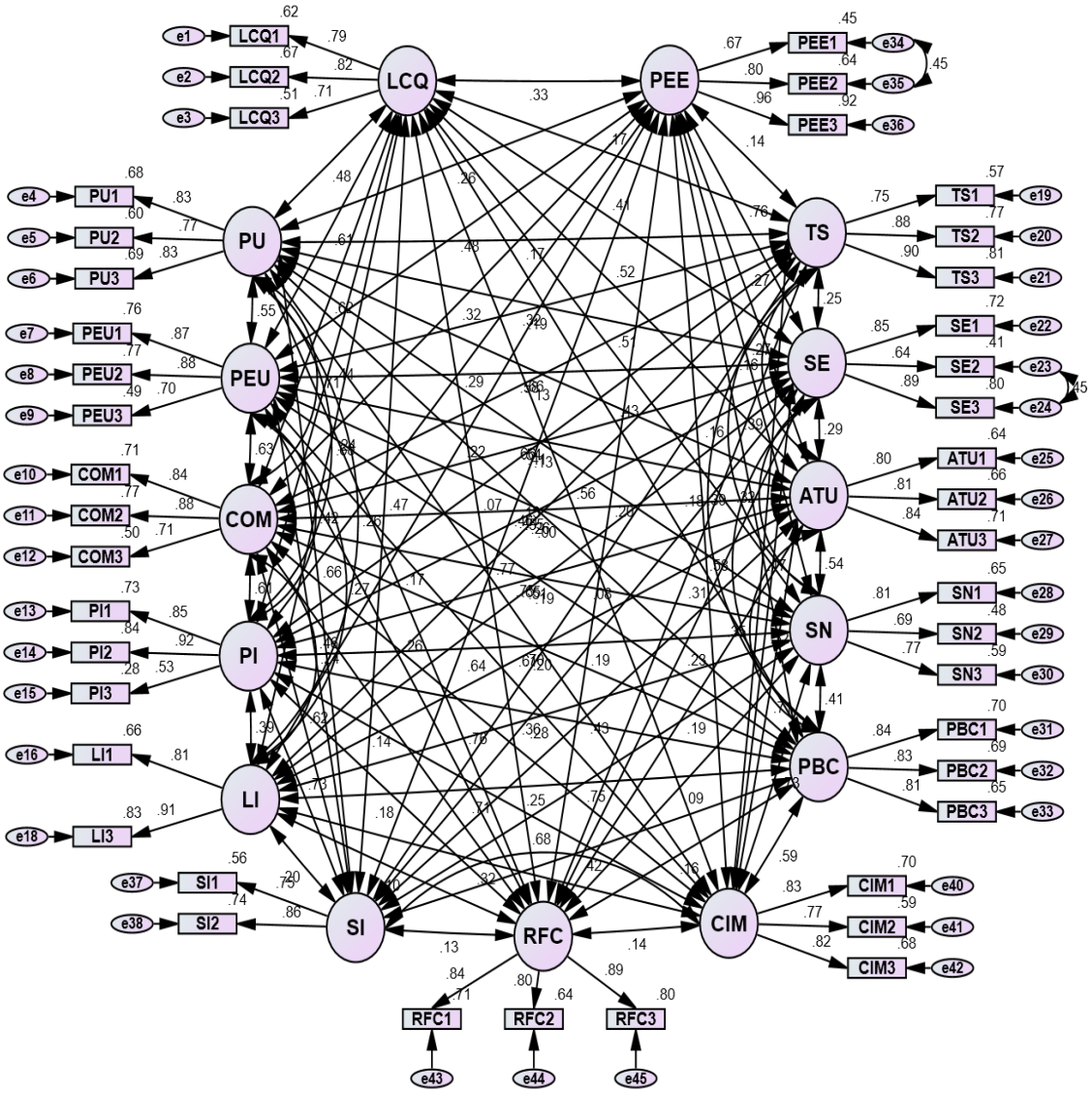

Absolute Fit Indices
df = 840
Chi Square = 1104.966

p-value = .000
GFI = .864
AGFI = .832
RMSEA = .032

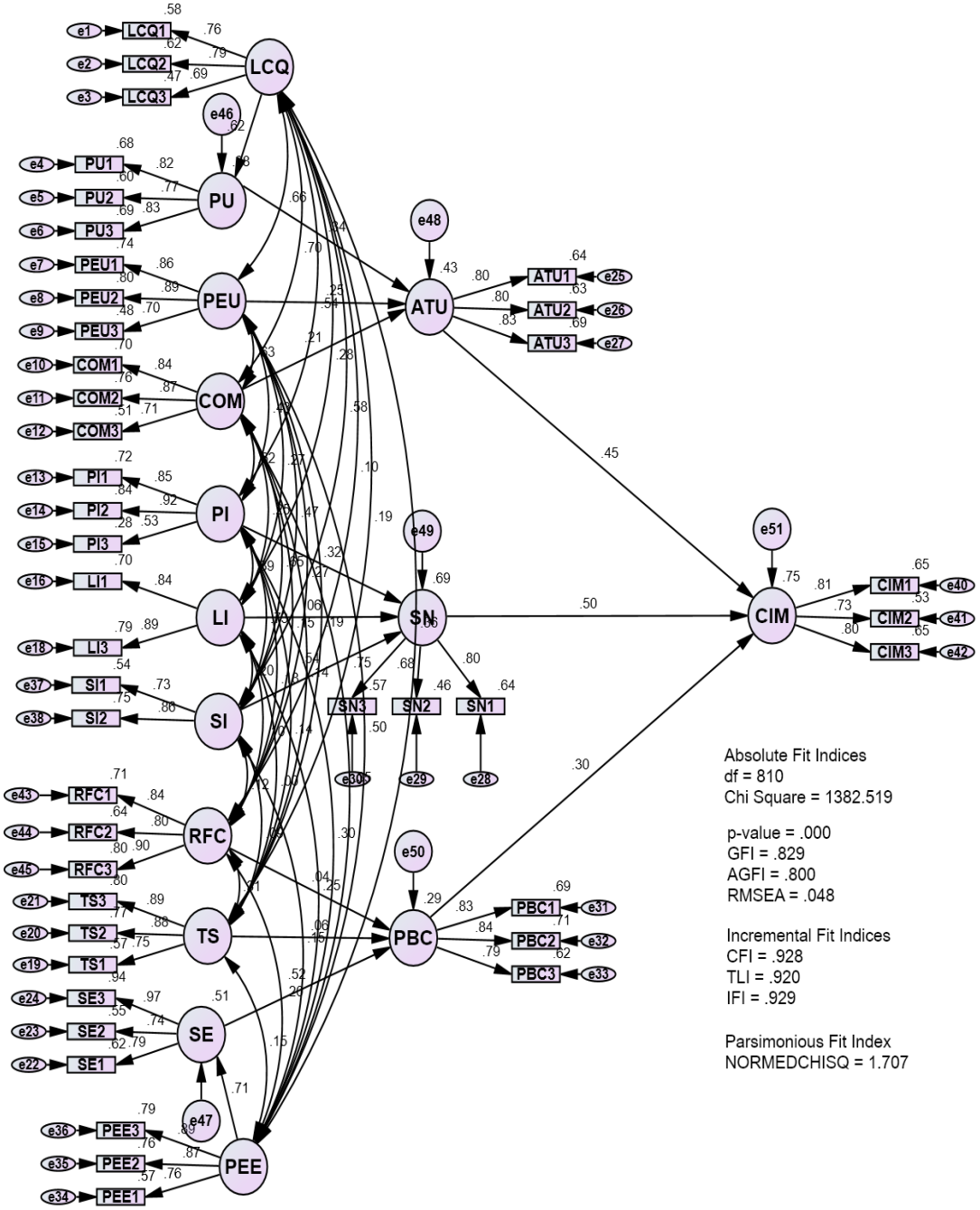
Incremental Fit Indices
CFI = .967
TLI = .961
IFI = .968

