CHALLENGES AND SUCCESS FACTORS IN EDUCATIONAL TECHNOLOGY
ADOPTION IN THE UNITED ARAB EMIRATES: A MIXED-METHODS
STUDY OF EDTECH FIRMS

by

AISWARYA THARABHAI ANISH, M.A.

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APPROVED BY

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Prof.Dr.Sc. Saša Petar, Ph.D., Chair

RECEIVED/APPROVED BY:

_____
SSBM Representative

Dedication

This dissertation is dedicated to my family and mentors. To my parents, for their endless support and encouragement throughout this journey. To my teachers and colleagues, whose inspiration and guidance fueled my passion for educational technology. I also dedicate this work to all educators and innovators in the UAE who strive to integrate technology to improve learning experiences. Your dedication to advancing education in challenging times has been my motivation.

Acknowledgements

ABSTRACT

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AISWARYA THARA BHAI ANISH
2025

Dissertation Chair: <Chair's Name>
Co-Chair: <If applicable. Co-Chair's Name>

Educational Technology (EdTech) has rapidly emerged as a pivotal element in modern education, particularly accelerated by the COVID-19 pandemic and national digital transformation agendas. In the United Arab Emirates (UAE), government initiatives and a thriving tech ecosystem have led to the establishment of over 150 EdTech companies, yet challenges of scalability, differentiation, and sustainable adoption persist (Dutt, 2024). This doctoral study examines the factors influencing the adoption and implementation of EdTech solutions in the UAE. The research employed a mixedmethods approach, combining a quantitative survey across UAE educational institutions, and qualitative interviews with UAE-based EdTech firms. The Technology Acceptance

Model (TAM) and related adoption frameworks provided the theoretical lens for examining how perceived usefulness, ease of use, and external factors shape EdTech acceptance).

Quantitative results indicated high awareness but moderate usage of EdTech tools in practice: ~68% of educator respondents reported using EdTech regularly, while others cited barriers such as limited training (70%), infrastructural gaps (60%), and resistance to change (55%). Statistical analysis showed that perceived usefulness ($\beta = 0.58$, $p < 0.001$) is the strongest predictor of educators' intent to adopt EdTech. Qualitative findings revealed five emergent themes: (1) Training & Literacy: EdTech firm leaders observed many teachers lack digital pedagogical training (2) Alignment with Curriculum: Successful adoption requires aligning EdTech solutions with local curriculum standards and Arabic content needs; (3) Leadership & Policy: School leadership commitment and government policies

significantly drive adoption (4) Cultural Attitudes: Cultural receptiveness and a growth mindset among educators and students facilitate adoption (5) Value Demonstration: Tangible improvements in learning outcomes to convince

stakeholders, reflecting perceived usefulness as a key motivator.

By integrating quantitative and qualitative insights, this study provides a holistic understanding of EdTech adoption in the UAE. The discussion highlights that perceived pedagogical value, ease of integration, and strong stakeholder support are vital. This dissertation concludes with strategic recommendations to stakeholders and suggestions, such as longitudinal studies on EdTech impacts on student performance and comparative studies across GCC countries.

Keywords: Educational Technology, EdTech Adoption, UAE Education, Technology Acceptance Model, Mixed-Methods, Teacher Training, Digital Learning, Innovation in Education, TAM, UTAUT, Cultural Influence, Infrastructure, Stakeholder Engagement.

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CHAPTER I: INTRODUCTION

1.1 Introduction

In recent years, Educational Technology (EdTech) has transformed from a niche concept into a cornerstone of modern education systems worldwide. The integration of digital tools, online platforms, and interactive media into teaching and learning processes holds the promise of enhanced engagement and improved learning outcomes(Feng et al., 2025). This global EdTech boom has been accelerated by the COVID-19 pandemic, which forced educational institutions to rapidly adopt remote learning solutions, and in doing so exposed both the potential and challenges of technology-enabled education. The UAE, known for its strategic emphasis on innovation, has been at the forefront of this trend in the

Middle East. Under initiatives like the UAE Vision 2021 and the National Innovation Strategy, the country has heavily invested in smart education infrastructure – from equipping classrooms with advanced hardware to launching nationwide e-learning platforms. For instance, the UAE's Ministry of Education collaborated with telecom providers to ensure free internet data for students during the pandemic, bridging access gaps in online education (PwC Middle East, 2024). Such measures demonstrate the country's commitment to leveraging technology for continuity and advancement in education.

The result of these efforts is a vibrant EdTech landscape in the UAE. As of 2024, the Emirati EdTech market recorded revenues of approximately $1.65 billion, reflecting a robust CAGR of 9.4% since 2019(EdTech in United Arab Emirates, 2024). Over 150 EdTech startups and companies operate in the UAE, offering services ranging from K-12 e-learning platforms and educational games to AI-driven tutoring systems (Kenresearch.com, 2025) (Dutt, 2024). Major home-grown players include platforms like Lamsa, an Arabic early childhood learning app with over 17 million downloads, and Alef Education, an AI-powered

learning system implemented in thousands of schools (Dutt, 2024). These impressive numbers underscore a national appetite for EdTech solutions and the UAE's potential to be a regional hub for educational innovation. Furthermore, the government's push towards a knowledge-based economy and the inclusion of digital skills in curricula have normalized the use of tablets, educational software, and online resources in everyday classrooms. By 2023, 96% of the UAE's population were smartphone users, one of the highest rates globally(PwC Middle East, 2024), providing a ready foundation for mobile learning

initiatives.

However, despite high levels of investment and optimism, the ground reality of EdTech adoption in the UAE's schools and universities presents a nuanced picture. Many educators and institutions are still navigating significant challenges in integrating technology effectively. Early observations suggest that teacher adoption of EdTech varies widely, influenced by factors such as training, attitudes, and perceived relevance. Some schools boast tech-forward practices (e.g., flipped classrooms, blended learning models), while others use digital tools only sporadically or in superficial ways. This disparity raises important questions: What differentiates successful EdTech integration from limited use? What barriers are educators and EdTech firms encountering on the ground? And what factors drive the sustained use of EdTech in enhancing teaching and learning? Answering these questions is crucial, as integrating technology in education is not merely a technical endeavor but a complex change management process involving human, organizational, and cultural dimensions(Feng et al., 2025).

This dissertation tackles these questions by examining both sides of the EdTech adoption equation: the educational institutions (demand side) and the EdTech firms (supply side). Through a comprehensive mixed-methods study, it seeks to identify the challenges and success factors that characterize EdTech adoption in the UAE context. By combining insights from educators (who implement EdTech in classrooms) and EdTech entrepreneurs (who

develop and promote these solutions), the study aims to provide a 360-degree view of the adoption process. Such a perspective is necessary to inform strategies that can bridge the gap between technological potential and practical implementation in classrooms. The introduction chapter sets the stage by outlining the research problem and context, clarifying the purpose and questions guiding the investigation, and highlighting the significance of the study for theory and practice.

1.2 Research Problem

Despite the UAE's substantial investments in educational technology and the proliferation of EdTech ventures, there remains a discernible gap between the availability of innovative tools and their effective usage in educational settings. Preliminary research and stakeholder reports point to a scenario where many EdTech initiatives struggle to achieve long-term integration into teaching practice. Schools often pilot new platforms or devices with enthusiasm, only to see usage drop off after the initial excitement fades. On the side of EdTech firms, many startups find it challenging to scale their solutions within the UAE market beyond early adopters. A notable research problem emerges: the inconsistent and at times limited adoption of EdTech solutions by educators, and the difficulties EdTech firms face in achieving sustained utilization of their products in UAE educational institutions. This problem manifests in several symptomatic issues observed anecdotally or reported in the literature:

Underutilization of EdTech Tools: Surveys of teachers suggest that while nearly all have access to some form of educational technology, only a subset integrate these tools into their daily teaching practice in meaningful ways (for example, using an interactive learning platform for a few weeks then reverting to traditional methods). This indicates a low depth of adoption even when breadth of access is high. Understanding why some teachers remain hesitant or face obstacles to regular use of EdTech is a key part of the problem.

Barriers for Educators: Multiple potential barriers have been hypothesized: insufficient training or digital skills among teachers, lack of time to redesign lesson plans to incorporate tech, technical problems (like unreliable internet connectivity or lack of IT support), misalignment of EdTech content with the curriculum, or even cultural/language issues (e.g., scarcity of high-quality Arabic educational content). A PricewaterhouseCoopers study on GCC education noted challenges like unequal access, low teacher digital literacy, and infrastructure limitations as hurdles to EdTech adoption (PwC Middle East, 2024). In the UAE, where infrastructure is generally advanced, softer factors like teacher preparedness and content relevance appear to be major issues.

Challenges for EdTech Firms: On the supply side, EdTech companies in the UAE face "complex challenges" of scalability and differentiation(Dutt, 2024). Many startups can demonstrate effectiveness in a pilot or controlled setting, but struggle to generalize that success across many schools which each have unique contexts and needs. Additionally, as the EdTech sector grows crowded (150+ companies in a relatively small market), convincing schools to adopt one's solution over others becomes harder, especially if offerings are similar. Competitive pressure and market saturation contribute to adoption challenges, as noted by industry analysts (Kenresearch.com, 2025). Furthermore, securing the buy-in of multiple stakeholders (school leaders, teachers, parents, government regulators) is often cited by EdTech CEOs as a complex task(Dutt, 2024). If any key stakeholder group is unconvinced of the technology's value or finds it hard to use, adoption can stall.

Cultural and Language Factors: The UAE's diverse cultural landscape (with both local Emirati and expatriate educators and students) adds another layer to the research problem. Prior research (e.g., Clarke, 2020) has shown that cultural influences can affect technology adoption by teachers (Clarke, 2020). In the UAE, differences in attitudes between, say, native Arabic-speaking teachers and Western expatriate teachers could influence how each perceives and uses

EdTech. Clarke's mixed-methods study found that while overall attitudes were positive, certain groups used technology differently in the classroom (e.g., some using it more for individualized support vs. whole-class instruction) (Clarke, 2020). Additionally, the language of content is crucial; a shortage of Arabic educational software, or culturally relevant content, might reduce perceived usefulness among local educators or students.

Given these complexities, the core research problem can be summarized as a need to identify and analyze the determinants of successful EdTech adoption in UAE educational institutions, and the obstacles that hinder it. This problem is significant not only at a practical level for improving educational outcomes, but also at a theoretical level. It presents an opportunity to investigate the applicability of existing technology adoption theories (mostly developed in Western contexts) in a Middle Eastern educational setting, potentially revealing new insights or extensions to those theories. Addressing this problem will require delving into "how and why" certain factors impact adoption, making it a rich area for mixed-methods inquiry.

1.3 Purpose of Research

The purpose of this doctoral research is to examine the adoption of educational technology in the UAE's education sector from a holistic perspective, and to identify the key factors that facilitate or impede its successful implementation. In service of this purpose, the study is designed to bridge the viewpoint of UAE educational practitioners (teachers and academic administrators) and that of UAE EdTech firm leaders, thereby illuminating the "push and pull" dynamics of technology integration. Specifically, the research aims to uncover what drives or hinders teachers' and institutions' acceptance of EdTech (demand side), and what challenges EdTech companies face in encouraging the uptake and sustained use of their products (supply side).

This overarching purpose can be broken down into several sub-goals:

- Diagnose Current Adoption Levels and Patterns: Establish a clear picture of how extensively and in what ways EdTech tools are currently being used in representative UAE schools and universities. This involves measuring usage frequency, purposes of use (e.g., instructional delivery, student collaboration, assessment), and variations across different contexts (such as K-12 vs higher education, or private vs public institutions).

- Identify Key Success Factors: Determine the factors correlated with high or effective EdTech use. These could include teacher-level factors (e.g., digital literacy, attitudes, years of experience), school-level factors (e.g., leadership support, professional development provided, IT infrastructure quality), and external factors (e.g., alignment with curriculum standards, government incentives, parental support). Past studies suggest factors like perceived usefulness and ease of use are fundamental(Ravichandran & Shanmugam, 2024), but this research will also probe context-specific elements such as cultural attitudes and government policy environment.

- Uncover Challenges and Barriers: Through qualitative inquiry, delve into the nuanced challenges perceived by educators and EdTech professionals. This could reveal issues not easily captured by surveys, such as motivational aspects, fear of technology replacing traditional roles, student engagement difficulties, or market education challenges (for EdTech firms trying to convey value to skeptical educators). For example, an EdTech CEO might cite difficulty in demonstrating longterm impact as a barrier to convincing more schools to sign on, while a teacher might mention lack of time to learn new systems or concerns about distractions as barriers to classroom use.

- Apply and Extend Theory: Use established technology adoption theories as a lens

(primarily the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT)) to interpret findings, testing their relevance in the UAE educational context. The research purpose includes evaluating whether factors emphasized by these theories (like performance expectancy/perceived usefulness, effort expectancy/ease of use, social influence, facilitating conditions) adequately explain adoption behavior here, or whether additional factors (like policy, cultural alignment, content language) need to be incorporated into an extended conceptual model for EdTech adoption.

- Provide Recommendations: Ultimately, fulfilling the purpose involves translating findings into actionable recommendations for both schools and EdTech companies. By pinpointing what works and what doesn't, the research aims to guide stakeholders on strategies to improve EdTech uptake and effectiveness – for example, recommending targeted teacher training modules, change management practices in schools, product design considerations for EdTech developers, or partnership models between government and startups. These recommendations will be rooted in the evidence gathered.

In summary, the purpose of the research is explanatory and pragmatic: to explain the phenomenon of EdTech adoption in UAE education (its drivers and barriers) and to use that understanding to recommend ways to enhance such adoption for better educational outcomes.

1.4 Research Objectives

To achieve the research purpose, the study is guided by a set of clear objectives. These research objectives translate the broad goals into specific investigational targets that can be addressed through data collection and analysis:

RO1: To assess the current state of EdTech usage among educators in the UAE, including frequency of use and ways in which educational technologies are being employed in classroom or remote teaching. – This objective focuses on establishing baseline data on how prevalent EdTech integration is at present and the common use cases. It will be primarily met through the quantitative survey of teachers and academic staff, yielding metrics on usage patterns.

RO2: To identify and evaluate the factors that significantly influence teachers' and institutions' adoption of EdTech in the UAE. – This involves testing variables grounded in theory (e.g., perceived usefulness, ease of use, social influence) as well as context-specific ones (e.g., training adequacy, leadership support, infrastructure, cultural compatibility) for their impact on adoption levels. Achieving this objective will likely combine quantitative analysis (e.g., regression to find predictors of self-reported usage or intention) and qualitative insights explaining why those factors matter.

RO3: To investigate the challenges and barriers faced by EdTech firms in achieving widespread and sustained adoption of their products within UAE educational institutions. – This objective shifts to the perspective of EdTech providers. It will be addressed mainly through qualitative interviews with EdTech company leaders, exploring issues such as market education, sales cycle in schools, product customization needs, competition, regulatory hurdles, etc. The aim is to capture business and implementation challenges that might not be visible from the educators' viewpoint.

RO4: To develop a conceptual model integrating the findings, that explains EdTech adoption in the UAE context, and to examine how this model aligns or diverges from established theoretical models (TAM, UTAUT, etc.). – Here the objective is more theoretical. Based on the results, a tailored model will be constructed that highlights the relationships between key factors and EdTech adoption outcomes in this context. For example, the model

might incorporate TAM's core constructs but add "Government Policy Support" as an external variable influencing facilitating conditions, if that emerges as important. The model's validity will be considered in light of the collected data.

RO5: To provide evidence-based recommendations for stakeholders – including educational policymakers, school administrators, teachers, and EdTech entrepreneurs – on strategies to overcome barriers and enhance the successful integration of EdTech in teaching and learning. – This objective ensures the research contributes to practice. By synthesizing what drives success and what hinders it, concrete recommendations will be formulated. For instance, if teacher training is found to be a critical bottleneck, a recommendation might be for the Ministry of Education to institute a digital pedagogy certification program. If alignment with curriculum is an issue, EdTech firms might be advised to collaborate with curriculum experts in product development.

These objectives cover descriptive, analytical, theoretical, and prescriptive aspects of the research, thus encompassing a comprehensive approach. They will serve as checkpoints throughout the study, ensuring that the research remains focused and that each component of the methodology is aligned with addressing one or more of these targets.

1.5 Research Purpose and Questions

Flowing from the objectives, the study is directed by several research questions (RQs) that specify the inquiries to be answered. These questions are formulated to drive the data collection instruments and analyses:

RQ1: What is the extent of adoption and usage of educational technology tools by teachers and academic staff in the UAE, and for what purposes are these tools being used? –

This question corresponds to RO1 and seeks to quantify and describe current EdTech usage. It essentially asks: How often and in what ways are educators using EdTech? Answering RQ1 establishes the context for deeper analysis by revealing usage levels and typical use cases (e.g., use for content delivery, student collaboration, assessment, etc.).

RQ2: Which factors are significantly influencing the acceptance and sustained use of EdTech by educators in the UAE? – Aligned with RO2, RQ2 delves into the determinants of adoption. Sub-questions might include: Do perceived usefulness and ease of use significantly predict teachers' intent to use EdTech (as TAM would suggest)(Clarke, 2020)? How do external factors such as availability of training, infrastructure quality, school leadership support, or peer influence affect adoption? Are there differences across demographics (e.g., younger vs older teachers, or differences across disciplines taught)? This RQ calls for both statistical correlation/regression analysis and triangulation with qualitative data to identify key factors.

RQ3: What challenges do EdTech firms in the UAE face in encouraging and scaling the use of their educational technology products in schools and universities? – This question targets the EdTech providers' perspective (RO3). It might probe issues such as: What reasons do EdTech CEOs give for schools deciding not to adopt or to discontinue using a product? How do EdTech firms address concerns around content localization, data privacy, or alignment with local standards? What role do pricing and budget constraints play? By capturing the voice of the EdTech firms, RQ3 reveals the other side of adoption barriers.

RQ4: How do the findings from the UAE context inform or extend existing models of technology adoption (such as TAM or UTAUT) in educational settings? – This research question is more interpretive, mapping to RO4. It invites analysis on whether, for example, TAM's constructs fully explain observed behaviors, or if modifications are needed. For instance, if social influence or culture emerges strongly, that might mirror UTAUT's inclusion

of social influence, suggesting UTAUT might be more applicable than TAM in this context (Feng et al., 2025). Alternatively, unique factors like "government policy" might need explicit inclusion, thereby extending theory. RQ4 ensures the study contributes to academic discourse by situating results in theoretical context.

RQ5: What strategies and actions can be recommended to various stakeholders to improve the adoption and effective usage of EdTech in the UAE? – This question is actionoriented, tied to RO5. It implies, based on all findings, what should be done next. It will synthesize insights to answer: How can schools and the Ministry of Education better support teachers (e.g. professional development, incentives)? How can EdTech firms adjust their approach or products (e.g., provide more localized content, offer implementation support)? What collaborative models (public-private partnerships, pilot programs) might accelerate adoption? RQ5 is essentially answered in the final chapters as practical recommendations.

Together, these research questions address the what, why, and how of EdTech adoption in the UAE. They also reflect the mixed-methods nature of the study: RQ1 and RQ2 lean on quantitative data (supported by qualitative for depth), RQ3 is largely qualitative, RQ4 is a blending of findings with theory, and RQ5 is synthetic. By the conclusion of this dissertation, each question will be addressed, providing a comprehensive narrative from current state and causes to theoretical implications and solutions.

1.6 Significance of the Study

This research carries both practical significance and theoretical significance, given the contemporary importance of EdTech and the relative paucity of comprehensive studies in the context of the Middle East and the UAE in particular.

From a practical standpoint, the study's significance is manifold. Firstly, for educational policymakers and leaders in the UAE, the findings will offer evidence-based insights into what is working and what is not in the realm of technology integration. At a

national level, the UAE has ambitious goals for digital transformation in education; however, policy must be informed by on-ground realities. This study can guide the Ministry of Education and related bodies on where to focus efforts – for example, if teacher professional development emerges as a key enabler, policies could be devised to mandate or fund extensive digital pedagogy training programs. If infrastructure disparities or access issues are uncovered in certain regions or school types, resources can be allocated accordingly to ensure more equitable EdTech opportunities. The research may also inform quality assurance and accreditation frameworks in education by highlighting EdTech usage as a criterion for modern, effective schooling.

For school administrators and principals, the study's significance lies in providing a clearer understanding of the barriers teachers face and the factors that could improve uptake of EdTech in their schools. Administrators often invest in hardware or software hoping for improved outcomes, but without knowing the conditions necessary for success, these investments can fall flat. By identifying, say, that a "lack of ongoing technical support" is demotivating teachers, or that "teachers need to see proven benefits on student engagement to commit to using a tool", principals and school IT directors can adjust their implementation strategies. They might, for instance, schedule regular peer-sharing sessions where teachers showcase successful tech-integrated lessons (leveraging social influence) or set up a tech mentorship program pairing tech-savvy teachers with those less confident. Essentially, the findings can help school leaders become change agents who foster a culture receptive to educational innovation rather than simply mandating technology use.

The teaching community in the UAE could also benefit. For teachers, knowing that their challenges are recognized and studied could be empowering; the recommendations may articulate needs they have long felt (such as better training or more relevant content). Moreover, the study might highlight success stories of teachers or schools effectively using

EdTech, serving as inspiration and providing practical ideas that others can emulate. By addressing concerns like cultural relevance and language, the study validates the importance of context in EdTech, which might encourage more development of Arabic-language and culturally tailored resources – indirectly benefiting teachers and students who will get more relatable materials.

Turning to the EdTech industry side, the significance for EdTech entrepreneurs and companies is direct. The aggregated feedback from educators about what they value or what frustrates them in EdTech solutions can guide product development. For example, if multiple teachers complain that certain platforms are not aligned with the national curriculum or that user interfaces are too complex, companies can prioritize these aspects in their next development cycle. Additionally, understanding the sales and adoption challenges within schools can help EdTech firms refine their go-to-market strategies. They might invest more in school onboarding programs, teacher training modules bundled with their product, or even adjusting pricing models (like offering freemium versions to lower entry barriers). This research effectively serves as a market study that delves into user psychology and organizational dynamics, offering EdTech firms a competitive edge if they heed its findings.

In terms of theoretical significance, this study contributes to the global academic discussion on technology adoption by providing data from a non-Western, specifically Gulf region, context. Many existing studies on educational technology adoption rely on theories developed and predominantly tested in the West (e.g., TAM by Davis (1989) in corporate settings, or UTAUT by Venkatesh et al. (2003) in organizational contexts). By examining these models in the UAE, the research tests their universality. The UAE's unique mix – high technology penetration and government support, combined with cultural and linguistic diversity – provides a critical case to see if established predictors hold true or if new factors emerge. For instance, the influence of government policy is not explicitly in TAM/UTAUT,

but in the UAE where top-down initiatives are common, this could be a significant factor. If the study finds policy support to correlate with adoption success, it might suggest extending models to include an external "policy environment" construct, thereby pushing theoretical boundaries.

Moreover, the research may highlight the role of cultural factors in adoption. Clarke's (2020) work suggested differences between local and expatriate teachers in the UAE regarding EdTech use (Clarke, 2020). Our study could reinforce or refine such findings. It might feed into cross-cultural technology acceptance literature by showing how values, language, and cultural expectations (e.g., attitudes towards change, authority, uncertainty avoidance in tech usage) mediate adoption. This adds to the theoretical discourse on whether technology acceptance models need adaptation for different cultural contexts – aligning with the broader criticism that one-size-fits-all models may ignore cultural dimensions.

Finally, through its mixed-methods design, the study also carries methodological significance. It demonstrates an approach to studying technology in education that is comprehensive, combining the strengths of quantitative breadth with qualitative depth. This can serve as a reference for future researchers in the region or elsewhere, illustrating the value of mixing methods to capture both measurable patterns and the stories behind those numbers.

In summary, the significance of this study is reflected in its potential to shape practice (making EdTech implementation more effective in the UAE, thus benefiting student learning) and to advance theory (offering new insights or validations for adoption models in a Middle Eastern educational context). The outcomes aim to ensure that the UAE's significant investments in EdTech yield the intended educational improvements, and that the scholarly community gains a richer, more diverse understanding of how and why educational innovations take root.

1.7 Structure of the Dissertation

This dissertation is organized into six chapters, along with preliminary pages and supplementary sections, to systematically cover the flow of research from conception to conclusions. Below is an overview of each chapter's content:

Chapter I: Introduction – (The current chapter) introduces the research context and rationale, clearly states the research problem, purpose, objectives, and questions, and discusses the significance of the study. It sets the foundation by explaining why the topic is important and what the study seeks to accomplish. Readers will understand the background of EdTech in the UAE and the focal issues being addressed by the end of this chapter. **Chapter II: Literature Review** – This chapter reviews relevant academic and industry literature to ground the study in existing knowledge. It starts with an introduction outlining the scope of the review. It then covers theoretical frameworks such as TAM, UTAUT, Diffusion of Innovations, etc., that explain technology adoption behavior. Next, it examines global research on EdTech impacts on teaching and learning, followed by specific literature on EdTech initiatives and adoption in the UAE and the broader GCC region. Key factors influencing EdTech adoption, as identified in past studies (e.g., infrastructure, training, cultural factors, etc.), are discussed in detail, supported by recent findings (with an emphasis on 2020-2025 studies for currency). The chapter also identifies gaps in the literature – for example, a lack of studies combining both educator and EdTech firm perspectives in this context – thereby justifying our research approach. It concludes by presenting a conceptual model or framework that synthesizes the literature and will be examined in our study, and lists any hypotheses if the study were to test certain relationships quantitatively.

Chapter III: Methodology – This chapter details the research design and methods employed to answer the research questions. It describes the mixed-methods approach (specifically, a sequential explanatory design, where quantitative data collection is followed by qualitative

data collection to explain quantitative results). It outlines the research paradigm (pragmatism, given the mixed approach), and the population and sample for both the survey (e.g., how many teachers, which emirates or institutions, and the sampling strategy used) and interviews (e.g., criteria for selecting EdTech firm leaders). Data collection methods are explained: the development of the survey instrument (questions, Likert scales, etc., possibly adapted from validated TAM/UTAUT questionnaires) and its administration process, as well as the design of the semi-structured interview guide for qualitative interviews. The chapter also covers data analysis procedures: for quantitative (use of descriptive stats, reliability checks, regression or factor analysis techniques) and for qualitative (coding procedures, thematic analysis, use of software like NVivo). Issues of reliability and validity are addressed, including how we ensured the survey's content validity (pilot testing, Cronbach's alpha for internal consistency) and the qualitative findings' trustworthiness (member checking, triangulation, etc.). Ethical considerations – such as informed consent, confidentiality of respondents (both teachers and company leaders), and data protection – are also described. Finally, any limitations of the methodology (like potential response bias, generalizability issues) are acknowledged.

Chapter IV: Results – This chapter presents the findings of the study without interpretation (interpretation is saved for Chapter V). It typically opens with an overview of response rates and participant demographics to contextualize the results. Then, quantitative results are presented: for example, the proportion of teachers using EdTech daily/weekly, mean scores on key constructs (perceived usefulness, etc.), and the results of statistical analyses (perhaps a table of regression results showing which factors significantly predict adoption). Visual aids like charts and tables are used here (e.g., a table summarizing survey responses or a bar chart of the top reported barriers to EdTech use). Next, qualitative results are conveyed, usually organized by themes that emerged from coding the interviews. Each theme (e.g.,

"Importance of Training", "Curriculum Alignment Issues", "Demonstrating Value to

Stakeholders") is described, with illustrative quotes from interviewees (anonymized as Participant A, B, etc.) to give voice to the participants. The chapter may also include a section where quantitative and qualitative findings are integrated – highlighting how the qualitative data explains or deepens understanding of the survey patterns. For instance, if survey data show X% of teachers find EdTech useful but still don't use it much, interview insights might reveal it's due to lack of time or support, thus connecting the dots. Chapter IV ends with a summary of results addressing each research question succinctly.

Chapter V: Discussion – In this critical chapter, the findings are interpreted and discussed in relation to the research questions and the literature reviewed in Chapter II. We examine whether the results support or contradict the expectations from theory. For example, if TAM predicted perceived ease of use would influence usage but our data showed it was less important than expected, we'd discuss why that might be (perhaps because most current EdTech is user-friendly, making ease of use a non-issue, shifting focus to usefulness or content). We also discuss how factors unique to the UAE (like government initiatives or cultural attitudes) played a role, possibly extending theoretical frameworks. Each major finding is connected back to literature: e.g., "The importance of infrastructure support aligns with Torres-Ortega et al. (2015) who emphasized technological readiness as key to EdTech integration(Ravichandran & Shanmugam, 2024), and our data confirm this in the UAE context." Contradictions are explored too: if, say, teacher's age was not a factor in adoption (whereas some literature finds younger teachers adopt more easily), reasons for this anomaly are considered. The discussion also covers implications – separated into theoretical implications (what the findings mean for models of technology adoption or educational change theories) and practical implications (what they mean for actions by educators, schools, or companies). We reflect on any unexpected findings and what new questions they raise.

Essentially, Chapter V is where meaning is made from the raw results, and where the contribution of the study becomes clear.