Parsimonious Fit Index
NORMEDCHISQ = 1.315

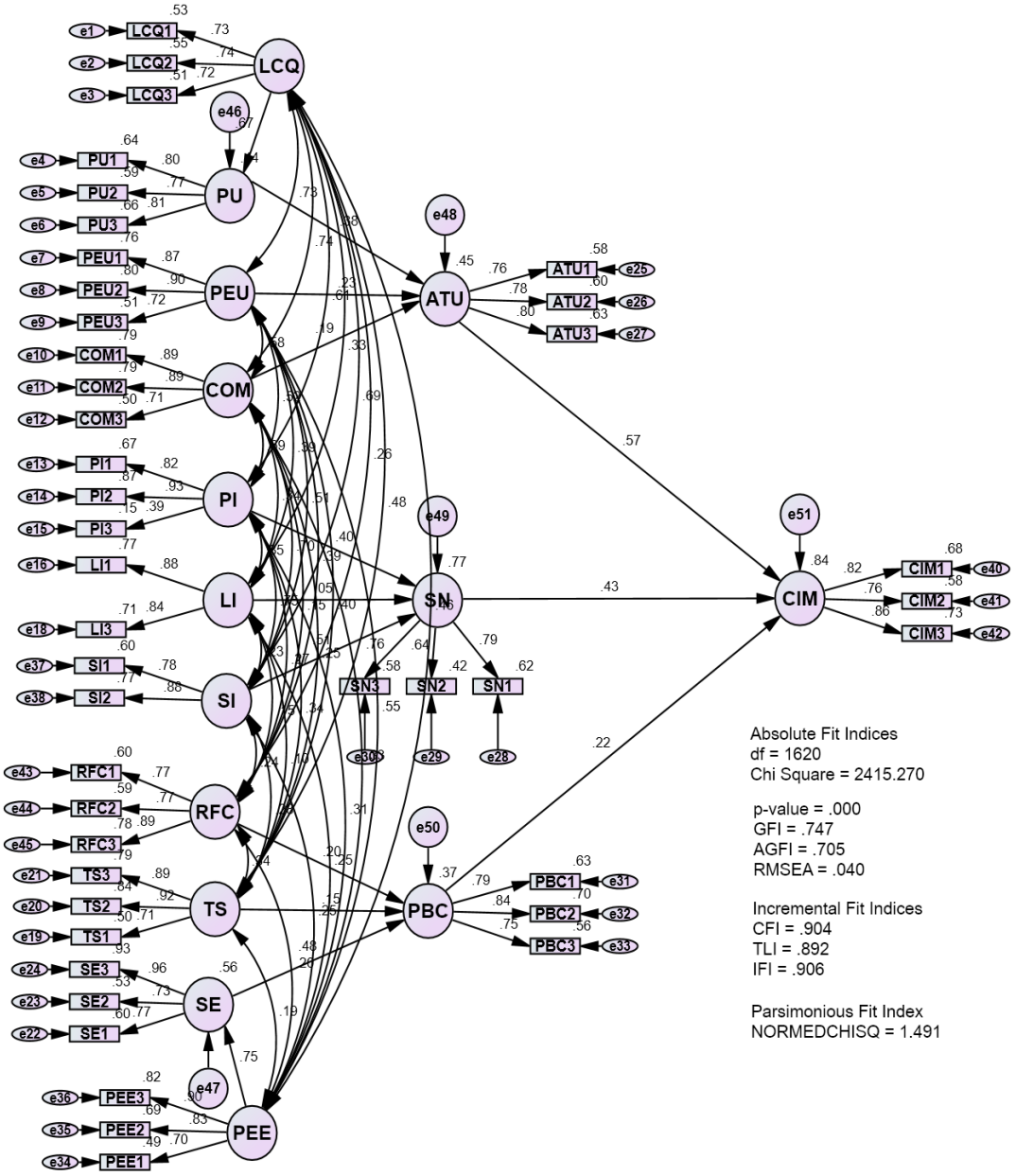
*Appendix A.2.4 Modified measurement model – LI2 & SI3 were deleted*



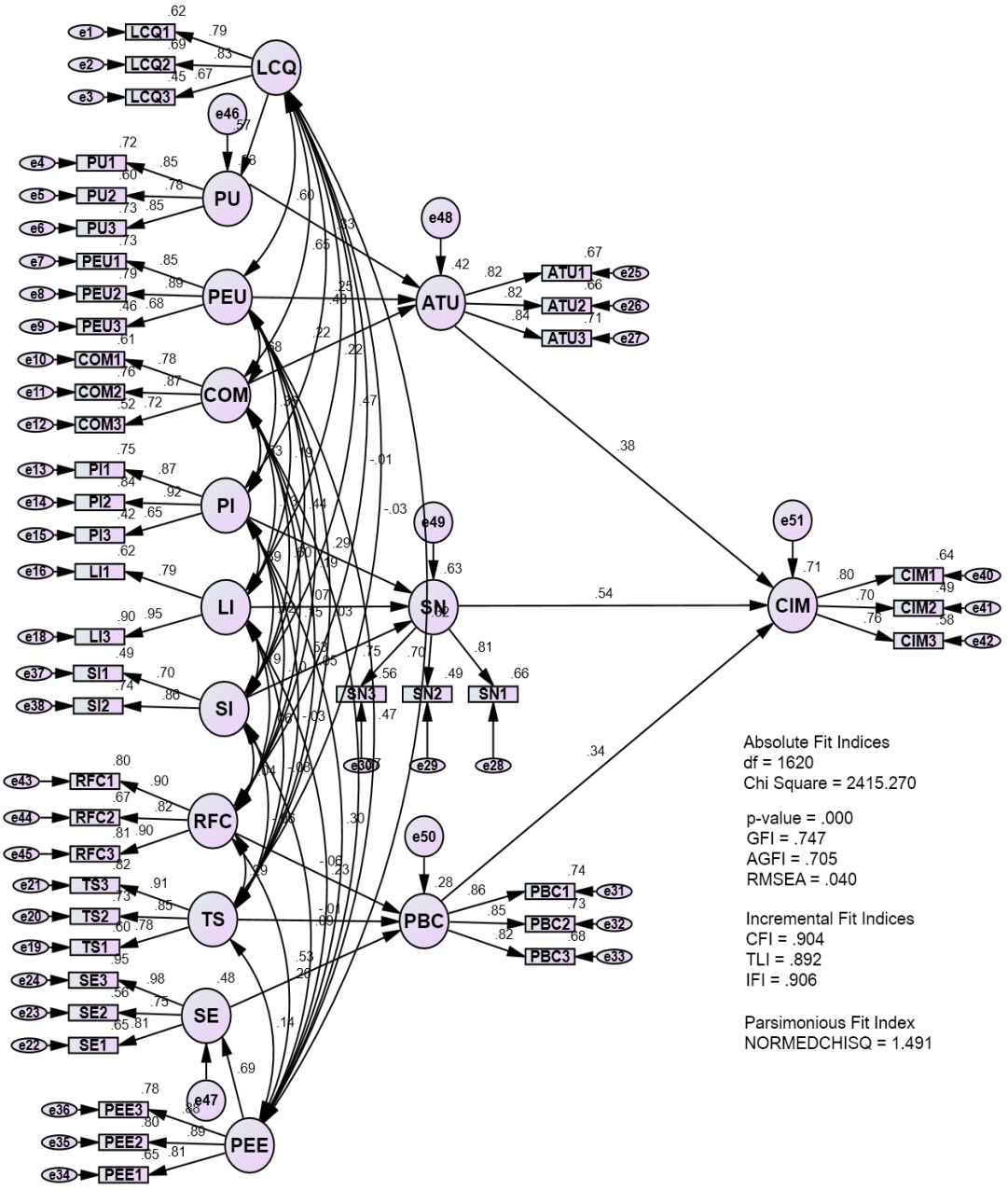
*Appendix A.2.5 AMOS Graph of structural model*



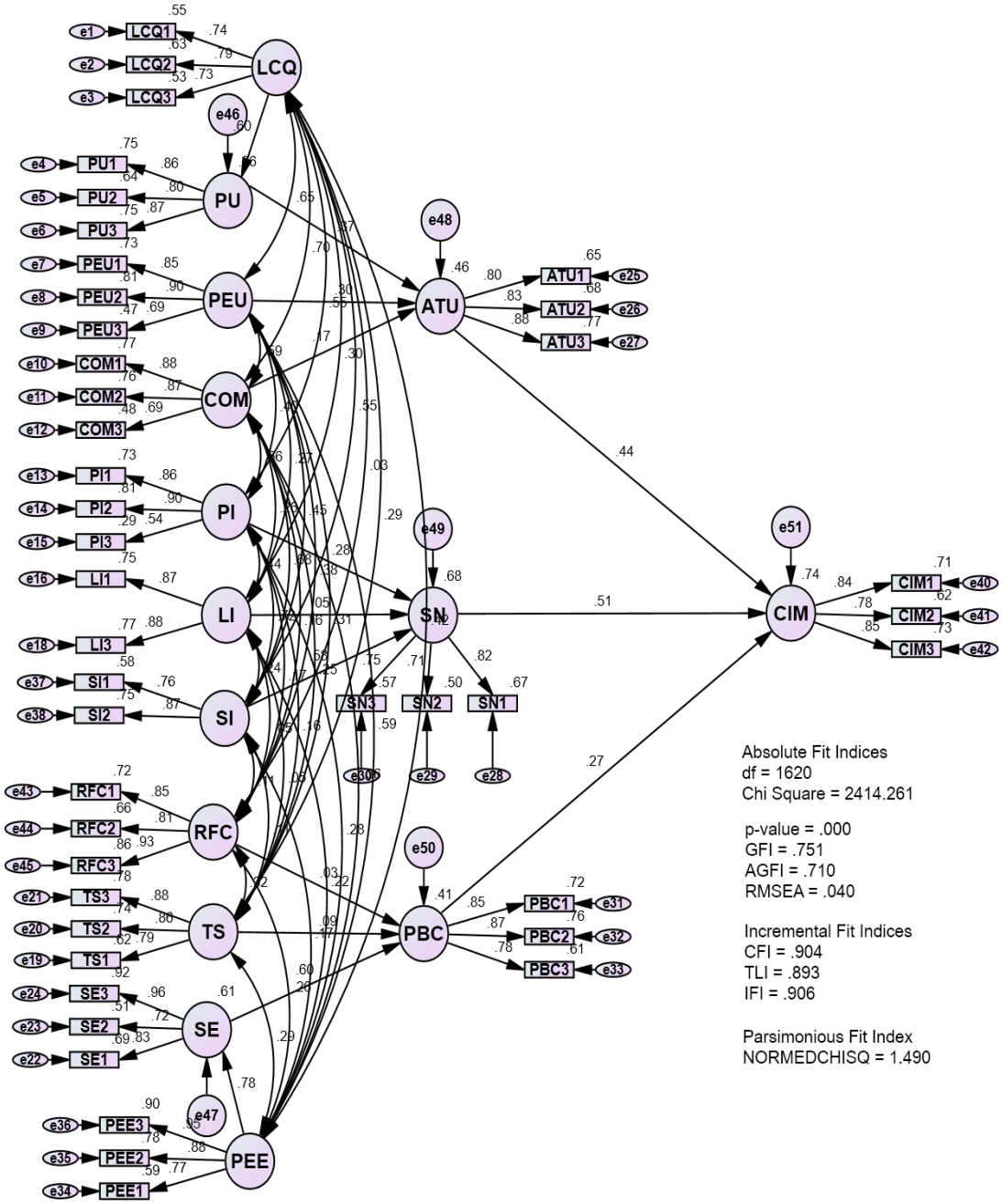
*Appendix A.2.6 AMOS Graph of structure model for male*