Chapter VI: Conclusion – The final chapter provides a concise summary of the research and its outcomes, discusses the contributions of the study to knowledge and practice, acknowledges limitations, and offers recommendations for future research. We revisit the research questions one by one and summarize how each was answered. The chapter then highlights the contributions: for instance, presenting a refined model of EdTech adoption that includes both individual and institutional factors (contribution to academic knowledge), and a set of best practices or guidelines for implementing EdTech in UAE schools (contribution to practice). We also clearly state the limitations, such as sample size or scope (maybe the study focused on certain emirates or education levels, which may limit generalizability), or that as a snapshot study it cannot fully capture long-term adoption changes. Recognizing these limitations provides transparency and context for the findings. We then suggest future research directions: for example, a longitudinal study to track adoption over time, studies in other GCC countries to compare with UAE, or research focusing on student perspectives of EdTech (which we did not directly cover). Finally, the chapter ends with concluding remarks – a reflective closure that often touches on the vision that motivated the research (like the potential of EdTech to transform education) and how this study helps move towards that vision. The tone is forward-looking, underscoring the importance of continuing efforts to successfully integrate technology in education for the benefit of current and future generations of learners.

Following Chapter VI, the dissertation includes the References section, formatted in Harvard style, listing all sources cited throughout the work. Then, Appendices are provided for supplementary material such as the survey questionnaire, interview guides, raw data summaries, or any additional documents (e.g., consent forms). These appendices allow

interested readers to inspect the research instruments and other details without interrupting the flow of the main text.

This structured approach ensures that the dissertation logically flows and that readers can follow the progression from broad context to specific findings to broad implications seamlessly. Each chapter builds on the previous, culminating in a comprehensive understanding of the study and its contributions.

CHAPTER II: REVIEW OF LITERATURE

2.1 Introduction

This chapter reviews the body of literature relevant to educational technology adoption, with a dual focus on theoretical models of technology acceptance and empirical studies on EdTech implementation in educational settings. The review begins by examining prominent theoretical frameworks that explain how and why individuals and organizations adopt new technologies. These frameworks, including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Diffusion of Innovations, provide lenses for understanding the factors influencing EdTech uptake. By grounding the study in these models, we can formulate expectations about key variables (e.g., perceived usefulness, ease of use, social influence, facilitating conditions) that may play a role in the UAE context (Feng et al., 2025).

Next, the chapter discusses the general impact of EdTech on learning and teaching outcomes as reported by global research. It synthesizes findings on how EdTech, when effectively integrated, can enhance student engagement, personalize learning, and improve academic performance, aligning with the concept of Education 4.0 which emphasizes technological integration in learning processes (Feng et al., 2025). This section highlights both the potential benefits and the documented challenges of EdTech – such as the oft-cited problem of digital inequality where not all students or institutions have equal access to technology, leading to disparities in outcomes(Feng et al., 2025).

The review then narrows down to literature specific to the Middle East and UAE. It covers studies and reports on how EdTech has been introduced in the region, including government-led initiatives, the rise of local EdTech startups, and the region's adaptation during the COVID-19 pandemic. For instance, we discuss how GCC countries rapidly expanded e-learning infrastructure in 2020, but also how some reverted to traditional methods post-

pandemic, highlighting the importance of sustainable integration strategies (PwC Middle East, 2024). Key data points, such as the growth of the UAE EdTech market and the number of companies, as well as success stories like the widespread adoption of platforms (e.g., the UAE's Madrasa e-learning platform, or Dubai's smart learning program), will be summarized (EdTech in United Arab Emirates, 2024).

A crucial part of this chapter identifies factors influencing EdTech adoption that have been highlighted by prior research, creating a foundation for our investigation. Several categories of factors emerge from the literature: - Technological Factors: These refer to attributes of the technology itself. According to many studies, if an EdTech tool is perceived as useful and improves learning (high Performance Expectancy or perceived usefulness), and is relatively easy to use (Effort Expectancy or ease of use), it is more likely to be adopted by teachers (Feng et al., 2025). Davis (1989) originally posited in TAM that these two perceptions drive user acceptance of technology. Subsequent research in education has echoed that – for example, a recent systematic review by Feng et al. (2025) found that perceived benefits in improving learning outcomes (analogous to usefulness) played a pivotal role in educational technology adoption (Feng et al., 2025). Similarly, if a platform has a steep learning curve or technical glitches, teachers are less inclined to persist in using it. - Institutional and Resource Factors: These include infrastructure availability (hardware, internet connectivity), technical support, and time/resources allocated for teachers to learn and integrate technology. Facilitating conditions, a construct highlighted in UTAUT, pertain to the degree to which an individual believes an organizational and technical infrastructure exists to support use of the technology(Feng et al., 2025). In practice, studies (e.g., TorresOrtega et al., 2015) have emphasized that robust technological infrastructure and support are critical enablers for EdTech, as without them even well-intentioned teachers can't use tech effectively (Ravichandran & Shanmugam, 2024). Research specifically in developing contexts often

points out infrastructure as a limiting factor, but even in the UAE where infrastructure is modern, we will explore if micro-level issues (like Wi-Fi reliability in a school wing or availability of devices for all students) are concerns. - Human and Cognitive

Factors: Teacher attitudes, self-efficacy with technology, and openness to change are key. The concept of mindset has been applied to tech adoption; teachers (and students) with a growth mindset may be more willing to try and persist with new technologies (Ravichandran & Shanmugam, 2024). Burgoyne & Brooke (2021) and others have argued that a positive mindset fosters openness to EdTech. Indeed, Ravichandran and Shanmugam (2023) found college students with a growth mindset were more likely to embrace EdTech, aligning with Dweck's (2006) theory on the benefit of believing in the ability to improve through effort(Ravichandran & Shanmugam, 2024). Teacher professional development and digital competence also fall here: teachers who receive targeted training and feel competent in using tech report higher adoption. - Social and Cultural Factors: According to UTAUT, Social

Influence – the extent to which an individual perceives that important others (peers, superiors, society) believe they should use the new technology – can shape adoption (Feng et al., 2025). In schools, this might translate to leadership support and peer usage norms. If a school principal strongly advocates for a particular platform, or if many colleagues are champions of an app, an on-the-fence teacher might be swayed. Culturally, in the UAE, respect for authority might mean top-down directives are influential. Conversely, cultural values around teaching and learning (for instance, some educators may feel that face-to-face traditional methods are inherently superior for maintaining discipline or quality) could act as a brake on change. Clarke's (2020) study on UAE teachers indicated that cultural background (native Arabic-speaking vs. native English-speaking teachers) influenced certain attitudes toward tech, hinting that underlying cultural schemas about education can affect willingness to adopt (Clarke, 2020). Content and Curriculum Alignment: A recurring theme in EdTech literature is the

importance of content relevance. Even a well-designed tool will fail if its content isn't aligned to what teachers need to cover in the curriculum or if it isn't available in the language of instruction. As the PWC (2024) report noted, one focus area in the Middle East is the creation of high-quality Arabic digital content to address language barriers (Dutt, 2024). We review studies highlighting the need for contextualized content – for instance, Alhumaidan et al. (2021) finding that teachers were more receptive to using eresources that mapped clearly to their syllabus and were culturally appropriate.

In light of the above, the literature review identifies that effective EdTech adoption is a multi-faceted issue, not solely about technology. It emerges at the intersection of technology features, individual user attributes, organizational context, and broader sociocultural milieu. This underscores the choice of a mixed-methods approach for our study, as quantitative data might capture the extent to which some factors matter, while qualitative data can explain the nuances (for example, how exactly cultural attitudes play out in daily teaching decisions).

Finally, the introduction of this chapter clarifies the gaps in existing literature. While many studies have examined teacher adoption of technology (including a few in the UAE), and others have looked at EdTech startups in terms of market trends, seldom have they been combined. Little has been published on the dynamic between EdTech suppliers and the education system in the UAE – a gap this research aims to fill. Additionally, there is a need for up-to-date research considering the rapid changes post-2020; hence we focus on studies from the last 5 years to capture the latest context (e.g., impact of pandemic experience, new government policies in UAE like the AI strategy in education, etc.). This study also breaks ground by applying and possibly extending adoption models in the GCC context, addressing a geographical gap in the predominantly Western-centric literature.

The remainder of this chapter will delve into each of these areas in detail, beginning with the theoretical frameworks that form the backbone of our analysis.

2.2 Theoretical Framework: Technology Adoption Models

Understanding why and how educators adopt (or resist) educational technology requires a theoretical foundation. Over the past few decades, researchers have developed various models to explain the acceptance of new technologies. This section outlines the key models and theories that are relevant to our study and will inform the interpretation of our findings.

Technology Acceptance Model (TAM): Proposed by Fred Davis (1989), TAM is one of the most influential and widely applied models in information systems research. TAM is grounded in the Theory of Reasoned Action (TRA) from social psychology, but tailors it to technology usage by positing two main beliefs that determine an individual's attitude towards using a technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance their job performance, whereas perceived ease of use is the degree to which a person believes that using the system would be free of effort. These beliefs influence the user's Attitude (A) toward using the technology, which in turn shapes their Behavioral Intention (BI) to use it, ultimately affecting actual usage behavior. One important aspect of TAM is that it acknowledges external variables that may affect PU and PEOU (such as system characteristics, user training, etc.), but it keeps the core model relatively simple.

TAM has been applied to countless settings including education. Its appeal lies in its parsimony and the strong empirical support it has received. Studies often find that TAM can explain a substantial portion of the variance in users' intentions (typically around 40% as noted in some meta-analyses(Bekkering et al., 2020)). For example, in an educational context, if a teacher perceives an e-learning platform as very useful for improving student outcomes and finds it easy to navigate, TAM would predict they are likely to intend to use it regularly. TAM, however, has limitations: it originally omitted social and organizational influences, focusing

on individual cognitive perceptions. It also assumes usage is volitional – which may not always hold if an organization mandates a technology use regardless of personal intention.

Extensions of TAM (TAM2, TAM3): Recognizing TAM's simplicity omitted some factors, researchers including Venkatesh and Davis proposed TAM2 (2000) and later Venkatesh and Bala proposed TAM3 (2008). TAM2 incorporated additional predictors of perceived usefulness like social influence processes (subjective norm, image) and cognitive instrumental processes (job relevance, output quality, result demonstrability). These were particularly to account for organizational context and mandatory settings. TAM3 further added factors influencing perceived ease of use (like computer self-efficacy, perceptions of external control, anxiety, and playfulness) and integrated TAM2 in a comprehensive model, with the idea that experience with technology moderates many relationships. While TAM2 and TAM3 provide a richer understanding, their complexity increases. For our study, which is exploratory in a novel context, we lean on original TAM as a starting point but remain open to the external factors it suggests, and indeed our qualitative data may highlight several that align with TAM2 constructs (like subjective norm akin to leadership influence).

Unified Theory of Acceptance and Use of Technology (UTAUT): Developed by Venkatesh et al. (2003) as a unification of eight existing models (including TAM, TRA, Theory of Planned Behavior, and others), UTAUT provides a comprehensive framework with four core determinants of intention and usage: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (Bekkering et al., 2020) (Feng et al., 2025). Performance expectancy and effort expectancy in UTAUT are conceptually similar to TAM's perceived usefulness and ease of use, respectively. Social influence captures the effect of others' opinions (it subsumes constructs like subjective norm from TRA or image from TAM2). Facilitating conditions reflect the degree to which the individual believes an infrastructure exists to support use (related to concepts in TPB like perceived behavioral control, or TAM3's external control,

and encompassing resource and technology availability). UTAUT also includes up to four moderators (gender, age, experience, and voluntariness of use) affecting the impact of the four determinants on behavioral intention and usage.

UTAUT has been used in various contexts including education and often demonstrates high explanatory power when all components are measured. For instance, a study on digital library adoption might find performance expectancy (i.e., how the library improves research efficiency) to be the strongest predictor for faculty, moderated by age (older faculty might weight it differently). In a school scenario, social influence might be pronounced if teachers feel pressure from their school administration or see peers successfully using tech, pushing them to also use it. Facilitating conditions resonates with practical needs: a teacher may intend to use an online homework system, but if the school's internet is unreliable (a facilitating condition), actual use may drop, directly affecting behavior even if intention was positive.

For the UAE EdTech scenario, UTAUT provides a valuable structure because it acknowledges the role of context (facilitating conditions like infrastructure and training) and social milieu (in a collectivist culture, social influence can be potent). We will evaluate our findings against UTAUT: do we see evidence that these four factors matter here? Preliminary literature suggests yes: e.g., teachers' perception of improved student learning (performance expectancy) and ease-of-use correlate with adoption(Ravichandran & Shanmugam, 2024), peer and leadership support (social influence) often come up in teacher surveys as enablers, and technical support and resource access (facilitating conditions) are frequently mentioned in barriers lists(PwC Middle East, 2024).

Diffusion of Innovations (DoI): Proposed by Everett Rogers (2003, with earlier editions in 1962 etc.), Diffusion of Innovations theory provides a macro perspective on how new ideas and technologies spread in a society or organization. It identifies adopter categories (innovators, early adopters, early majority, late majority, laggards) and characteristics of the

innovation that affect its adoption rate: relative advantage, compatibility, complexity, trialability, and observability. Many of these overlap with TAM/UTAUT concepts. Relative advantage is akin to performance expectancy/usefulness; complexity is inverse of ease of use; compatibility means how well the innovation fits with existing values and practices (an important angle TAM doesn't explicitly cover). DoI also emphasizes the process and communication channels through which awareness and adoption spread.

In an educational institution, diffusion might manifest as a couple of tech-enthusiast teachers (innovators) try a new app, then a few more (early adopters) champion it seeing the success, eventually a bulk of teachers come on board as it becomes mainstream, while some holdouts (laggards) may never fully embrace it. The theory underscores peer influence and support networks – a teacher is more likely to try something if a colleague has demonstrated its usefulness in a context similar to theirs (thus reinforcing the importance of trialability and observability). Additionally, compatibility is crucial in education: if an EdTech tool is seen as incompatible with the curriculum requirements or with cultural expectations of the classroom role, it will face resistance. For example, an innovation that requires a radical change in teaching style might be less readily adopted than one that fits into existing routines.

We reference DoI to frame the uptake patterns and the role of communication. The UAE's education system, having both public and private schools, might show different diffusion curves; for instance, private international schools sometimes are quicker to adopt EdTech (acting as pilot sites) whereas broader public adoption might follow once results are observable and policies back it.

Other Relevant Theories: We also note Theory of Planned Behavior (TPB), which extends TRA by adding perceived behavioral control as a factor. TPB is somewhat reflected within UTAUT's constructs. In the educational context, a teacher's intention to use a tech (behavior) is influenced by attitude (similar to TAM's PU & PEOU influences attitude),

subjective norm (others' expectations), and perceived control (do they feel in control of using it, which ties to self-efficacy and facilitating conditions).