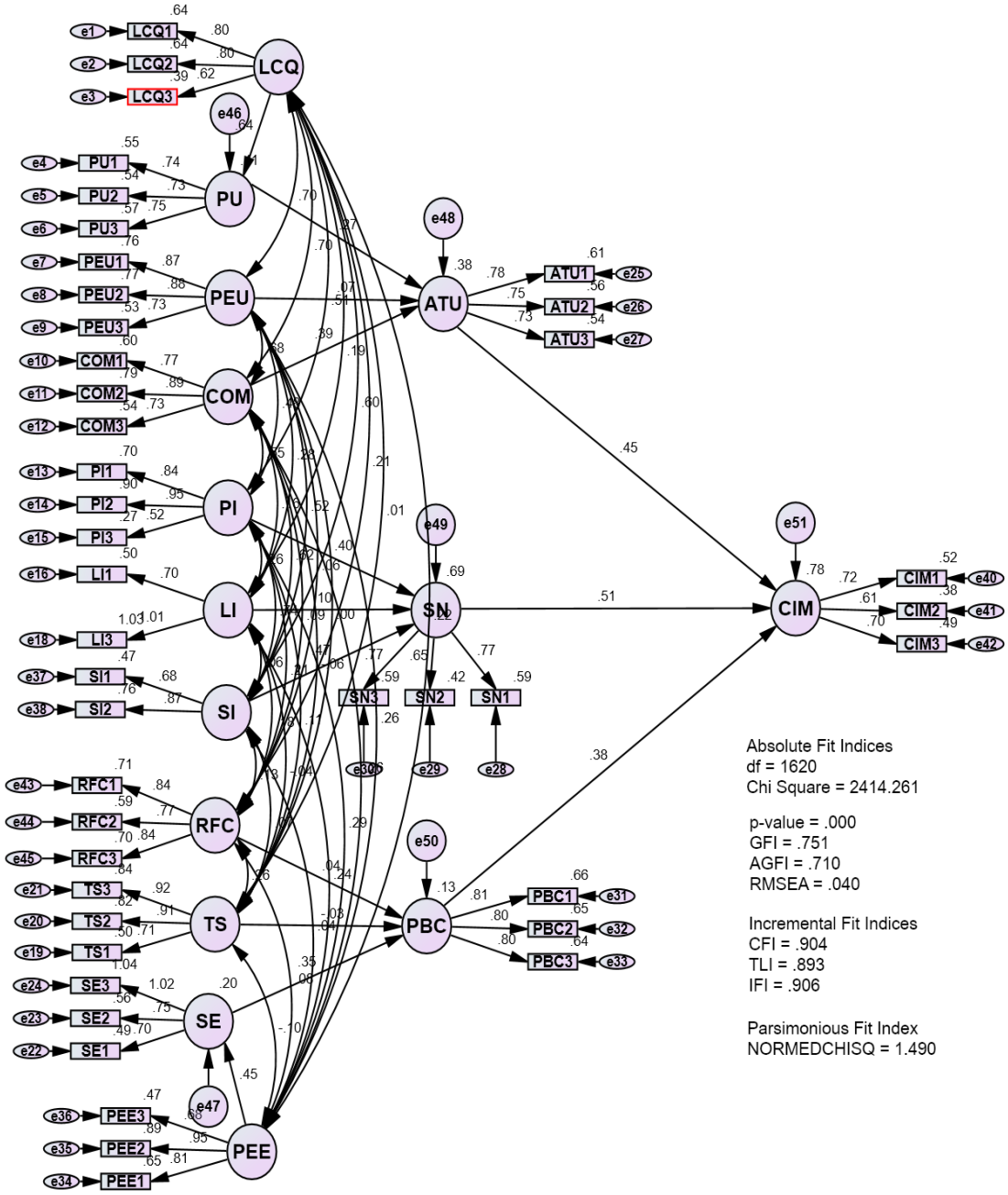
*Appendix A.2.7 AMOS Graph of structure model for female*



*Appendix A.2.8 AMOS Graph of structure model for young*



*Appendix A.2.9 AMOS Graph of structure model for old*



*Appendix A.2.10 Mahalanobis distance assessment using AMOS*

Max ($D^2$) / (no. variables) = 92.045/ 100 = 0.920 which is < 3.5 → No Multivariate Outliers

| Observation number | Mahalanobis d-squared | p1 | p2 |
|---|---|---|---|
| 84 | 92.045 | .000 | .013 |
| 205 | 81.254 | .001 | .022 |
| 56 | 77.574 | .002 | .019 |
| 25 | 75.468 | .003 | .014 |
| 55 | 72.563 | .006 | .032 |
| 297 | 71.582 | .007 | .022 |
| 177 | 71.576 | .007 | .006 |
| 215 | 70.681 | .009 | .005 |
| 123 | 70.295 | .009 | .002 |
| 204 | 69.859 | .010 | .001 |
| 153 | 69.644 | .011 | .001 |
| 129 | 68.186 | .014 | .002 |
| 104 | 67.955 | .015 | .001 |
| 201 | 67.677 | .016 | .000 |
| 199 | 67.262 | .017 | .000 |
| 167 | 67.072 | .018 | .000 |
| 72 | 66.149 | .022 | .000 |
| 246 | 65.786 | .023 | .000 |
| 37 | 65.232 | .026 | .000 |
| 47 | 64.402 | .030 | .001 |
| 28 | 64.177 | .032 | .001 |
| 132 | 63.220 | .038 | .003 |
| 51 | 63.154 | .038 | .002 |
| 272 | 62.958 | .040 | .001 |
| 217 | 62.887 | .040 | .001 |

| Observation number | Mahalanobis d-squared | p1 | p2 |
|---|---|---|---|
| 77 | 62.030 | .047 | .003 |
| 187 | 61.851 | .048 | .002 |
| 115 | 61.822 | .049 | .001 |
| 171 | 61.629 | .050 | .001 |
| 183 | 61.094 | .055 | .002 |
| 294 | 60.609 | .060 | .003 |
| 212 | 59.825 | .069 | .011 |
| 138 | 59.616 | .071 | .010 |
| 83 | 59.339 | .074 | .012 |
| 36 | 59.328 | .074 | .007 |
| 63 | 59.155 | .077 | .007 |
| 176 | 59.049 | .078 | .005 |
| 69 | 59.005 | .079 | .003 |
| 275 | 58.552 | .085 | .006 |
| 221 | 58.361 | .087 | .006 |
| 170 | 58.123 | .091 | .007 |
| 241 | 57.980 | .093 | .006 |
| 291 | 57.755 | .096 | .007 |
| 190 | 57.592 | .099 | .007 |
| 300 | 57.479 | .100 | .006 |
| 9 | 57.435 | .101 | .004 |
| 234 | 57.187 | .105 | .005 |
| 125 | 56.921 | .110 | .006 |
| 116 | 56.783 | .112 | .006 |
| 233 | 56.500 | .117 | .008 |
| 91 | 56.310 | .120 | .009 |
| 120 | 56.259 | .121 | .007 |
| 186 | 55.972 | .127 | .010 |
| 2 | 55.872 | .128 | .009 |
| 80 | 55.816 | .129 | .007 |

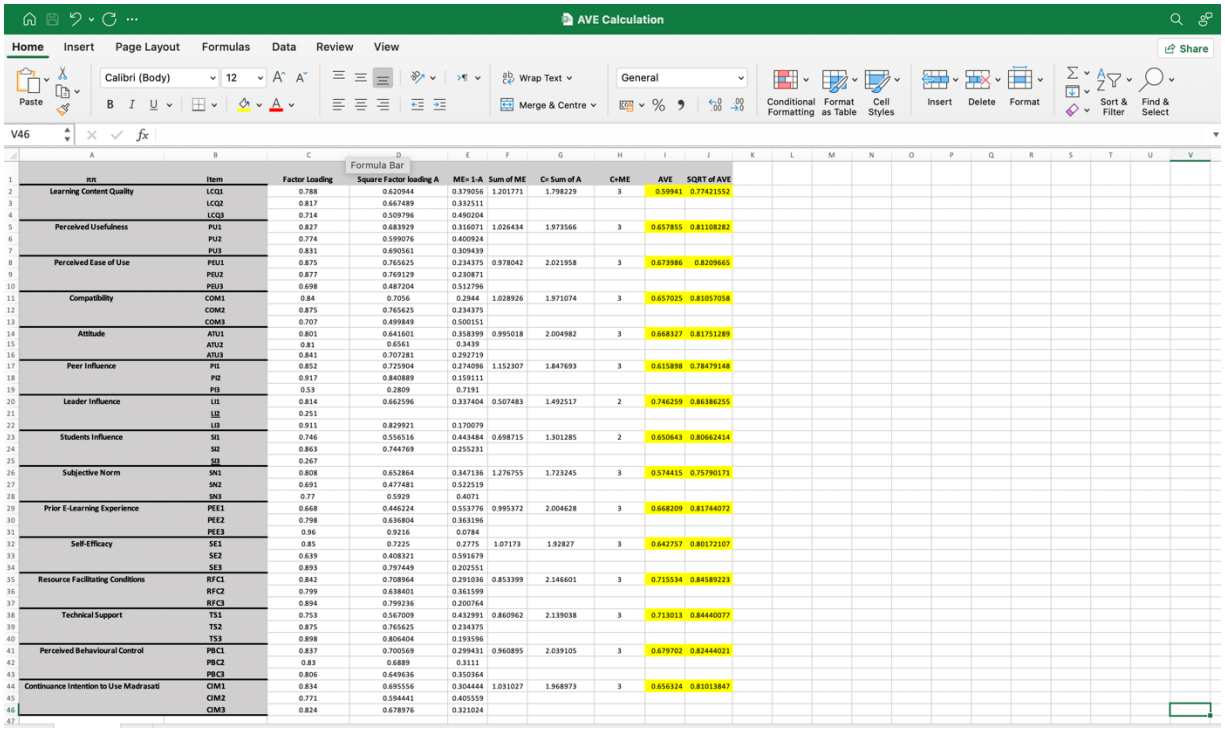
| Observation number | Mahalanobis d-squared | p1 | p2 |
|---|---|---|---|
| 210 | 55.809 | .130 | .004 |
| 82 | 55.726 | .131 | .003 |
| 277 | 55.715 | .131 | .002 |
| 207 | 55.589 | .134 | .002 |
| 71 | 55.482 | .136 | .002 |
| 144 | 55.115 | .144 | .004 |
| 135 | 55.004 | .146 | .004 |
| 229 | 54.833 | .150 | .004 |
| 147 | 54.805 | .150 | .003 |
| 175 | 54.705 | .152 | .003 |
| 256 | 54.518 | .156 | .003 |
| 19 | 54.415 | .159 | .003 |
| 261 | 54.186 | .164 | .004 |
| 179 | 54.015 | .168 | .005 |
| 136 | 53.648 | .177 | .010 |
| 70 | 53.463 | .181 | .013 |
| 16 | 53.381 | .183 | .011 |
| 151 | 53.325 | .185 | .009 |
| 197 | 53.179 | .188 | .010 |
| 287 | 53.113 | .190 | .009 |
| 163 | 52.872 | .196 | .013 |
| 249 | 52.720 | .200 | .014 |
| 11 | 52.705 | .201 | .011 |
| 42 | 52.483 | .207 | .015 |
| 90 | 52.257 | .213 | .021 |
| 75 | 52.227 | .214 | .016 |
| 40 | 52.094 | .217 | .018 |
| 85 | 52.064 | .218 | .014 |
| 22 | 51.712 | .228 | .029 |
| 202 | 51.509 | .234 | .038 |

| Observation number | Mahalanobis d-squared | p1 | p2 |
|---|---|---|---|
| 252 | 51.442 | .236 | .034 |
| 99 | 51.384 | .238 | .030 |
| 238 | 51.377 | .238 | .023 |
| 248 | 51.315 | .240 | .020 |
| 139 | 51.258 | .242 | .017 |
| 93 | 50.842 | .254 | .043 |
| 13 | 50.708 | .259 | .048 |
| 225 | 50.679 | .260 | .039 |
| 59 | 50.305 | .271 | .080 |
| 24 | 50.276 | .272 | .068 |
| 48 | 50.140 | .277 | .074 |
| 268 | 50.131 | .277 | .060 |
| 244 | 49.904 | .285 | .083 |
| 304 | 49.820 | .287 | .081 |
| 181 | 49.617 | .294 | .105 |

*Appendix A.2.11 Assessment of normality of the items*

| Construct | Item | Skewness | Std. Error of Skewness | Kurtosis | Std. Error of Kurtosis |
|---|---|---|---|---|---|
| Learning Content Quality (LCQ) | LCQ1 | -0.551 | 0.14 | -0.69 | 0.279 |
| | LCQ2 | -0.463 | 0.14 | -0.648 | 0.279 |
| | LCQ3 | -0.633 | 0.14 | -0.474 | 0.279 |
| Perceived Usefulness (PU) | PU1 | 0.023 | 0.14 | -1.017 | 0.279 |
| | PU2 | -0.056 | 0.14 | -1.093 | 0.279 |
| | PU3 | -0.384 | 0.14 | -0.801 | 0.279 |
| Perceived Ease of Use (PEU) | PEU1 | -0.931 | 0.14 | 0.369 | 0.279 |
| | PEU2 | -0.765 | 0.14 | 0.052 | 0.279 |
| | PEU3 | -0.01 | 0.14 | -1.095 | 0.279 |
| Compatibility (COM) | COM1 | -0.317 | 0.14 | -0.747 | 0.279 |
| | COM2 | -0.304 | 0.14 | -0.559 | 0.279 |
| | COM3 | -0.585 | 0.14 | -0.445 | 0.279 |
| Attitude (ATU) | ATU1 | -0.446 | 0.14 | -0.36 | 0.279 |
| | ATU2 | -0.666 | 0.14 | -0.485 | 0.279 |
| | ATU3 | -0.506 | 0.14 | -0.605 | 0.279 |
| Peer Influence (PI) | PI1 | -0.317 | 0.14 | -0.775 | 0.279 |
| | PI2 | -0.248 | 0.14 | -0.791 | 0.279 |
| | PI3 | -0.463 | 0.14 | -0.475 | 0.279 |
| Leader Influence (LI) | LI1 | -0.813 | 0.14 | -0.349 | 0.279 |
| | LI2 | -1.001 | 0.14 | 0.346 | 0.279 |
| | LI3 | -0.611 | 0.14 | -0.556 | 0.279 |
| Students Influence (SI) | SI1 | -0.081 | 0.14 | -1.023 | 0.279 |
| | SI2 | -0.016 | 0.14 | -1.038 | 0.279 |
| | SI3 | -1.031 | 0.14 | 1.952 | 0.279 |
| Subjective Norm (SN) | SN1 | -0.259 | 0.14 | -0.287 | 0.279 |
| | SN2 | -0.476 | 0.14 | -0.202 | 0.279 |
| | SN3 | -0.041 | 0.14 | -0.51 | 0.279 |
| Prior E-Learning Experience (PEE) | PEE1 | -1.216 | 0.14 | 0.545 | 0.279 |
| | PEE2 | -1.269 | 0.14 | 0.356 | 0.279 |
| | PEE3 | -1.127 | 0.14 | 0.264 | 0.279 |
| Self-Efficacy (SE) | SE1 | -0.841 | 0.14 | 0.003 | 0.279 |
| | SE2 | -0.185 | 0.14 | -0.311 | 0.279 |
| | SE3 | -0.685 | 0.14 | -0.173 | 0.279 |
| Resources Facilitating Conditions (RFC) | RFC1 | 0.101 | 0.14 | -1.136 | 0.279 |
| | RFC2 | 0.311 | 0.14 | -0.953 | 0.279 |
| | RFC3 | -0.157 | 0.14 | -1.166 | 0.279 |
| Technical Support (TS) | TS1 | 0.189 | 0.14 | -0.942 | 0.279 |
| | TS2 | 0.128 | 0.14 | -0.691 | 0.279 |
| | TS3 | -0.112 | 0.14 | -1.08 | 0.279 |
| Perceived Behavioural Control (PBC) | PBC1 | -0.604 | 0.14 | -0.209 | 0.279 |
| | PBC2 | -0.403 | 0.14 | -0.649 | 0.279 |
| | PBC3 | -0.211 | 0.14 | -0.827 | 0.279 |
| Continuance Intention (CIM) | CIM1 | -0.608 | 0.14 | -0.604 | 0.279 |
| | CIM2 | -0.434 | 0.14 | -0.932 | 0.279 |
| | CIM3 | -0.503 | 0.14 | -0.677 | 0.279 |