Self-Efficacy Theory (Bandura) is worth noting since a teacher's confidence in their ability to use technology (computer self-efficacy) strongly affects their willingness to attempt it, which is recognized in TAM3 and other studies. For example, teachers with low ICT self-efficacy might avoid EdTech regardless of perceived benefits, until their confidence is improved via training or positive experiences.

In synthesizing these theories, our conceptual understanding is that successful adoption requires: a belief that the tech is useful and fits their needs (TAM's PU, Rogers' relative advantage & compatibility), that it's not overly difficult (TAM's PEOU, Rogers' complexity), social reinforcement (UTAUT's social influence, Rogers' peer networks), and supportive conditions (UTAUT's facilitating conditions, TPB's control). We also remain cognizant of the moderating factors – e.g., older teachers or those with long tenure might have different attitudes than younger novice teachers, a consideration in interpreting results.

To visually summarize TAM, which forms a core part of our theoretical lens, we include the classic diagram:
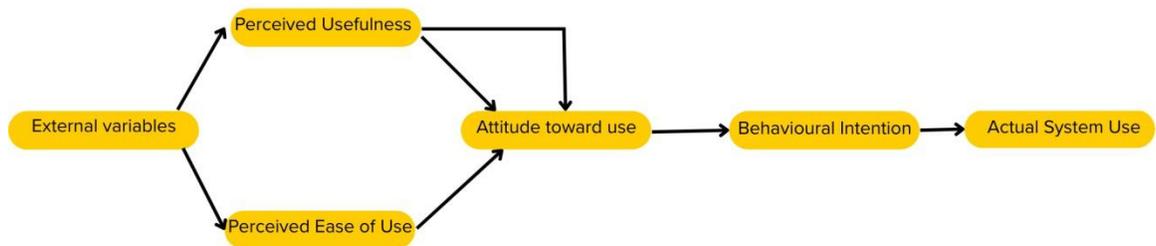
Figure 1: Technology Acceptance Model (TAM) – Davis (1989).

In TAM, External Variables influence two key perceptions (Perceived Usefulness and Perceived Ease of Use), which shape the user's Attitude toward using the system, thereby affecting their Behavioral Intention to use and ultimately Actual System Use.

This basic model will be expanded conceptually when we consider the contextual factors from UTAUT and our qualitative exploration in the UAE. By anchoring our study in these frameworks, we ensure our investigation is theory-driven. As we proceed, each theoretical construct will be linked to findings from prior empirical studies on EdTech in education, which is our next focus.

2.3 EdTech and Educational Outcomes

A fundamental motivation behind integrating technology in education is the promise of improved teaching and learning outcomes. This section reviews what existing research says about the impacts of EdTech on student learning, teacher effectiveness, and overall educational quality. It provides context on why stakeholders push for EdTech (the expected benefits), as well as cautionary findings on when EdTech does not automatically equate to better outcomes. Understanding these outcomes is important for our study because perceived or actual improvement in outcomes is likely a major driver of whether educators find EdTech useful (connecting back to perceived usefulness in TAM and performance expectancy in UTAUT).

Numerous studies in the 21st century have documented positive effects of technology when used appropriately: - Student Engagement and Motivation: Interactive multimedia content, educational games, and simulations have been shown to increase student engagement. Students often report higher motivation to learn when lessons incorporate digital elements, as these can make learning more visual, hands-on, and relatable. For example, a study by Huang

et al. (2021) found that middle school students in a science class were more engaged and participated more when using a virtual lab simulation compared to a traditional lab, due to instant feedback and the gamified aspects. The gamification of learning via EdTech – adding game-like features such as points, levels, immediate feedback

– has been cited as a way to sustain student interest and encourage active learning behaviors. However, engagement is a necessary but not sufficient condition; research also looks at whether that engagement translates to learning gains.

- Personalization and Differentiation: One of EdTech's hailed benefits is the ability to personalize learning. Adaptive learning software can adjust the difficulty of content in real time to match a learner's level (e.g., an app that gives easier or harder math problems depending on the student's performance). This helps both struggling learners and advanced learners get material appropriate to their pace – something a single teacher might find hard to do for 30 students simultaneously. Studies, such as those summarized in Education 4.0 literature, suggest that personalized learning paths enabled by AI tutors or adaptive systems can lead to improved mastery of content for students who might otherwise be left behind or not challenged enough (Feng et al., 2025). In the UAE, initiatives like the "Alef Platform" have implemented AI-driven personalization at scale, with reports of improved student test scores in schools using the platform, though rigorous independent evaluations are limited.

- Collaborative Learning and Skills Development: Technology can facilitate collaboration beyond the classroom through tools like discussion forums, shared documents, and project-based learning platforms. In higher education, for instance, the use of learning management systems and forums has been tied to better development of critical thinking and collaboration skills, as students engage in online discussions and peer feedback. For K-12, projects that involve using technology (like creating a

multimedia presentation or participating in a global classroom videoconference) are said to build not only subject knowledge but also digital literacy, communication, and teamwork skills – competencies needed for the 21stcentury workforce. The literature on 21st century skills often references EdTech as an enabler for teaching skills like creativity (through content creation tools), communication (through digital presentations), and information literacy (through internet research tasks).

- Assessment and Feedback: EdTech allows new forms of assessment that can be more timely and formative. Quizzes on e-learning platforms give instant feedback, enabling students to learn from mistakes immediately. Teachers can get analytics on student performance to identify who needs help on which topics, enabling a datainformed approach to instruction. Research by Ma et al. (2022) showed that classes using an online assessment tool that provided immediate feedback saw improved performance on final exams compared to classes that used only traditional delayed feedback mechanisms. The concept of a flipped classroom – where students watch lectures at home (often via video) and do "homework" in class with teacher support – is also facilitated by EdTech and has shown positive outcomes in some studies (e.g., higher student satisfaction and better performance in some subjects, since class time is used for active problem-solving with teacher guidance rather than passive
listening).

While these positive findings exist, the literature also issues caveats and mixed results: - Not all studies find significant improvements. Some large-scale meta-analyses (such as Tamim et al., 2011) indicated a modest overall positive effect of technology on learning outcomes, but the effect sizes vary widely depending on how technology is used. Technology is a tool, and outcomes depend on pedagogy. If an interactive whiteboard is used just like a

chalkboard (i.e., teacher-centric one-way delivery), it might not change outcomes at all; it's the integration into pedagogy that matters. - Teacher role remains critical:

Technology does not replace the teacher; in fact, research often emphasizes that effective EdTech use requires strong teacher facilitation and integration into lesson plans. Mishra & Koehler's TPACK framework (Technological Pedagogical Content Knowledge) argues that teachers need to develop knowledge of how technology interacts with pedagogy and content in their specific subject to create meaningful learning experiences. When teachers lack training or understanding in this integration, outcomes can be negligible or even negative (e.g., class time wasted troubleshooting tech issues or superficial use of tech without learning gains). - Issues of distraction and misuse: There's literature highlighting that if not well managed, devices can distract students. For instance, Kay & Lauricella (2011) found that in some university settings, students on laptops in class often multitasked with non-class activities, which correlated with lower grades. In school settings, this translates to the need for policies or solutions to keep students on-task (some EdTech systems have monitoring features for this reason). - Equity and access concerns: A major theme in EdTech literature is the digital divide – differences in access to technology can widen achievement gaps if not addressed (Feng et al., 2025). Students from lower-income families or under-resourced schools may not have the same access to devices or high-speed internet at home, which puts them at a disadvantage in tech-heavy learning. The literature urges that any EdTech integration plan include strategies to ensure all students can benefit (like device loaner programs, offline access options, etc.). In the UAE, while device penetration is high at the national level, inequities might still exist (for example, between well-funded private schools and some public or rural schools, or among families). - Measuring outcomes properly: There's discussion on how to measure the impact of EdTech. Standardized test scores are one measure, but technology might also impact harder-to-measure outcomes like creativity, problem-solving, or long-term engagement in learning.

Some literature encourages looking beyond test scores to evaluate success (e.g., through portfolios, student feedback, or longitudinal tracking of skills).

Given these insights, our study's exploration of perceived usefulness by teachers will likely touch on these areas: do teachers believe EdTech improves engagement? Does it help them differentiate instruction? Do they see concrete improvements in student understanding or exam performance attributable to tech? Teachers' and administrators' beliefs about outcomes will influence their enthusiasm to adopt (linking back to TAM's PU – if they don't believe it truly benefits students, they won't be keen to use it).

Also, in our interviews with EdTech firm leaders, we expect to hear about how they claim their products improve outcomes – many EdTech companies gather case studies or data to show schools that using their platform leads to X% improvement in something. These claims and whether they materialize or are recognized by educators are part of the discourse. For instance, an EdTech CEO might say "School A improved their math scores by 20% after using our platform for a year", but if teachers are skeptical of such claims, that affects adoption.

In summary, the literature confirms that EdTech can enhance educational outcomes under the right conditions – namely, when accompanied by sound pedagogy, teacher competency, equitable access, and alignment with learning objectives. These conditions essentially align with factors in adoption models: facilitating conditions (training, support), perceived usefulness (seeing the outcome benefit), etc. This connection strengthens the rationale for our focus on those factors in the UAE context. The next sections will drill down into the UAE and similar contexts specifically, to see how these general findings play out in our study's setting.

2.4 EdTech Development in the UAE

Over the past decade, the United Arab Emirates has made concerted efforts to modernize its education system, and technology integration has been a central pillar of this strategy. This section examines the trajectory of EdTech development in the UAE, including government initiatives, market growth, and previous research on EdTech usage within the country.

Government Vision and Initiatives: The UAE government's commitment to education technology is evident in national vision documents and substantial investments.

The UAE Vision 2021 explicitly aimed for a first-rate education system, with Smart Learning initiatives introduced as early as 2012. One flagship program was the Mohammed Bin Rashid Smart Learning Program, which introduced tablets and e-learning content in public schools, along with training for teachers. The Ministry of Education (MOE) also launched the Madrasa e-learning platform in 2018, offering 5000 Arabic educational videos in science and math, free for students across the Arab world. This focus on Arabic content addresses a key need in the region for high-quality resources in the local language, aligning with expert opinions that multi-language content is crucial for inclusive EdTech (Dutt, 2024).

During the COVID-19 pandemic in 2020, the UAE was quick to switch to full online learning. The MOE partnered with tech companies and telecom providers to ensure access – for example, as noted earlier, providing free mobile data and devices to students in need(PwC Middle East, 2024). The LMS (Learning Management System) infrastructure was scaled up, and platforms like Microsoft Teams and Google Classroom became standard. This period served as a stress-test and also a catalyst, accelerating EdTech adoption. A survey by UAE University in late 2020 found that the majority of teachers and students experienced full-time e-learning for the first time and reported mixed experiences, with common challenges including adapting teaching methods and assessment online, but also a newfound familiarity

with tools they hadn't used before. As PWC (2024) observed, while there was some retraction in tech use when schools re-opened physically, the overall adoption of digital tools remained higher post-pandemic than pre-2020, signaling a paradigm shift in openness to EdTech (PwC Middle East, 2024).

EdTech Market Growth and Key Players: The UAE's EdTech market is one of the largest in the Middle East. By 2024 it reached an estimated $1.65 billion in value(EdTech in United Arab Emirates, 2024), with projections of continued growth (GlobalData, 2025). The market comprises both international players (global companies like Coursera, Blackboard, etc., which have usage in UAE institutions) and a vibrant local startup scene. HolonIQ, an education market intelligence firm, has highlighted the MENA EdTech 50, among which UAE startups feature prominently. Notable UAE-based EdTech firms include: - Alef Education: An AI-powered learning platform developed in Abu Dhabi, which provides personalized learning pathways in core subjects. Alef has been implemented in hundreds of UAE public schools (particularly in Abu Dhabi emirate) and has won global awards for its approach to blending AI and pedagogy. - Lamsa: Mentioned earlier, focuses on early childhood (pre-K) learning through engaging digital content in Arabic. Its popularity (17+ million downloads) indicates the appetite for localized content for younger learners[18]. - Almentor: An online learning platform (originally from UAE/Egypt) offering Arabic video courses for professional development and skills – demonstrating that EdTech isn't just in K12 but also lifelong learning and upskilling. - SchoolVoice: A communication platform aimed at connecting schools and parents via an app (solving a traditionally paper-based communication issue). - Classera Middle East: While originally from outside, it has a significant presence in the UAE, providing LMS solutions to schools. - Little Thinking

Minds: A platform for Arabic literacy and learning (Jordan/UAE collaboration) used in some UAE schools to improve Arabic reading.

The presence of global EdTech companies in the UAE is also strong: e.g., Blackboard and its successor platforms are used in many universities; Coursera and edX have learners and even partnerships for university content; Minecraft for Education was rolled out in some schools as a STEM learning tool, etc. Additionally, big tech companies like Google and Microsoft have education initiatives (Google Educator certification, Microsoft Showcase Schools) that have taken root in the UAE, often in partnership with the MOE or local education authorities.

Research and market reports indicate a few distinctive points about the UAE EdTech landscape: - High mobile and internet penetration: As of 2023, ~99% of households have internet access and smartphone penetration is ~96%(PwC Middle East, 2024). This digital readiness makes the UAE fertile ground for EdTech adoption compared to some neighboring countries. - Government support and funding: The government not only adopts EdTech in public schools but also encourages the sector through incubators and funding initiatives. For instance, the UAE's Ministry of Artificial Intelligence has encouraged AI in education startups, and there are innovation funds that EdTech entrepreneurs can tap. Dubai's Knowledge and Human Development Authority (KHDA) has hosted EdTech bootcamps and innovation challenges. These indicate a policy environment conducive to EdTech growth. - Private school influence: The UAE has a large private education sector (especially in Dubai, where ~90% of students are in private schools). Many private schools bring in EdTech as part of their competitive offerings to parents (like advanced STEAM labs, iPad programs, etc.). These schools sometimes act as early adopters due to having more autonomy and resources. - Cultural and linguistic context: The UAE's education system is bilingual (Arabic in many public school subjects, English in many private schools and higher ed), so EdTech solutions often need to cater to both languages. A lack of Arabic content was historically a gap, though initiatives like Madrasa and private content providers are filling it. Additionally, the diversity of curricula

(American, British, Indian, UAE national, IB, etc. in private schools) means EdTech products often need alignment with different standards (Common Core, CBSE, etc.), which can be challenging for providers.