*Appendix A.2.12 Reliability, convergent, and discriminant validity test*



AVE Calculation

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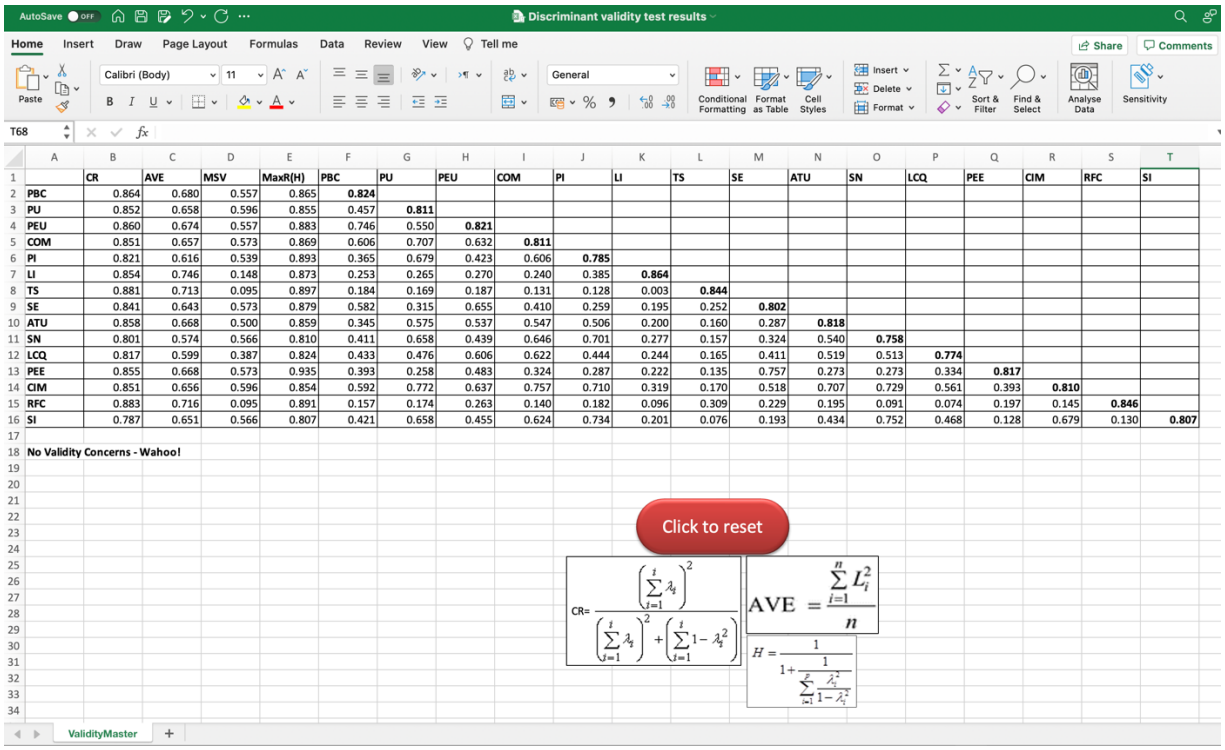
Formula Bar

| | Item | Factor Loading | Square Factor loading A | ME= 1-A | Sum of ME | C= Sum of A | C+ME | AVE | SQRT of AVE |
|---|---|---|---|---|---|---|---|---|---|
| Learning Content Quality | LCQ1 | 0.788 | 0.620944 | 0.379056 | 1.201771 | 1.798229 | 3 | 0.59941 | 0.77421552 |
| | LCQ2 | 0.817 | 0.667489 | 0.332511 | | | | | |
| | LCQ3 | 0.714 | 0.509796 | 0.490204 | | | | | |
| Perceived Usefulness | PU1 | 0.827 | 0.683929 | 0.316071 | 1.026434 | 1.973566 | 3 | 0.657855 | 0.81108282 |
| | PU2 | 0.774 | 0.599076 | 0.400924 | | | | | |
| | PU3 | 0.831 | 0.690561 | 0.309439 | | | | | |
| Perceived Ease of Use | PEU1 | 0.875 | 0.765625 | 0.234375 | 0.978042 | 2.021958 | 3 | 0.673986 | 0.8209665 |
| | PEU2 | 0.877 | 0.769129 | 0.230871 | | | | | |
| | PEU3 | 0.698 | 0.487204 | 0.512796 | | | | | |
| Compatibility | COM1 | 0.84 | 0.7056 | 0.2944 | 1.028926 | 1.971074 | 3 | 0.657025 | 0.81057058 |
| | COM2 | 0.875 | 0.765625 | 0.234375 | | | | | |
| | COM3 | 0.707 | 0.499849 | 0.500151 | | | | | |
| Attitude | ATU1 | 0.801 | 0.641601 | 0.358399 | 0.995018 | 2.004982 | 3 | 0.668327 | 0.81751289 |
| | ATU2 | 0.81 | 0.6561 | 0.3439 | | | | | |
| | ATU3 | 0.841 | 0.707281 | 0.292719 | | | | | |
| Peer Influence | PI1 | 0.852 | 0.725904 | 0.274096 | 1.152307 | 1.847693 | 3 | 0.615898 | 0.78479148 |
| | PI2 | 0.917 | 0.840889 | 0.159111 | | | | | |
| | PI3 | 0.53 | 0.2809 | 0.7191 | | | | | |
| Leader Influence | LI1 | 0.814 | 0.662596 | 0.337404 | 0.507483 | 1.492517 | 2 | 0.746259 | 0.86386255 |
| | LI2 | 0.251 | | | | | | | |
| | LI3 | 0.911 | 0.829921 | 0.170079 | | | | | |
| Students Influence | SI1 | 0.746 | 0.556516 | 0.443484 | 0.698715 | 1.301285 | 2 | 0.650643 | 0.80662414 |
| | SI2 | 0.863 | 0.744769 | 0.255231 | | | | | |
| | SI3 | 0.267 | | | | | | | |
| Subjective Norm | SN1 | 0.808 | 0.652864 | 0.347136 | 1.276755 | 1.723245 | 3 | 0.574415 | 0.75790171 |
| | SN2 | 0.691 | 0.477481 | 0.522519 | | | | | |
| | SN3 | 0.77 | 0.5929 | 0.4071 | | | | | |
| Prior E-Learning Experience | PEE1 | 0.668 | 0.446224 | 0.553776 | 0.995372 | 2.004628 | 3 | 0.668209 | 0.81744072 |
| | PEE2 | 0.798 | 0.636804 | 0.363196 | | | | | |
| | PEE3 | 0.96 | 0.9216 | 0.0784 | | | | | |
| Self-Efficacy | SE1 | 0.85 | 0.7225 | 0.2775 | 1.07173 | 1.92827 | 3 | 0.642757 | 0.80172107 |
| | SE2 | 0.639 | 0.408321 | 0.591679 | | | | | |
| | SE3 | 0.893 | 0.797449 | 0.202551 | | | | | |
| Resource Facilitating Conditions | RFC1 | 0.842 | 0.708964 | 0.291036 | 0.853399 | 2.146601 | 3 | 0.715534 | 0.84589223 |
| | RFC2 | 0.799 | 0.638401 | 0.361599 | | | | | |
| | RFC3 | 0.894 | 0.799236 | 0.200764 | | | | | |
| Technical Support | TS1 | 0.753 | 0.567009 | 0.432991 | 0.860962 | 2.139038 | 3 | 0.713013 | 0.84440077 |
| | TS2 | 0.875 | 0.765625 | 0.234375 | | | | | |
| | TS3 | 0.898 | 0.806404 | 0.193596 | | | | | |
| Perceived Behavioural Control | PBC1 | 0.837 | 0.700569 | 0.299431 | 0.960895 | 2.039105 | 3 | 0.679702 | 0.82444021 |
| | PBC2 | 0.83 | 0.6889 | 0.3111 | | | | | |
| | PBC3 | 0.806 | 0.649636 | 0.350364 | | | | | |
| Continuance Intention to Use Madrasati | CIM1 | 0.834 | 0.695556 | 0.304444 | 1.031027 | 1.968973 | 3 | 0.656324 | 0.81013847 |
| | CIM2 | 0.771 | 0.594441 | 0.405559 | | | | | |
| | CIM3 | 0.824 | 0.678976 | 0.321024 | | | | | |