Empirical Studies in the UAE: Academic research specifically investigating EdTech in UAE educational contexts has begun to accumulate. Clarke's (2020) Walden dissertation, mentioned earlier, explored how culture affects teacher adoption in a UAE school. It found overall positive attitudes but revealed interesting nuances, like local Arab teachers rating usefulness higher than expat teachers, potentially because the former saw tech as leveling some gaps (language or resource access)(Clarke, 2020). Another study by Bukhatwa (2019) examined e-learning implementation at a federal UAE university and found that while infrastructure was excellent, faculty usage varied widely based on their beliefs and departmental support. Barriers noted were similar to global ones: time constraints, training needs, and some resistance to change. On the other hand, positive correlates were leadership encouragement and seeing peers succeed with technology in teaching.

A recent (2023) study by Al-Sammadi et al. surveyed teachers in Dubai on the use of tablets in primary classrooms; it reported that about 75% of respondents used tablets at least weekly for instruction or student activities. Teachers acknowledged improved engagement and easier access to information as benefits, but cited concerns about distraction and the need for more professional development to effectively integrate tablets into lesson plans.

The UAE has also been part of cross-country EdTech studies. For instance, the UNESCO ICT Competency Framework implementation report included UAE as a case, noting that UAE teachers score high on basic ICT skills but there's room to grow in integrating ICT into pedagogy meaningfully.

In summary, EdTech development in the UAE is characterized by strong top-down support, rapid market growth with numerous players, high readiness in terms of infrastructure,

but also the need to tailor to local needs (language, curriculum) and ensure that practice (teacher use) catches up with policy and technology availability. Our study enters this scene aiming to shed light on how these macro developments translate into microlevel adoption in classrooms and what friction points exist between the promise of EdTech and the day-to-day practice in UAE schools.

2.5 Factors Influencing EdTech Adoption

Building on both the theoretical models (Section 2.2) and contextual background (Sections 2.3 and 2.4), this section zeroes in on specific factors – identified through prior research – that influence the adoption of educational technology by teachers and institutions. These factors will later guide our data analysis and interpretation in the UAE setting. We organize them into categories for clarity, while noting that they often interrelate.

1. Perceived Usefulness and Effectiveness: As consistently highlighted, if teachers are convinced that using an EdTech tool will enhance their teaching effectiveness or student learning, they are far more likely to adopt it. Numerous studies have shown perceived usefulness to be the strongest determinant of intention to use in educational tech contexts(Ravichandran & Shanmugam, 2024). For example, Rafeeq et al. (2022) found that among UAE college instructors, those who believed that a learning management system improved student engagement and performance were

   significantly more inclined to integrate it regularly into courses. Teachers gauge usefulness through either personal experience or evidence – which is why providing training that demonstrates student gains, or sharing success stories, can improve adoption. In the UAE, where standardized test performance (like TIMSS, PISA, Emirates Standardized Tests) is closely watched, EdTech that is seen to improve test preparedness or results might be particularly valued by schools.

2. Perceived Ease of Use and Technical Ease: If a platform is too complex or unintuitive, busy educators will likely abandon it. Research often finds that userfriendly design, reliable performance, and low technical hassle encourage continued use. In our context, this may cover things like whether the interface supports both English and Arabic seamlessly (for bilingual ease-of-use), whether logins and account management are straightforward, and if the tool integrates with other systems (like student information systems) to avoid duplicate work. As one UAE teacher said in a case study (Ahmed, 2021): "If I have to struggle with logging in or setting up a class each time, I just won't bother after a while." That sentiment echoes in the literature. Thus, one factor is the technical quality and ease of the EdTech itself, which influences adoption via the effort expectancy route(Feng et al., 2025).

3. Training and Teacher Competency: Lack of adequate training is a commonly cited barrier. Teachers need not only initial training on how to use a tool, but ongoing professional development to integrate it pedagogically. A study in Saudi Arabia by Almulhim (2020) (relevant due to cultural and regional similarity) indicated that teachers who received comprehensive training on interactive whiteboards were using them more effectively and frequently even a year later, whereas those with minimal training used them sporadically as projection screens. In the UAE, the MOE and many private schools do provide ICT training, but its quality and reach vary. Training that is hands-on, context-specific (subject-specific tech integration), and sustained (not one-off) is associated with higher adoption rates. Thus, availability and quality of training is a factor: we expect teachers to mention whether they feel prepared or not, and EdTech firms also sometimes step in to do training for their products (and their ability to do so can influence schools' usage success). Teacher self-efficacy with technology

ties into this – training builds self-efficacy, and higher self-efficacy leads to more willingness to experiment with tech.

4. Leadership Support and Institutional Policies: The stance of school leadership can make a big difference. Principals who champion EdTech by setting a vision, providing resources, and incentivizing usage create an environment where teachers feel encouraged (and perhaps expected) to innovate. Conversely, if leadership is indifferent or focused solely on short-term exam results, teachers may not prioritize tech integration on their own. A comparative study by Tondeur et al. (2019) across schools implementing ICT found that in high-adoption schools, leaders often allocated time for teachers to collaborate on tech integration, recognized innovative teachers, and sometimes even adjusted schedules (e.g., giving free periods for tech experimentation). Policies, such as whether using the tech is optional or mandated, also matter. Mandates can ensure use but can also breed resentment if not accompanied by support. The organizational culture and policy factor in adoption is essentially UTAUT's social influence and facilitating conditions in action – a supportive culture creates positive peer pressure and practical help.

5. Infrastructure and Resources: Simply put, if the tech isn't readily accessible, it won't be used. This covers having sufficient devices (1:1 tablets, or at least a well-equipped computer lab), robust internet connectivity, and technical support personnel. A teacher might be enthusiastic about a new platform, but if the Wi-Fi drops frequently or if only a handful of laptops are available for a class of 30, usage becomes impractical. In UAE, infrastructure is generally strong at a macro level, but micro issues could exist (some older school buildings might have Wi-Fi dead zones, etc.). Moreover, some rural or smaller private schools might not have the latest tech compared to big city schools. The presence of an IT support team at school is often underappreciated – teachers feel more

confident knowing someone can troubleshoot issues or assist in setup. Thus, facilitating conditions in terms of physical and human infrastructure is vital (Ravichandran & Shanmugam, 2024). For EdTech firms, the compatibility of their solution with existing infrastructure (do they require certain hardware or software environments) can also affect adoption – a cloud-based solution might face issues if a school's internet is slow, for instance, whereas an offlinecapable solution might be easier in such contexts.

6. Content Alignment and Curriculum Fit: As mentioned, if an EdTech tool's content does not match the curriculum requirements or exam standards, teachers may see it as a detour or an "extra" rather than integral. In the UAE, especially in upper grades where there's an emphasis on board exam prep (for international curricula) or national exams, teachers might be reluctant to devote time to tools that don't directly advance the syllabus coverage. So an EdTech math app that covers problem-solving could be great pedagogically, but if it doesn't align with the specific math topics that will be tested that term, teachers might not use it due to time constraints. Conversely, EdTech that is mapped to curriculum standards (like providing practice questions by unit, etc.) is more readily adopted. The compatibility of EdTech with existing practices and requirements is a major factor, echoing Rogers' diffusion theory and highlighted in regional research. For instance, a study on e-textbooks in the Gulf found that adoption was higher when the e-textbook matched the print curriculum page-for-page, because teachers could easily substitute it without reworking their lesson plans; when content structure differed, teachers were hesitant.

7. Cultural and Language Relevance: In the UAE, culture and language can't be ignored. Some older generation educators or those from traditional backgrounds might have pedagogical beliefs not immediately aligned with student-centered tech integration

(preferring lecture formats, etc.). Winning them over might require addressing those beliefs, perhaps by showing how tech can support traditional values

like academic excellence or by providing content in Arabic to assure nothing is "lost in translation" for students. As noted, a lack of Arabic content historically limited adoption in Arabic-medium schools; it was reported that teachers in some public schools felt many interesting EdTech tools were "not useful for us because they're all in English." This has been changing with more Arabic platforms emerging, but the language factor remains: teachers need EdTech that either is in Arabic or at least supports bilingual usage for them to integrate it in Arabic-medium instruction. Additionally, parental expectations in the culture can influence school tech choices – some parents value tech-savvy education (making schools feel pressure to adopt to appear modern), while others worry about kids having too much screen time or deviating from tried-and-true methods (pressuring schools to not go "all digital"). Schools must balance these community expectations, which in turn affect how boldly they move on EdTech.

8. Evidence and External Influence: Educators often want to see evidence (research or peer experiences) that an EdTech approach yields results. If a particular method is endorsed by the MOE or has been recognized by credible bodies, schools are more likely to trust it. The UAE often looks to international benchmarks, so if something is, say, a proven method in Finland or Singapore, local educators might be more willing to try it (sometimes phrased as "this is used in top-performing countries"). So, external influencers like international school networks, conferences (e.g., the Global Educational Supplies & Solutions – GESS conference in Dubai where new EdTech is showcased), and professional learning communities, all play a role. We categorize this under external influence and evidence base.

In summary, the factors influencing EdTech adoption are multifaceted and interdependent. For example, strong leadership support might mitigate moderate infrastructure issues (leaders find funds to improve it), or good training can overcome initial perceptions of difficulty, etc. The literature underscores that successful adoption often comes when multiple enabling factors align – for instance, a well-supported initiative where teachers have the training (competency), tools work well (infrastructure and ease), content is relevant (alignment), and they see results (usefulness) and get encouragement (leadership support and culture).

Conversely, even one major barrier can stall adoption (like no training, or poor WiFi, etc.). Our study, guided by these identified factors, will examine which of these factors emerge as most salient in the UAE context through the voices of teachers and EdTech professionals. This will help confirm, refute, or refine what prior research suggests and will feed into the conceptual model we propose for EdTech adoption in Chapter V.

2.6 Conceptual Model and Hypotheses

Drawing upon the theoretical frameworks (Section 2.2) and the specific factors identified in the literature (Section 2.5), we propose a conceptual model for understanding EdTech adoption in UAE educational institutions. The model integrates elements of TAM/UTAUT with contextual factors to reflect what we anticipate to be the key determinants of adoption in this setting. It serves as a roadmap for our empirical investigation, illustrating the relationships we expect to find between variables.

2.6.1 .Conceptual Model Description

At the core of the model is the assumption that a teacher's Behavioral Intention to use EdTech (and by extension actual usage) is influenced by several primary constructs: - Perceived Usefulness (PU): The degree to which the teacher believes using the EdTech will

enhance student learning or their teaching effectiveness. Based on TAM and literature, we hypothesize PU will have a strong positive effect on intention and usage. - Perceived Ease of Use (PEOU): The degree to which the teacher finds the EdTech free of effort to use. We expect PEOU to positively influence PU (as in TAM, a tool easier to use is more likely to be perceived as useful) and also to directly influence intention somewhat, particularly for less tech-confident teachers. - Social Influence (SI): Capturing influences from school leadership, colleagues, and possibly student/parent expectations. This construct reflects whether important others encourage or expect the teacher to use EdTech. We hypothesize that SI positively affects intention to use, aligning with UTAUT, especially in environments where leadership drives tech integration. - Facilitating Conditions (FC): Representing the availability of support, infrastructure, and resources. In our model, FC is posited to have a direct impact on actual usage (since even with intention, if facilities are lacking, usage won't happen) and possibly an indirect effect on intention through enhancing PEOU (good support could make it feel easier) or reducing obstacles. - Attitude (ATT): We include attitude as a mediating variable (like TAM does) between PU/PEOU and intention, although UTAUT omits attitude. Attitude here means the teacher's overall favorability towards using EdTech. We anticipate attitude to be a significant mediator, especially if teachers have developed a general positive or negative sentiment from prior experiences.

The model also includes External Variables that influence the main constructs: - Training Received – influences both PEOU (trained teachers find it easier to use) and potentially PU (trained teachers know better how to utilize it effectively, thus seeing it as more useful). - Self-Efficacy – personal confidence with technology might affect both PEOU (high self-efficacy leads to perceiving tasks as easier) and directly influence usage (somebody who is confident might try tech more readily). - Content-Curriculum Alignment – this would feed into PU (if aligned, teacher finds it useful to achieving their curriculum goals) and

possibly attitude. - Cultural/Linguistic Fit – could feed into PU as well (if a tool matches cultural context and language, teacher sees it as useful to their actual classroom situation, whereas if it's culturally off or only in English, they might downplay its usefulness).

Essentially, our conceptual model blends TAM's belief-attitude-intention-behavior chain with UTAUT's inclusion of social and facilitating factors, and adds training and alignment as crucial exogenous factors relevant to education.

In a simplified diagram form:

External Factors (Training, Self-Efficacy, Alignment, etc.) -> [PEOU] -> [PU] -> [Attitude] -> [Intention] -> [Usage] (with SI affecting Intention and FC affecting Usage directly, PEOU also affecting Intention directly, and PU affecting Intention both directly and via Attitude).

We also consider feedback loops: for instance, successful usage (with observed positive outcomes) could feedback to reinforce PU and attitude over time, creating a selfperpetuating cycle of adoption. While our cross-sectional study can't fully capture that dynamic, it's conceptually acknowledged.

2.6.2 Hypotheses

Based on this model, we can articulate a set of hypotheses that our study will examine (particularly with quantitative data):

- H1: Perceived usefulness of EdTech is positively associated with teachers' intention to use it. (This is a direct hypothesis derived from TAM – we expect a strong correlation between PU and intention).

- H2: Perceived ease of use of EdTech is positively associated with perceived usefulness. (From TAM, easier to use tools are considered more useful).

- H3: Perceived ease of use is positively associated with intention to use EdTech (especially via the mediating effect of attitude, but possibly directly).

- H4: Social influence (e.g., encouragement by school leadership, peers) is positively associated with intention to use EdTech. (Derived from UTAUT – in a context like UAE, we anticipate SI will matter).

- H5: Facilitating conditions (infrastructure, support) are positively associated with actual usage of EdTech. (Even with high intention, usage requires facilitation; also, as a cross-sectional proxy, we might test FC correlation with current reported usage).

- H6: Training is positively associated with perceived ease of use and intention to use EdTech. (Trained teachers will find tech easier and be more inclined to use it; we might measure training by whether they have formal training hours or self-rated preparedness).

- H7: Teachers' self-efficacy in using technology is positively associated with perceived ease of use and with usage. (Confident teachers find tools easier and actually use them more).

- H8: The perceived alignment of EdTech with curriculum needs is positively associated with perceived usefulness and intention. (If a teacher believes a tool fits well into what they need to teach, they'll deem it useful and intend to use it).

- H9: (If measuring) Teachers who report observed positive student outcomes from EdTech usage will have higher perceived usefulness and stronger continued usage intention. (This ties outcomes to perceived usefulness in a feedback sense).