Discriminant validity test results

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| | CR | AVE | MSV | MaxR(H) | PBC | PU | PEU | COM | PI | LI | TS | SE | ATU | SN | LCQ | PEE | CIM | RFC | SI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBC | 0.864 | 0.680 | 0.557 | 0.865 | **0.824** | | | | | | | | | | | | | | |
| PU | 0.852 | 0.658 | 0.596 | 0.855 | 0.457 | **0.811** | | | | | | | | | | | | | |
| PEU | 0.860 | 0.674 | 0.557 | 0.883 | 0.746 | 0.550 | **0.821** | | | | | | | | | | | | |
| COM | 0.851 | 0.657 | 0.573 | 0.869 | 0.606 | 0.707 | 0.632 | **0.811** | | | | | | | | | | | |
| PI | 0.821 | 0.616 | 0.539 | 0.893 | 0.365 | 0.679 | 0.423 | 0.606 | **0.785** | | | | | | | | | | |
| LI | 0.854 | 0.746 | 0.148 | 0.873 | 0.253 | 0.265 | 0.270 | 0.240 | 0.385 | **0.864** | | | | | | | | | |
| TS | 0.881 | 0.713 | 0.095 | 0.897 | 0.184 | 0.169 | 0.187 | 0.131 | 0.128 | 0.003 | **0.844** | | | | | | | | |
| SE | 0.841 | 0.643 | 0.573 | 0.879 | 0.582 | 0.315 | 0.655 | 0.410 | 0.259 | 0.195 | 0.252 | **0.802** | | | | | | | |
| ATU | 0.858 | 0.668 | 0.500 | 0.859 | 0.345 | 0.575 | 0.537 | 0.547 | 0.506 | 0.200 | 0.160 | 0.287 | **0.818** | | | | | | |
| SN | 0.801 | 0.574 | 0.566 | 0.810 | 0.411 | 0.658 | 0.439 | 0.646 | 0.701 | 0.277 | 0.157 | 0.324 | 0.540 | **0.758** | | | | | |
| LCQ | 0.817 | 0.599 | 0.387 | 0.824 | 0.433 | 0.476 | 0.606 | 0.622 | 0.444 | 0.244 | 0.165 | 0.411 | 0.519 | 0.513 | **0.774** | | | | |
| PEE | 0.855 | 0.668 | 0.573 | 0.935 | 0.393 | 0.258 | 0.483 | 0.324 | 0.287 | 0.222 | 0.135 | 0.757 | 0.273 | 0.273 | 0.334 | **0.817** | | | |
| CIM | 0.851 | 0.656 | 0.596 | 0.854 | 0.592 | 0.772 | 0.637 | 0.757 | 0.710 | 0.319 | 0.170 | 0.518 | 0.707 | 0.729 | 0.561 | 0.393 | **0.810** | | |
| RFC | 0.883 | 0.716 | 0.095 | 0.891 | 0.157 | 0.174 | 0.263 | 0.140 | 0.182 | 0.096 | 0.309 | 0.229 | 0.195 | 0.091 | 0.074 | 0.197 | 0.145 | **0.846** | |
| SI | 0.787 | 0.651 | 0.566 | 0.807 | 0.421 | 0.658 | 0.455 | 0.624 | 0.734 | 0.201 | 0.076 | 0.193 | 0.434 | 0.752 | 0.468 | 0.128 | 0.679 | 0.130 | **0.807** |

**No Validity Concerns - Wahoo!**

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$$CR = \frac{\left(\sum_{i=1}^{i} \lambda_i\right)^2}{\left(\sum_{i=1}^{i} \lambda_i\right)^2 + \left(\sum_{i=1}^{i} 1 - \lambda_i^2\right)}$$

$$AVE = \frac{\sum_{i=1}^{n} L_i^2}{n}$$

$$H = \frac{1}{1 + \frac{1}{\sum_{i=1}^{p} \frac{\lambda_i^2}{1-\lambda_i^2}}}$$

ValidityMaster

# Appendix B Follow-up Interviews Documents

## B.1 Ethical Documents

### *Appendix B.1.1 The General Administration of Education in Asir*

المملكة العربية السعودية
وزارة التعليم
الإدارة العامة للتعليم بمنطقة عسير
إدارة التخطيط والتطوير

وزارة التعليم
Ministry of Education

الرقم : ٤٥٠٠٥٥٢٩٧٥
التاريخ: ١٤٤٥/٥/٧
المشفوعات: ٨

الموضوع: تسهيل مهمة الباحث/فيصل عسيري.

سعادة المساعد/ة للشؤون التعليمية وفقهم الله

السلام عليكم ورحمة الله وبركاته

بناءً على خطاب وكيل الوزارة للتخطيط والتطوير المكلف رقم ٤٤٠١٣٣٦٨٢٦ وتاريخ ١٤٤٥/١/٢هـ المتضمن الموافقة على قيام طالب الدكتوراه/ **فيصل عبدالله حسن عسيري** بجامعة قلاسكو إجراء دراسة بعنوان (دراسة العوامل المؤثرة في استمرار معلمي المدارس الثانوية في استخدام منصة مدرستي في المملكة العربية السعودية) في الفترة من ١٤٤٥/٧/٢هـ الى١٤٤٥/٨/١٤هـ.

آمل تسهيل مهمة الباحث في تطبيق أداة البحث.

| أداة البحث | مقابلة |
|---|---|
| عينة البحث | معلمو ومعلمات المرحلة الثانوية |
| مجتمع البحث | مدارس المرحلة الثانوية بعسير (بنين/بنات) |
| (جهة تسهيل البحث) الإدارة/مكتب التعليم/مدرسة | مكاتب التعليم بعسير (بنين/بنات) |

والله يزعاكم، ، ،

مدير عام التعليم بمنطقة عسير

*Appendix B.1.2 Interviews consent form*

University of Glasgow

College of Social Sciences

## نموذج موافقة

**عنوان البحث:** دراسة العوامل المؤثرة في نية استمرار معلمي المدارس الثانوية في استخدام منصة مدرستي في المملكة العربية السعودية
**اسم الباحث:** فيصل عسيري، **ايميل الباحث:** f.assiri.1@research.gla.ac.uk

أؤكد أنني قد قرأت وفهمت "بيان اللغة السهلة" للدراسة المذكورة أعلاه وأتيحت لي الفرصة لطرح الأسئلة.
أدرك أن مشاركتي تطوعيه وأنني حر في الانسحاب في أي وقت، دون إبداء أي سبب.
أوافق على تسجيل المقابلة صوتياً.

**السرية / عدم الكشف عن هويته**
أقر بأن جميع المشاركين سيشار إليهم بأسماء مستعارة.

**العلاقات التابعة**
أقر بأنه لن يكون هناك أي تأثير على وظيفتي نتيجة لمشاركتي أو عدم مشاركتي في هذا البحث.

**استخدام البيانات وتخزينها**
سيتم التعامل مع المعلومات على أنها سرية وسيتم الاحتفاظ بها في مخزن آمن في جميع الأوقات.
سيتم التخلص من المعلومات بمجرد اكتمال المشروع.
أوافق على التنازل عن حقوق الطبع والنشر لأي بيانات تم جمعها كجزء من هذا المشروع.

**(  ) أوافق على المشاركة في المقابلة**

**(  ) أنا لا أوافق على المشاركة في المقابلة**

**اسم المشارك:** ..... **التوقيع:** ..... **التاريخ:**

**الباحث:** ..... **التوقيع:** ..... **التاريخ:**

## B.2 Interviews materials

### *Appendix B.2.1 Interviews questions in Arabic*

٢- ما هي الفئة العمرية؟

٣- بنهاية هذا العام الدراسي، كم عدد سنوات خدمتك؟

٤- هل استخدمت منصة مدرستي في السابق؟

٥- كم معدل عدد الساعات اليومية التي يجب ان يقضيها المعلم على منصة مدرستي، اما في المنزل او في المدرسة؟

---

١- برأيك، ماهي الأسباب التي تؤثر على استمرار استخدام منصة مدرستي في المستقبل من قبل المعلمين؟

٢- ما رأيك في المحتوى التعليمي في منصة مدرستي (دروس، عروض، مقاطع فيديو، كتب)؟ هل ترى انها كافية ومناسبة للتعليم؟

٣- ما مدى سهولة أو صعوبة استخدام منصة مدرستي؟ هل تعتقد ان السهولة تؤثر في استمرارية الاستخدام؟

٤- هل يؤثر رأي الآخرين أو انطباعاتهم في مجتمع مدرستك على استخدامك لمدرستي؟ هل ممكن توضيح أكثر؟

٥- هل تعتقد أن تجربتك في استخدام منصة مدرستي خلال فترة COVID-19 أثرت على تصورك لاستخدامها الآن في تدريسك؟ الى أي مدى تعتقد ذلك؟

٦- هل تعتقد أن توافر الموارد (مثل الوقت، المال، الأجهزة الإلكترونية، الاتصال بالإنترنت) قد يكون له تأثير على استمرارية استخدام مدرستي؟ هل ممكن توضح أكثر

٧- هل حضرت دورات تدريبية حول استخدام مدرستي؟ إذا كنت قد حضرت هل ممكن تخبرني عنها؟

٨- من خلال استخدامك وتجربتك لمنصة مدرستي؟ ما رأيك في الفوائد والعيوب لاستخدام منصة مدرستي في التدريس والتعلم؟

*Appendix B.2.2 Table of codes appearance in transcripts*

| | | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 | H17 | H18 | H19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attitudes towards Madrasati | Modern technology in learning | √ | | | | | √ | | | √ | | √ | | | | | | | √ | |
| | Progress of technology in education | | √ | √ | √ | | | | √ | | | | | √ | | | | | | |
| | Using technology for education purpose | | √ | | | | | √ | | √ | | √ | √ | | | √ | √ | | √ | |
| | Challenges and difficulties during COVID | √ | √ | | √ | √ | | | √ | | √ | | √ | √ | | | √ | √ | | |
| | Rural context impact | | | √ | | | √ | | | | | | | √ | | | | | | |
| | Parents resistance of technology | | | √ | | | | | | | | √ | | | | | | | | |
| | Unprepared school buildings | | √ | | | | | √ | √ | | | | | | | | | | √ | |
| | Using Madrasati additional responsibilities | | | √ | | | | | | √ | | | | | | √ | | | | |
| Usefulness | Madrasati supports my teaching | | | √ | | | √ | √ | | | √ | | √ | √ | | | | √ | | √ |
| | Quick communication | | √ | | √ | | | √ | | | √ | | √ | | | √ | | | √ | |
| | Lack of visual and physical communication | | | √ | | | | | | | | | | | √ | | | | | |
| | Ease of communication | | √ | | | √ | √ | | | | √ | | | | | | √ | √ | | √ |

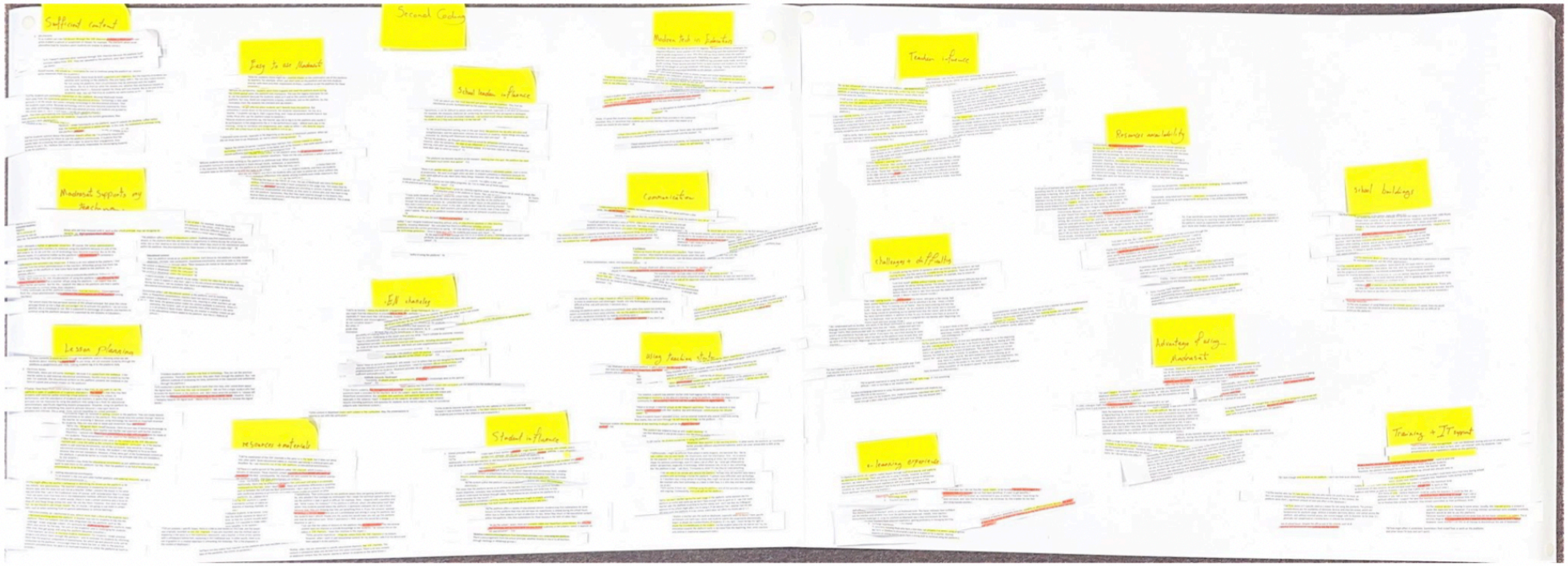
| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Communication out of school hours | | | √ | √ | | | | | | | √ | √ | | | | √ | | | |
| | Students take tests after school hours | √ | | √ | | | | | | √ | | | | | | | | √ | | |
| | Lesson planning through Madrasati | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | | √ | |
| | Virtual classes and experiments | | | √ | | | | | | | | | | | | | | | | |
| | Virtual classes and experiments | | | √ | | | | | | | | | | | | | | | | |
| | Programmes through Madrasati | √ | | | | √ | | | | | | | | | | | | | | √ |
| | Individual differences among students | | | √ | | | | | √ | | | | | | | | | | | |
| | Self-learning method. | | | √ | | | √ | √ | √ | | | | | √ | | | | | | |
| | Self-directed learning. | | | √ | | | | | √ | | | | √ | | | | | | | |
| | Sustainability of learning | | √ | √ | | | √ | √ | √ | | | √ | | | | | √ | | | √ |
| | Organised educational tasks for teachers | | √ | | | √ | √ | √ | | | | | √ | | | √ | | | | |
| | Managing crowded classes | | | √ | | | | | | | | | | √ | | | | | | |
| | Using different teaching strategies | | | | √ | √ | | √ | | | √ | √ | | | √ | | | √ | | √ |
| Ease of use | Easy-to-use interface | | | | √ | | | | √ | | | √ | | √ | | | | √ | | |
| | User-friendly icons | √ | | √ | | √ | | | | | √ | | | √ | √ | | √ | | | |
| | Well-organised icons | | | | | | | √ | | | | | √ | | | | | √ | | |
| | Easy to use Madrasati | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Education content | Sufficient education content | √ | √ | √ | | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

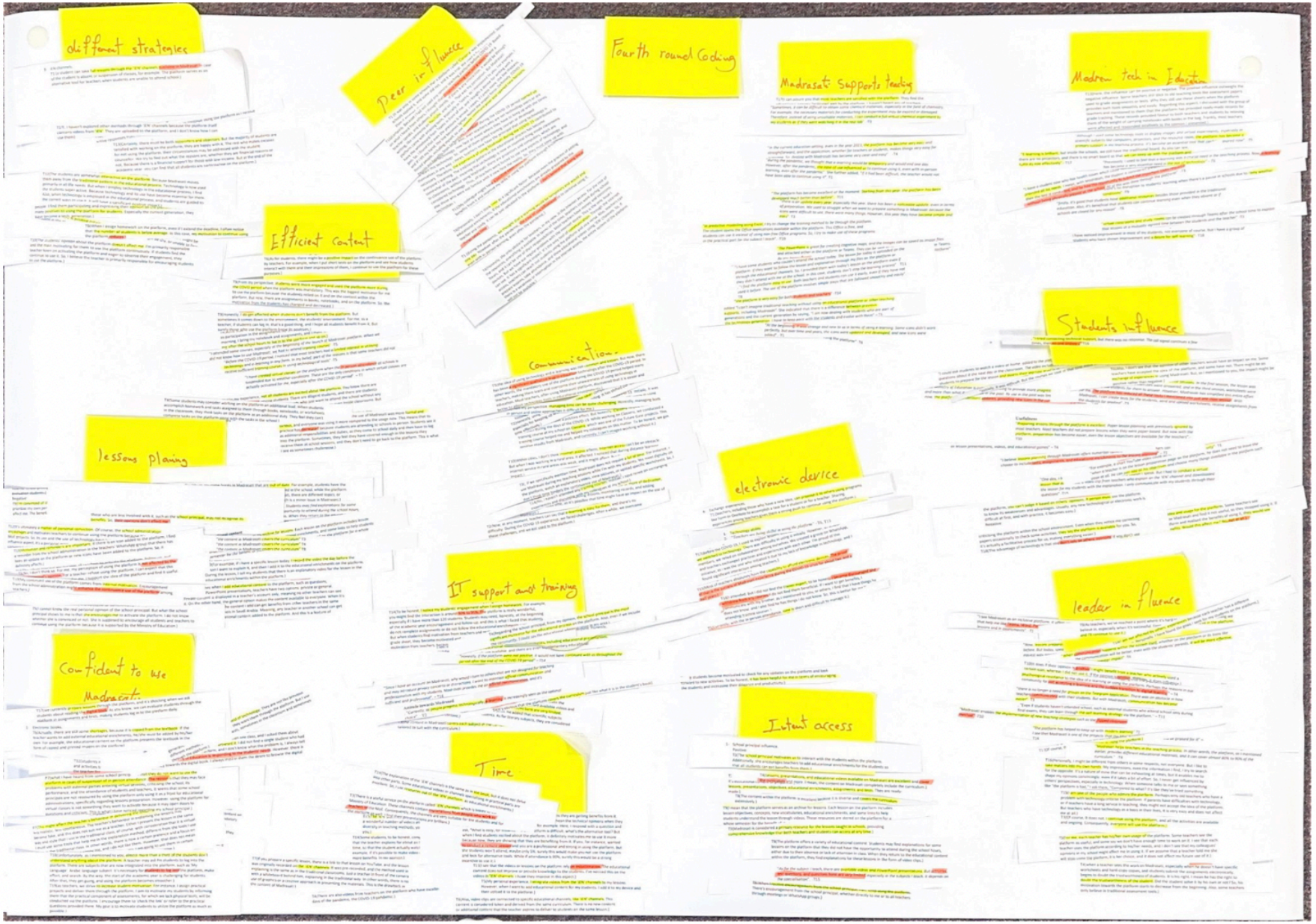
| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Insufficient education content | | | | √ | | | | | √ | | | | | | | √ | √ | | |
| | Various content | | √ | | | | | √ | | | | √ | √ | | | √ | | | | |
| | Content covers the curriculum | | | √ | | √ | | | √ | | | √ | √ | | | | √ | | | |
| | Lack content in some subjects | | | | √ | | | | | | | | | | | | √ | | | |
| | Content presents as in the curriculum | | | | | √ | | | | | | | √ | | | | | √ | | |
| | Electronic books | | | | | | | √ | | | | | | | | | √ | √ | | √ |
| | Full lesson through iEN channels | √ | | √ | | √ | √ | √ | √ | | | √ | | | √ | √ | | | | |
| | Directed teaching method in iEN videos | | | | | √ | | | | | | | | | | | | | √ | |
| | Educational resources and materials | √ | | | √ | | | | | √ | √ | | √ | √ | | | | √ | | |
| | Additional resources besides curriculum | | | √ | | | | | √ | | | √ | | | | √ | | | | |
| | Adding educational enrichments | √ | | √ | √ | √ | √ | √ | √ | | √ | | √ | √ | √ | √ | | √ | √ | √ |
| Self-Efficacy | Skilled teachers over time | | √ | | | | √ | | | | | √ | √ | | | | | | | |
| | Constant developments to Madrasati | | √ | | | √ | √ | | | | | √ | √ | √ | | | | | | |
| | Prior e-learning experience (during COVID/ before) | √ | | √ | √ | √ | | √ | √ | | | | √ | | | √ | √ | | | √ |
| School leader influence | Motivation from school leader | √ | | √ | √ | √ | | √ | √ | | | | √ | √ | √ | | √ | | √ | √ |