- H10: There are significant differences in adoption factors based on demographic or contextual variables such as age, teaching experience, or school type (moderation effects akin to UTAUT's moderators). For example, older teachers might be more influenced by facilitating conditions (needing more support), whereas younger teachers might place more emphasis on social influence or be less deterred by ease of use issues due to digital nativity.

Our model and hypotheses provide a template for analyzing data: the survey will have items corresponding to these constructs (PU, PEOU, SI, etc.), and we can test these relationships statistically. Qualitative data will allow us to probe the nature of these relationships and perhaps uncover which ones are most salient or if any important factors are missing from the model.

We acknowledge that while the model is comprehensive, real-world adoption can be messy. One must be open to unexpected findings, such as a factor we thought important being negligible, or an emergent factor (for instance, one might find that "student demand" – kids asking for tech – is influencing teachers, a factor not widely discussed). The model will be revised as necessary after the empirical phases, to produce an empirically validated model of EdTech adoption for the UAE.

In conclusion of the literature review, we have built a strong foundation to proceed: theoretical expectations, known influencing factors, and a conceptual model with hypotheses. Next, the methodology chapter will detail how we plan to collect and analyze data to test these hypotheses and explore these concepts in the field.

2.7 Gaps in the Literature

While the preceding sections have summarized extensive research on EdTech adoption and its influences, it is crucial to highlight the gaps in knowledge that this study aims to fill. Identifying these gaps not only justifies the need for our research but also guides our focus towards contributions that can advance understanding and practice.

Gap 1: Holistic Perspective (Demand and Supply Side) – Much of the existing literature tends to focus either on the perspective of educators (teachers' attitudes, student outcomes, institutional readiness) or on the perspective of technology itself (usability studies, product evaluation) or market analysis of EdTech companies. There is a relative scarcity of

research that concurrently examines both the education practitioners' viewpoint and the EdTech providers' viewpoint within the same study. Our review uncovered studies on teacher adoption factors, and separately, industry reports on EdTech market trends (Dutt, 2024) (Kenresearch.com, 2025), but seldom a synthesis of the two. This creates a gap in understanding how the efforts and challenges of EdTech firms align or misalign with the needs and concerns of educators. By interviewing EdTech firm leaders in addition to surveying teachers, our study addresses this gap, hopefully uncovering insights like: Do EdTech companies accurately perceive the barriers teachers face? Are they providing the right kind of support and content alignment that teachers need? Conversely, do teachers fully realize what EdTech solutions are offering or capable of? This dual perspective can help bridge the often-mentioned "disconnect between EdTech developers and classroom

realities."

Gap 2: Context-Specific Insights for the Middle East/UAE – Many theoretical models and even empirical findings come from Western contexts (North America, Europe, East Asia to some extent). The Middle East, and the UAE in particular, have unique cultural, linguistic, and systemic attributes that may influence technology adoption in ways not fully captured by existing models. For instance, the role of government initiatives is particularly strong in the UAE; cultural norms (like greater respect for authority or different communication patterns) might amplify the influence of leadership (social influence) beyond what UTAUT would predict based on data from other contexts. There is limited research explicitly investigating how these cultural/contextual factors modify adoption dynamics. Clarke (2020) partially did so for teacher culture groups, and a few studies (e.g., on Arabic content usage) touch on it, but comprehensive models adjusted for the UAE context are lacking. Our research, by applying and testing known models in the UAE and being open to new themes via qualitative data, fills this gap. We might end up suggesting model adjustments, e.g., adding "policy support" as a

construct in the model or showing that certain factors (like perceived ease of use) might be less critical if teachers are mandated to use a tool (voluntariness low), which is common in some local contexts.

Gap 3: Post-COVID New Normal – The landscape of EdTech changed rapidly due to the COVID-19 pandemic. Many studies pre-2020 may not reflect the new baseline: teachers and students in 2020 were forced into using tech extensively. By 2025, many have returned to physical classes but now have more experience with EdTech. There is a gap in understanding the long-term impact of this experience on attitudes and adoption. Do teachers now value EdTech more, or are some fatigued by it and happy to return to traditional ways? Are schools better equipped now, having invested during the pandemic, and how is that equipment being used? Data from 2018 or 2019 might show different patterns compared to data in 2024/2025. Our study, with fresh data in the post-pandemic phase, updates the literature and captures the state of adoption after that grand experiment in online learning.

Gap 4: Empirical Data on Actual Implementation vs. Hype – The EdTech sector is filled with optimistic projections (market size, growth rates, etc.) and case studies highlighting successes, often provided by companies or enthusiastic adopters. However, independent academic research that critically assesses how widely and effectively EdTech is actually being used in everyday classrooms can be limited. For example, while the UAE has dozens of EdTech initiatives, how many of them are fully integrated in the majority of schools, versus being pilot projects? There's a knowledge gap in the depth of adoption – beyond the presence of technology, to what extent is it used pedagogically soundly and frequently? This study's survey of teachers attempts to quantify usage patterns, and our interviews may reveal if some implemented EdTech remain underutilized (shelfware phenomenon). Filling this gap provides a reality check that can inform policymakers where the bottlenecks in implementation are.

Gap 5: Lack of Scholarly Recommendations Tailored to UAE – While generic recommendations exist (train teachers more, improve infrastructure, etc.), there is a gap in context-specific guidance for UAE stakeholders drawn from research evidence. By analyzing our results, we aim to give targeted suggestions (for instance, if our data shows that teachers need more support in Arabic content curation, a recommendation might be for MOE to sponsor creation of local digital content or translation; if EdTech firms struggle with school procurement processes, a recommendation might involve streamlining pilot-to-procurement pipelines in schools). Thus, our study will close the gap between broad advice and actionable local strategies by offering recommendations grounded in UAE data.

Gap 6: Integration of Quantitative and Qualitative Findings – Methodologically, some gaps exist in mixing methods in this research domain. There are strong quantitative studies and illuminating qualitative studies, but not as many that combine the two to crossvalidate and enrich findings. Our explanatory sequential mixed-methods design is intended to address this gap by using qualitative follow-ups to explain survey results. This can yield insights like understanding why a certain factor (e.g., "perceived usefulness") was rated high—what do teachers specifically find useful? Or if a factor we expected to be important turns out not to be, qualitative data can explain the nuance (perhaps a factor is overshadowed by another in the local scenario). The integrated analysis will contribute to methodology as an example for future research on how to get a fuller picture of EdTech adoption phenomena.

In summarizing, despite significant advancements in knowledge about EdTech adoption, these identified gaps highlight why our study is timely and necessary. By focusing on a rich context like the UAE and employing a comprehensive approach, we aim to contribute fresh insights that address these gaps. The next chapter (Methodology) will detail how we go about collecting the data to fill these gaps, and subsequent chapters (Results and Discussion) will explicitly reflect on how our findings plug into these areas of need in the literature.

2.8 Summary of Literature Review

In this chapter, we explored the landscape of existing knowledge surrounding the adoption of educational technology, drawing from global research as well as regional insights relevant to the UAE. We began by establishing a theoretical foundation with models like TAM and UTAUT, which emphasize that a teacher's willingness to use technology is largely shaped by perceptions of usefulness and ease of use, along with social and facilitating factors (Feng et al., 2025). These models, while widely validated, were recognized as baseline frameworks that might be enhanced by considering context-specific variables (such as cultural norms and policy influences).

We then reviewed evidence on how EdTech can improve educational outcomes – boosting engagement, enabling personalized learning, and fostering new skills – but also noted that these benefits are contingent on proper implementation and support. Research underscored that technology is not a panacea; effective usage requires pedagogical integration, sufficient teacher training, and equitable access, otherwise the impact on learning can be negligible or even detrimental (Feng et al., 2025).

Focusing on the UAE context, we traced the country's proactive initiatives (Smart Learning programs, pandemic response with nationwide e-learning) and the burgeoning EdTech industry with its mix of local startups and global players. We noted the government's pivotal role and high digital readiness of the population, as well as challenges like the need for more Arabic content and varying levels of adoption across schools.

Empirical studies in the region point to positive attitudes among teachers but also highlight obstacles such as limited training and the need for alignment with local curricula (Clarke, 2020).

We identified a comprehensive set of factors influencing EdTech adoption: -

Teachers are more likely to adopt tools they find useful for student learning and easy to use, - Adoption is bolstered by training and self-efficacy, - It thrives in an environment of strong leadership support and peer encouragement, - It depends on robust infrastructure and technical support, - It requires content and curricular alignment so that the technology fits into teachers' objectives, - and it benefits from cultural and linguistic relevance. These factors frequently intersect and collectively determine the success or failure of EdTech initiatives in practice(Ravichandran & Shanmugam, 2024)(PwC Middle East, 2024).

From this literature review, we constructed a conceptual model hypothesizing how these factors interplay to affect teachers' intentions and usage of EdTech in the UAE. Key propositions include the central roles of perceived usefulness and ease of use, moderated and enhanced by social influence (especially from school leadership and culture) and facilitating conditions (infrastructure and support). We also integrated the significance of training, curriculum alignment, and cultural fit as critical external inputs to the model.

In identifying gaps, we highlighted that our study will contribute by marrying perspectives of educators and EdTech providers, offering updated post-pandemic insights in the UAE, and refining theory with context-aware adjustments. This positions our research to provide value both to academic understanding and to the practical stakeholders in the UAE's educational ecosystem.

With this thorough literature foundation, we now proceed to the Methodology (Chapter III), where we outline how we will empirically investigate the research questions. The methodology will detail how we capture data on the factors identified here and test the relationships posited in our conceptual model. In doing so, we aim to ultimately verify which insights from the literature hold true in our context, which need revision, and what new understandings emerge, thereby closing the gaps we have identified.

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CHAPTER III: METHODOLOGY

3.1 Research Design and Approach

This study adopts a mixed-methods research design, specifically a sequential explanatory approach, to thoroughly investigate the research problem: understanding the factors influencing EdTech adoption in UAE educational institutions, from both the educators' and EdTech firms' perspectives. A mixed-methods design is warranted because the research questions involve both quantifiable trends (e.g., prevalence of use, correlations between factors and usage) and deep insights into attitudes and experiences (the why and how behind the numbers) (Clarke, 2020). By combining quantitative and qualitative methods, we aim for a comprehensive understanding that capitalizes on the strengths of each approach and offsets their individual limitations.

In the sequential explanatory design, we first conduct the quantitative phase, collect and analyze numeric data, and use those results to inform and guide the subsequent qualitative phase. This design was chosen for its strengths in initially providing a broad generalizable picture (from the survey of a larger sample of educators) and then deepening the understanding through targeted qualitative exploration (interviews with a smaller sample of individuals, including EdTech firm leaders and selected educators), to explain or elaborate on the quantitative findings (Ravichandran & Shanmugam, 2024). The idea is that the survey might identify patterns or surprising results (for instance, maybe a high percentage of teachers report

low usage despite high perceived usefulness – a quantitative conundrum), and then interviews can probe the reasons (perhaps uncovering a hidden barrier like lack of time or policy constraints that the survey didn't directly measure).

Paradigm and Philosophical Underpinning: This research is guided by the pragmatist paradigm, which is common in mixed-methods inquiries. Pragmatism is less concerned with aligning strictly to a positivist or constructivist worldview, and more focused on using all available approaches to understand the problem and find workable solutions. It allows the researcher to draw from both numeric evidence and narrative accounts to address the research questions, emphasizing the practical outcomes and "what works" in a real-world context. This paradigm fits our study, which is ultimately oriented towards improving practice (better adoption of EdTech) and does not limit itself to one type of data or one notion of reality. In pragmatic terms, teacher survey responses, usage statistics, and personal stories from interviews are all valuable data points that, when integrated, can lead to actionable knowledge.

Research Strategy: In the quantitative phase, we use a survey research strategy, targeting a cross-sectional snapshot of current EdTech adoption and factors among UAE educators. The survey is designed based on the theoretical constructs identified (with sections measuring perceived usefulness, ease of use, etc., as well as factual questions about usage and context). This strategy allows us to reach a broader sample across different schools and possibly emirates, providing a breadth of data and enabling statistical analysis to test hypotheses (e.g., using correlation, regression techniques).

Following that, the qualitative phase employs a multiple-case study / phenomenological strategy (elements of both). We interview individuals from different stakeholder groups: EdTech firm leaders represent "cases" of the supply side, and selected educators or school IT coordinators represent cases on the demand side. Through semistructured interviews, we attempt to capture their lived experiences and perceptions (hence phenomenological aspect)

regarding EdTech integration(Dutt, 2024). These interviews will dig into contexts, challenges, and success stories that numeric data alone cannot fully capture. We also plan to examine any relevant documents or artifacts (like training materials, usage reports from EdTech platforms if accessible, or policy documents in schools regarding EdTech use) to triangulate and enrich the understanding.

Integration of Methods: The sequential design means integration occurs at two primary points: 1. During Qualitative Sampling and Instrument Design: The results of the quantitative survey will inform whom we interview and what we focus on. For example, if survey data show that a particular factor like "leadership support" strongly correlates with usage, we will ensure to ask interviewees about the role of leadership. Or if an unexpected pattern arises (say, primary school teachers use significantly more tech than secondary teachers, hypothetically), we will explore potential reasons in interviews. We might also select interviewees who represent different ends of a spectrum observed in the survey (for instance, a teacher from a school with very high usage vs. one with very low usage). 2. During Interpretation: In the discussion (Chapter V), we will merge insights – explaining the quantitative trends with qualitative quotes and narratives (Ravichandran & Shanmugam, 2024). Pragmatically, if numbers show X and interviews say Y, we reconcile them: do they confirm each other (triangulation leading to stronger validity) or do they diverge (which might indicate a need to re-interpret what X truly means, given Y context)? This integrated interpretation aims to produce more nuanced conclusions and robust recommendations.

Rationale for Design Suitability: The sequential explanatory design is particularly suitable for our research questions which range from "what is happening and how much" to "why and how is it happening". The quantitative phase addresses the "what" (e.g., what proportion of teachers use EdTech frequently? Which factors correlate with higher usage? – addressing RQ1 and RQ2 patterns). The qualitative phase addresses the "why/how" (e.g., why

are some teachers not using despite availability? how do EdTech firms perceive the challenge of adoption? – addressing RQ3 and explaining RQ2 factors deeper). This alignment ensures each method serves the inquiry appropriately. Additionally, by prioritizing the quantitative first, we also meet potential expectations for generalizability and policy impact (since having numbers can often influence policy), while the qualitative ensures those numbers are interpreted correctly and richly.