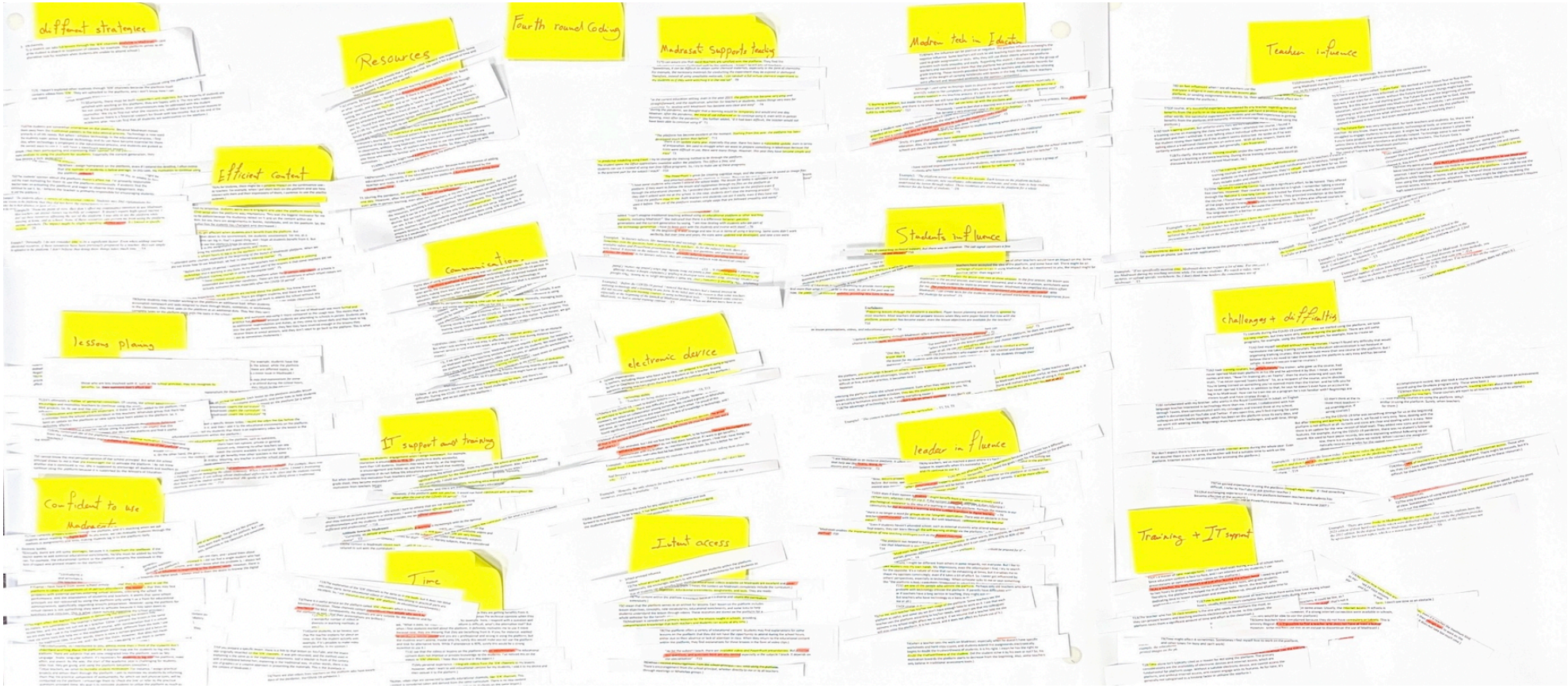
| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unaffected by school leader opinion | | √ | | | | √ | | | | √ | √ | | | | | | | | |
| | Opinions related to age | | √ | | | | | | √ | | | | | | | | | | | |
| Peer influence | Teacher collaboration | | | √ | | √ | √ | | | | √ | √ | | √ | | | √ | | | |
| | Sharing experiences among teachers | √ | | | | | | √ | √ | | | √ | | | | | | √ | √ | |
| | Negative opinions do not affect me. | | √ | | | | | | | √ | | | | | | √ | | | | |
| Students influence | Student participation | | √ | | | | | | | √ | | √ | | | | | | | | |
| | Connection between teachers and students' usage | √ | | √ | | √ | | | | | | | | | √ | | | | | |
| | Low student login rates | √ | | | | | | | | | √ | | | | | | | | | |
| | Improvement technological skills in some students | √ | | | √ | | | | | | | | | | √ | √ | | | | |
| Resources Availability | Importance of internet access | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | | √ |
| | Important of constant internet access | √ | | | √ | | | | | √ | √ | | | | | | | | | |
| | Limited internet access in rural areas | | | | √ | | | | | | | | √ | √ | | | | | | |
| | Device compatibility | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ |
| | Time management | | √ | √ | | | | | √ | | | | | | √ | | | | | |
| | Save time | | √ | | √ | √ | | √ | | | √ | | √ | | | | √ | | √ | |
| | Availability of time | √ | | | | | | | | | | | | | | | | | | |
| | Time is short in current settings. | | | | | √ | | | | | | | √ | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ability to provide internet and device | | √ | √ | √ | | | √ | √ | √ | | √ | √ | √ | | √ | | √ | √ | √ |
| | Financial difficulties | | √ | | | | | | | | | | √ | | | | | | | |
| Training/ IT support | Need more training courses | √ | √ | | | √ | √ | √ | √ | | √ | | | √ | √ | | | | √ | |
| | Updating teachers on new features | √ | √ | | | √ | | | √ | | | | √ | | | | | | √ | |
| | Development of Madrasati | | √ | √ | | | √ | √ | √ | | | | | √ | | √ | √ | | | |
| | Importance of IT support | √ | √ | | | | | | √ | √ | | | | | √ | | | | √ | |
| | Skilled without training courses | √ | | | | √ | √ | | | | | | | √ | √ | | | | | |

*Appendix B.2.3 Round codes processes*




different strategies
Peer influence
Fourth round Coding
Madrasati supports teaching
Madrasa tech in Education
Efficient content
Communication
Students influence
lessons planing
electronic device
IT support and training
leader in flurence
Confident to use Madrasati
Intent access
Time


different strategies
Resources
Fourth round Coding
Madrasati supports teaching
Modern teh in Educatin
Teachers influence
Efficient Content
Communication
Students influence
lessons planing
electronic device
challenges + difficulties
IT support and training
leader influence
Confident to use Madrasati
Intent access
Training + IT support
Time