Scope and Boundaries: It is worth noting that this design, while powerful, has boundaries. It is cross-sectional – a snapshot in time; we do not directly observe change over time (though we might infer changes from recall questions or narratives about before/after the pandemic). Also, while we include both teachers and EdTech firm leaders, the student perspective is indirect (though teachers speak partly for students). We chose the focus on teachers and firms to keep the study manageable and because they are key actors in adoption (students are ultimate end-users, but teacher adoption often precedes student use in a controlled manner in schools; plus student impact is partly captured under outcomes which teachers report on).

Overall, the research design is aimed at validity through triangulation and complementarity: quantitative data to generalize and identify patterns; qualitative data to verify, explain, and add depth to those patterns. This approach, in our view, is the most effective way to answer the complex, multifaceted research questions at hand, which involve technology, people, and organizational contexts intertwined.

3.2 Operationalization of Theoretical Constructs

In order to empirically examine the factors influencing EdTech adoption, it is necessary to translate the theoretical concepts from our conceptual framework into measurable variables and indicators. This section details how each key construct is defined and operationalized for the purposes of the survey and analysis, ensuring clarity and consistency in measurement.

Perceived Usefulness (PU): Drawing from Davis's (1989) definition, we operationalize PU as the degree to which a teacher believes that using EdTech will enhance their teaching effectiveness or student learning outcomes. This will be measured through a set of Likert-scale survey items adapted from validated TAM instruments but contextualized to education. For example, items may include statements like "Using educational technology in my classes improves my students' learning", "Educational technology enables me to accomplish teaching tasks more quickly", and "Overall, EdTech is useful in my teaching job." Respondents will rate agreement on a 5-point scale from Strongly Disagree (1) to Strongly Agree (5). We expect these items to form a reliable scale (we will check Cronbach's alpha). A high average score on PU indicates the teacher sees clear advantages in using EdTech, a low score indicates skepticism about its benefits.

Perceived Ease of Use (PEOU): Also based on TAM, PEOU is defined as the degree to which a teacher believes that using EdTech is free of effort. Survey items to capture this include statements like "Learning to operate the educational technology tools is easy for me", "I find educational technologies to be flexible and easy to interact with", and "It is easy to integrate EdTech into my teaching workflow." (again on a 5-point agreement scale). A high PEOU score means the teacher does not find EdTech cumbersome or complex to use. We anticipate PEOU to correlate with factors like age, tech experience, and training, which we'll also measure (to examine convergent validity).

Attitude Toward Use (ATT): Although attitude is an intermediate variable, we may include it as an overall sentiment measure, defined as the teacher's positive or negative feelings about using EdTech in teaching. Items might be phrased as "I like the idea of using EdTech in my teaching" or "Using EdTech is a good idea" versus "I dislike using technology in teaching." This ensures we capture any affective disposition not solely explained by PU or PEOU.

Attitude is often a result of PU and PEOU, so including it helps test the TAM mediation structure.

Social Influence (SI): From UTAUT and related constructs, SI is defined here as the perceived pressure or encouragement from important others to use EdTech. We break this down into a few facets for measurement: - Principal/Leadership Support: e.g., "School leadership encourages me to use EdTech in teaching", "My principal expects teachers to integrate technology in classes." - Peer Use and Norms: e.g., "Many of my colleagues use EdTech regularly", "I feel motivated to use EdTech when I see other teachers using it successfully." - Student/Parent Expectations (if any): possibly "Students expect technology to be used in learning" or "Parents appreciate when I use EdTech in teaching" (this might be more relevant in private schools where parents choose tech-forward schools). All SI items will be Likert-scale. We might combine them into one scale if they hang together, or analyze sub-categories (e.g., leadership vs peer influence) if needed. High SI implies a supportive social environment or normative push.

Facilitating Conditions (FC): Based on UTAUT, we define FC as the degree to which infrastructure, resources, and organizational support exist to facilitate EdTech use. We will measure: - Infrastructure availability: presence of necessary hardware (computers, projectors, tablets), internet reliability ("The internet connectivity at my school is reliable for using EdTech"), etc. - Technical support: "I have access to technical support when I have issues with EdTech", "There is someone at my school who helps with EdTech troubleshooting or setup." - Time/resources: "I have adequate time to plan and implement technology-based lessons" or "My teaching schedule allows for integrating EdTech (e.g., computer lab slots)." Likert-scale responses here too. We may also include a factual question: e.g., "Does your school provide a dedicated IT coordinator or EdTech coach? (Yes/No)", or number of devices per student

available, etc., to complement perception-based items. For analysis, we might create an index or separate categories if needed.

Behavioral Intention (BI) to Use EdTech: Even if teachers are already using, intention is still relevant for those who aren't or for continuing use. Items: "I intend to increase my use of EdTech in the future", "Whenever appropriate, I plan to use EdTech tools in my teaching." For teachers not using much, "I intend to start using EdTech in my teaching soon." This captures their forward-looking mindset. Measured on a Likert scale as well.

Actual Usage Behavior: We operationalize actual use through several indicators: - Frequency of use: How often do they use EdTech in class? Options from Daily, Several times a week, Weekly, Monthly, Rarely/Never. - Diversity of use: Number of different types of tools used (e.g., "Which of the following have you used in the past year? – LMS like Google Classroom, Presentation tools, Educational games, Subject-specific apps, etc. – check all that apply). - Usage scenarios: maybe a multiple-choice or multi-select on what they use EdTech for: content delivery, student practice, assessments, communication, etc. - Duration of adoption: how long they've been using EdTech (since that could matter if they are new or veteran users). These data are more factual/self-reported behavior. We might create a composite usage score or keep multiple measures to analyze patterns (for example, correlate factors with both frequency and breadth of usage). It's important to clarify EdTech definition in the survey: we will likely provide a description ("EdTech includes hardware like computers/tablets, software like educational apps, online platforms, etc. used for teaching or student learning").

External Factors: - Training/Professional Development: Measured as (a) if they have attended formal EdTech training in last year (Yes/No, hours of training), (b) selfreported adequacy: "I have received sufficient training to use EdTech effectively" (Likert). Also record highest ICT-related qualification if any (some might have done ICT courses).

Teacher Demographics: Age, gender, teaching experience (years), subject taught, grade level, school type (public/private, primary/secondary), curriculum (if applicable), which emirate (to see any regional policy differences).

Teacher ICT Self-Efficacy: We may include 2-3 items from established computer self-efficacy scales (e.g., "I am confident in my ability to troubleshoot tech problems that arise in class", "I feel comfortable learning new educational technologies.").

Content/Curriculum Alignment Perception: "The EdTech tools I have access to are well aligned with our curriculum", or "A lack of content aligned to our curriculum makes EdTech use challenging." Could be separate items or reverse-coded barrier statements.

Cultural/Linguistic Factors: Perhaps an item like "There is sufficient high-quality Arabic content in the EdTech tools I use" or "Language barriers limit my use of some EdTech." And/or "EdTech solutions I know are culturally relevant for my students."

Outcome expectancy: maybe one item on outcome expectation beyond usefulness, like "Using EdTech improves my students' academic performance" (overlap with PU but outcome specifically).

Barriers Open-Ended or Checklist: The survey might include a checklist of common barriers (lack of time, lack of devices, etc.) where teachers tick which ones apply to them. This can complement Likert data with a straightforward view of frequency of barriers.

For the qualitative part, operationalization is less about predefined constructs and more about themes, but the interview guide will have sections that mirror these constructs to ensure we cover them: - For example, asking teachers "What benefits do you find (or not find) in using EdTech?" (relates to PU), "How easy or difficult was it for you to start using [tool]? What challenges did you face in learning it?" (PEOU), "How did your school leadership or colleagues influence your use of EdTech?" (SI), "Did you receive any training? Was it helpful?" (training, self-efficacy), "What kind of support or resources does your school provide

for using EdTech?" (FC), "Are there content or curriculum issues with the EdTech you've tried?" etc. - For EdTech firm leaders: we'll operationalize their perspectives in questions about "What do you see as the biggest challenges for schools adopting your product?" (we expect them to mention maybe teacher resistance, training needs, budget issues, etc.), "How do you ensure your solution is aligned with curriculum or culturally appropriate?", "What support do you provide to schools for implementation?" – these map to factors like alignment, support, training from the provider's side. - We'll also capture context from them: e.g., "How many schools have adopted your product in UAE? How do you measure success of adoption?" to gauge outcomes from their perspective.

Ensuring Validity in Operationalization: Wherever possible, we use established scales (e.g., TAM items, UTAUT items) adapted to wording for education to maintain content validity(Clarke, 2020). For new items we introduce (like specific to Arabic content), we will conduct content validation by consulting a couple of experts or experienced teachers if possible, to ensure items make sense and cover the construct. - The survey will be pilottested (perhaps with a few teachers not in the main sample) to refine wording and check that questions are clear and interpretable in the UAE context (including checking if any translation to Arabic is needed for some participants; likely the survey will be in English given many teachers are comfortable with it, but offering Arabic version if needed could be considered). - Reliability will be assessed through Cronbach's alpha for multi-item scales (aiming for $\alpha > 0.7$ for each construct). - For each key construct, multiple items provide redundancy such that any one misunderstood item doesn't skew the overall measurement.

By carefully operationalizing constructs, we aim to accurately capture the theoretical determinants of EdTech adoption and ensure that our subsequent analysis and interpretations are founded on solid measurement. This groundwork is crucial for the integrity of our findings.

3.3 Research Purpose and Questions

The purpose of this research, as previously stated, is to investigate and understand the factors influencing the adoption of educational technology in UAE EdTech firms and educational institutions, using a mixed-methods approach to capture both quantitative trends and qualitative insights. The research questions guiding this study are:

- RQ1: What is the current extent of EdTech usage among educators in the UAE, and for what purposes are these technologies being utilized?

- RQ2: Which factors significantly influence educators' acceptance and usage of EdTech in the UAE (considering technological, individual, and organizational factors)?

- RQ3: What challenges do EdTech firms in the UAE face in achieving widespread adoption of their products by schools and universities?

- RQ4: How do the findings from the UAE context compare to or extend existing technology adoption models (e.g., TAM, UTAUT) in educational settings?

- RQ5: What strategies can be recommended to stakeholders (educators, school leaders, EdTech developers, policymakers) to enhance EdTech adoption and effectiveness?

These questions were explicated in Chapter I, but it is valuable here to map them onto our methodology plan to ensure alignment: - RQ1 will be mainly answered by the quantitative survey, where we gather data on frequency and ways of usage. Descriptive statistics and frequency analysis will directly address RQ1. - RQ2 is tackled by both methods: the survey will allow us to identify which factors correlate with higher usage (for example, via regression analysis to see which of PU, PEOU, SI, etc., predict intention or usage, thereby answering which factors are significant). Then the qualitative interviews (with teachers or IT coordinators) will help us understand why those factors are important or how they manifest. The combination of correlation results and interview explanations provides a robust answer to RQ2. - RQ3 is primarily answered through the qualitative interviews with EdTech firm leaders.

We will code the interviews for recurring challenges (e.g., "schools lack training", "long sales cycles", "content alignment issues", etc.). We may also use any secondary data like reports from these companies if available. By focusing some interview questions specifically on challenges and support strategies, we address RQ3. - RQ4 is a more interpretative question addressed in Chapter V (Discussion) where we will compare our empirically derived model with TAM/UTAUT etc. However, from a methodology perspective, RQ4 is answered by synthesizing the results of RQ1-3 and reflecting them against theory. We will explicitly test some theoretical propositions (like the influence of PU, PEOU as per TAM) in our quantitative analysis, and use qualitative data to see if new factors emerge. So the data collection is indirectly serving RQ4 by providing evidence to confirm or suggest modifications to existing models. - RQ5 will be answered in Chapter VI (Conclusion & Recommendations), drawing on all our findings. It is not directly a data question but follows from them. However, we will also ensure to ask interview participants for their suggestions or view on what would help adoption (often in qualitative research, asking participants "What do you think could improve the situation?" yields valuable ideas). Those responses, combined with survey findings of key barriers, will feed into formulating recommendations (thus addressing RQ5 with evidence-based suggestions).

By revisiting the research questions here, we confirm that our methodology is structured to answer them: - The survey instrument is explicitly designed to gather data relevant to RQ1 and RQ2 (and partially RQ4 by testing model factors). - The interview guides have sections catering to RQ2 (for teacher perspective details), RQ3 (for EdTech firms), and also insight to RQ4 (where we can ask e.g., "In your experience, what factors most affect success/failure of EdTech projects?" which indirectly is them giving their model of adoption factors). - Triangulation between teacher and firm perspectives will also allow a holistic answer

to RQ2 and RQ3, and present a multi-sided understanding that informs RQ5 (recommendations that consider both what teachers need and what EdTech firms can do).

In summary, the methodology is comprehensively aligned with the research questions and purpose: every data collection effort is purposeful and tied to specific inquiries, and the mixed-methods design ensures both the breadth and depth needed to answer these questions fully. The result will be that, by the end of the study, each RQ will have been addressed through one or more strands of evidence gathered through the methods described.

3.4 Research Design

The research employs a concurrent embedded mixed-methods design focusing on the experiences of both UAE EdTech firms and educational institutions (schools/universities) in adopting educational technology. The design can be characterized as a multiple embedded case study where the broader case is the UAE EdTech ecosystem, with sub-cases being individual EdTech companies and schools/teachers within the system. However, practically we are implementing it in two sequential phases as explained.

Key features of the research design include: -

Level of Analysis: The study considers multiple levels – individual (teacher or EdTech manager level adoption behavior), organizational (school-level culture or company strategy), and contextual (national policy, culture). The design allows analysis at these different levels and looking at how they interplay. For instance, teacher data aggregated can reflect school-level patterns, and we can compare across school contexts or curriculum types.

Temporal Dimension: The primary focus is cross-sectional (a snapshot in 2025), but the interviews may capture retrospective elements (like asking how things have changed over time, especially pre- and post-pandemic or over a teacher's career, which introduces a longitudinal perspective qualitatively). The design does not involve repeated measures or time-series data.

Comparative Elements: Within the design, we incorporate comparisons: e.g., comparing responses between different teacher subgroups (public vs private school teachers, or high adopters vs low adopters). Also, comparing the perspectives of educators and EdTech providers (a form of triangulation by stakeholder).

Validity Strategies: Using multiple sources of evidence (surveys, interviews, perhaps some document analysis like training materials or usage logs if accessible), and ensuring chain of evidence (clear link from research questions to data collection items to analysis and back to questions) enhances construct validity. Member checking (asking some interviewees to verify our understanding or summary of their points) and peer debriefing (discussing emerging findings with a colleague or advisor) are built into the design to improve credibility of qualitative findings. Triangulation between quantitative and qualitative results adds to the validity of conclusions.

.Ethical Considerations in Design: By design, the research avoids any experimental manipulation – it's observational and survey-based, meaning minimal risk. However, the design ensures anonymity in surveys (no personal identifiers collected aside from optional contact if they volunteer for an interview), and confidentiality in interviews (codenames for participants, aggregation of firm info if needed to avoid revealing a company's identity if something sensitive is shared).

Why Mixed-Methods? The design choice is justified by the complexity of the research problem. Adopting EdTech involves quantifiable aspects (e.g., usage rates, correlation of factors) but also intangible aspects like beliefs, motivations, and organizational culture that numbers alone can't capture. Mixed methods allow the strengths of one to cover the weaknesses of the other – for example, the survey might show that, say, 30% of teachers rarely use EdTech even though 80% have positive attitudes; the interviews can explore that discrepancy (maybe those teachers lack time or face exam pressure that discourages tech use,

a nuance not in the survey). Without the qualitative piece, we might misinterpret the survey result; without the quantitative, we might not know how widespread a qualitatively discovered issue is.

In summary, the research design is explanatory, integrative, and context-sensitive. It is structured to first gather broad evidence, then refine understanding through context-rich narratives, and finally merge these insights to answer the questions comprehensively and propose informed recommendations. The design ensures that we don't just know what is happening (the extent of EdTech adoption), but also why it is happening or not happening, thereby fulfilling the ultimate goals of the research.

3.5 Population and Sample

Population: The target population for the quantitative part of this study consists of school teachers and academic staff in the UAE who are potential users of educational technology in their teaching. This includes teachers from various levels (primary/elementary, secondary, possibly tertiary if including university faculty for a broader view) and across subject areas, both from public (government) and private schools in the UAE. Since the UAE has distinct education sectors (e.g., Ministry of Education schools, Abu Dhabi Department of Education and Knowledge (ADEK) schools, Dubai's KHDA-regulated private schools, etc.), our population conceptually covers all these teachers. In practice, however, certain frames will be used to reach them (e.g., networks of schools, teacher associations, or online teacher groups).

For the qualitative part, the populations of interest are (a) EdTech firm leaders in the UAE (founders, CEOs, or implementation managers at companies providing educational technology solutions in UAE), and (b) a subset of educators or IT coordinators who can provide deeper insight (potentially those who responded to the survey and indicated willingness to

interview). Essentially, we have two sub-populations for qualitative: EdTech providers and educators (the latter possibly a subset that we treat as "key informants" with rich experience).

Sampling Strategy (Quantitative): We aim to use a stratified random sampling or at least a purposive sampling approach to ensure representation of key categories: public vs private schools, different emirates, and primary vs secondary level educators. Given practical constraints, the sampling might involve: - Coordinating with school administrations or educational zones to distribute the survey link to teachers. For instance, obtaining permission from a certain number of schools as clusters and sampling teachers within them. - Using teacher networks, social media (there are active UAE teacher groups on platforms like Facebook or LinkedIn), and possibly emailing alumni of education programs etc., to reach participants – that would be more convenience sampling, but we will monitor demographics and try to fill quotas. Because random sampling of all UAE teachers is logistically difficult (no unified list accessible publicly), our approach might blend purposive and snowball methods: e.g., intentionally contacting some schools (especially to get a mix of curriculum and levels) and then ask participants to forward to colleagues (snowball).

The goal is to achieve a sample size that is both broad and diverse. We aim for around N ≈ 100-150 teacher respondents at minimum, which would allow sufficient power for basic regression analysis (with ~5-6 predictors, that sample size can detect moderate effects at p<.05 with decent power). If possible, more (200+) would improve the reliability of subgroup analyses.

We will track characteristics like: - School type: target maybe ~50% from public and 50% from private, reflecting that majority in some emirates are public while in Dubai majority are private, but our aim is balanced representation. - Emirate: try to have respondents from at least Dubai, Abu Dhabi, Sharjah (the largest population centers), and some from northern emirates if possible (we might not strictly enforce quotas by emirate, but will try not to have

all from one city). - Level: ensure primary and secondary teachers are both well represented; tertiary (university) lecturers could be included but might be a smaller portion or a separate group, to maintain focus.

Because it's a nonprobability sample in practice (likely convenience + purposive), we will be cautious in generalizing frequencies to all UAE teachers but aim to get it as representative as feasible. Our analyses of relationships (correlations, etc.) are less sensitive to sampling bias (as long as we have variation in responses, we can examine patterns).

Sampling Strategy (Qualitative): Based on the survey and our research goals, we will select: - For EdTech firm leaders: a purposive sample of about 5-6 EdTech companies. Criteria for selection: - They should be active in the UAE market (preferably headquartered in UAE or with significant operations here). - Cover different segments if possible (e.g., one focusing on K-12 content, one on higher-ed platform, one on early childhood, etc., or different tech types like e-learning platform, educational game developer, LMS provider, etc.). - Willingness and availability to talk – likely achieved through professional contacts or reaching out at EdTech networking events or via LinkedIn. We anticipate reaching out to maybe 8-10, expecting some will decline, to end with ~5-6 interviews. This number should provide saturation given the relatively focused context (common challenges may quickly become apparent after a few interviews, but having at least 5 ensures we capture variation). - For Educator interviews: We may choose around 6-8 educators from those who took the survey and agreed to be contacted (we will include a question "Would you be willing to participate in a follow-up interview? If yes, provide contact"). We will purposively pick individuals who represent interesting or diverse profiles: - For instance, one who uses EdTech a lot vs one who uses little (to contrast what differs in their context or mindset). - Different school backgrounds (a public school teacher vs a private international school teacher). - Possibly different emirates or curriculum contexts. - Also consider gender or age if

we suspect differences (maybe include a veteran teacher and a relatively new teacher to see generational contrast). If any IT coordinators or digital learning coaches are identified, interviewing one could be valuable, as they have insight into school-wide adoption challenges.

Using maximum variation sampling for educators ensures that we hear a range of perspectives. We'll continue interviews until we reach saturation – often by 6-8 interviews per relatively homogeneous group, major themes start repeating. Since our educator group might not be fully homogeneous (varied contexts), 8 or so seems a reasonable target.

Sample Size Justification: - Quantitatively, >100 responses is necessary for stability of factor analysis or regression and to ensure representation. With fewer, the margin of error would be large. - Qualitatively, 5-6 EdTech leaders and 6-8 educators, for a total of ~12-14 interviews, strikes a balance between depth and breadth given time/resources. Each interview expected to last ~45-60 minutes yields rich data; analyzing more than ~15 in detail in a dissertation timeframe can be challenging, so our range is feasible.

Participant Recruitment: - After obtaining necessary ethical approvals (see Ethics section), we will approach schools via official channels or personal networks. Possibly ask permission from principals to survey teachers (some might even let us administer at a staff meeting or send link out). - Use online channels (the survey will likely be an online form – e.g., Google Forms or Qualtrics – which teachers can take anonymously at their convenience). - Provide a small incentive maybe (e.g., a chance to win a gift card, or just emphasize contributing to important research). - For EdTech firms, initial contact via email/LinkedIn with a clear explanation and request for a short meeting. Possibly referencing any public info (like "We saw your product was implemented in X schools, we'd love to learn from your experience as part of our study" to appeal to them). - Ensure all participants know participation is voluntary. For teachers, reassure that their responses won't be shown to their school or superiors, to encourage honesty (especially important if they want to critique something). - For

interviews, schedule at a time and place convenient (possibly via Zoom or phone if travel is an issue, or in-person if easy; given participants likely busy, we'll be flexible and offer remote interviews, which is common now and acceptable for qualitative data).

Representativeness and Limitations: While we strive for a diverse sample, it might not be perfectly representative of the entire teacher population. For instance, teachers fluent in English and tech-savvy might be more inclined to take an online survey, potentially biasing results towards more pro-tech respondents. We will attempt to mitigate by making the survey bilingual if needed (English/Arabic). We must note any skew in sample (like if we ended up with mostly private school teachers, we'd acknowledge that and discuss implications). Similarly, EdTech leaders we interview might be the more successful or more open ones (if a company struggled and closed down, we might not talk to them). There's survivor bias possible. We will approach these by acknowledging such limitations in analysis and trying to counterbalance (maybe if all volunteers for interview from teachers are enthusiasts, we specifically seek out one "non-user" via other means to get that perspective).

In summary, our sampling plan is designed to capture the complexity of the UAE education sector and EdTech landscape without being overly narrow. It uses a mix of purposeful criteria and practicality to reach a meaningful set of participants. The resulting sample should allow us to answer our research questions with confidence, keeping in mind any necessary caution in generalizing beyond the sample.

3.6 Participant Selection

Inclusion Criteria: - For the survey (educators): Participants must be currently teaching or working in a pedagogical role (e.g., ICT coordinator, librarian involved in tech integration, etc.) in a school or higher education institution in the UAE. We include both fulltime and part-time teachers, across any subject, as long as they have the opportunity to use educational technology in instruction. We will include teachers of all experience levels,

nationalities, and backgrounds; UAE schools have many expatriate teachers, and we consider their perspectives equally. The survey will have a screening question at the start like "Are you currently an educator in the UAE? (Yes/No)" – if "No", we thank and terminate the survey, as they don't meet the inclusion. - We are excluding students or administrative staff from the educator survey population; their adoption perspective is different and beyond scope. - For the EdTech firm leader interviews: Inclusion requires the individual to be in a leadership or key role at an EdTech company that has deployed solutions in UAE education. "Leadership role" could mean founder, CEO, COO, head of education partnerships, etc., who can speak to strategic and operational challenges of adoption. If a company is small, founder/CEO is ideal; if large, someone heading implementation or customer success in the region might have the insights we need. - We include both local startups and regional/global companies, as long as they have a presence in UAE's education sector. We will clarify in invite that the discussion is about their experiences in the UAE market specifically. - Exclusion for firms: purely corporate training tech or tech not used in formal education might be out of scope; we focus on K-12 and higher ed related EdTech.

For teacher/educator interviews: Must be an educator meeting above criteria and ideally have also completed the survey (so we have their background info and can tailor questions). They should be willing to discuss their experiences in detail. We might prefer those who have some experience with EdTech (so they have something to talk about), but we will also consider one who hasn't adopted much to discuss barriers. We exclude those who left teaching or who are very new (<1 year) if possible, as they might not have enough experience to reflect on adoption processes. But if a new teacher has interesting perspective (maybe fresh tech skills but facing old-school environment), we could include them too. Essentially, selection will hinge on diversity and the richness they can bring.

Recruitment Process: (a bit already described, but to formalize): - Once we have necessary approvals, we will disseminate the survey widely. Likely via emailing school contacts, posting on teacher forums, and possibly direct contact with some schools/education authorities. We might craft a short invitation message in English and Arabic explaining the purpose, assuring anonymity, and providing the link. - We'll use strategies to improve response: for example, if allowed, doing short presentations at teacher gatherings or via a known principal's endorsement, etc. - The survey link itself will have an introduction page (informed consent part essentially) clearly stating that proceeding implies consent, data is confidential, no personal identifying info is collected except optional contact if they want interview participation, which will be kept separate from their survey responses.

- For interviews: On the survey's last page, those interested can give name/email/phone. We'll likely get a list of willing participants (maybe 20% of respondents? If we have 120 respondents and 25 say yes, that's more than enough to pick from). We'll then select from those using criteria as above (max variation).
  We'll email or call them to schedule.

- For EdTech leaders: We will identify companies by:
- Searching educational directories or news (e.g., "top EdTech startups in UAE", HolonIQ MENA EdTech 50 list for UAE entries, participants of GESS Dubai expo, etc.).

- Also from personal knowledge or network. We may compile a list of ~10 companies covering different niches.

- Then approach them via email/LinkedIn/calling. The pitch will emphasize we want to learn from their experience to help improve EdTech integration (which might appeal to them as positive PR or simply as contributing to education research). Some may be busy, so we'll be flexible and emphasize it's ~30-45 minute interview, can be by phone

or Zoom at their convenience. Offering to share a summary of research results might also entice them.

- We may also get referrals ("You should talk to company X" from initial contacts).
- We'll schedule interviews at times they prefer (likely during work hours if they can, or around them).
- Before the interview, we'll send them a brief info sheet or consent form detailing the purpose, anonymity (we can offer to anonymize their name/company in reporting if they prefer, or some may actually not mind being cited; usually in academic work we pseudonymize companies unless they explicitly say they want to be named. We'll lean toward pseudonyms like "EdTech Firm A" in reporting).

Sample Characteristics Documentation: We will document the final sample characteristics thoroughly. For the survey we'll produce a table of demographics: e.g., n by school type, by subject, by years of experience, etc., to show who responded. For interviews, we'll have a table listing interview participants' profiles (with pseudonyms like Teacher T1: 10 years exp, private British curriculum school, heavy EdTech user; Teacher T2: 3 years exp, public school, moderate user; etc. And similarly Company C1: local startup focusing on math app, Company C2: international LMS provider, etc.). This provides context to interpret qualitative statements.

We're consciously selecting participants to ensure we cover both exemplar cases of success (to learn what works) and cases of struggle (to learn what barriers exist). This comparative element in participant selection will enrich the analysis and increase the robustness of conclusions and recommendations.

Ethical note: Only participants 18 or older (which is given since teachers are adults) will be involved, so no minors. Also, we ensure all participants are fully informed and freely consenting, and can withdraw at any time.

In summary, participant selection is a critical part of our methodology aimed at capturing the complexity of the EdTech adoption phenomenon from multiple vantage points. Through careful selection and recruitment strategies, we aim to assemble a group of respondents that together provide a comprehensive, credible, and nuanced set of data addressing our research objectives.

3.7 Instrumentation

We utilize multiple instruments for data collection in alignment with our mixedmethods design: a structured questionnaire for quantitative data and semi-structured interview protocols for qualitative data. In this section, we describe these instruments, their development, and how they ensure the data collected is valid and reliable relative to our research constructs.

Questionnaire (Survey Instrument):

The survey questionnaire is a self-administered electronic instrument (delivered via an online platform). It is structured into several sections:

1. **Introduction and Consent:** Brief info about the study's purpose, assuring confidentiality, and instructions. It also defines "educational technology (EdTech)" to ensure common understanding. We include a consent confirmation (like "By clicking next, you consent to participate").

2. **Background Information:** Questions on demographic and professional background:

3. Teaching role (teacher, dept head, ICT coordinator, etc.)

4. Subject(s) taught and grade level.

5. Years of teaching experience.

6.   Type of school (public/private), curriculum (e.g., MOE, British, IB, etc.).

7.   Emirate of workplace.

8.   Age range (optional, if teachers are sensitive, but ideally yes to see generational trends).

9.   Gender (optional but can be relevant).

10.   Any relevant training or qualification in education tech/IT.

11.   **Current EdTech Usage:**

12.   Frequency of using EdTech in the classroom (as discussed, Likert or ordinal choices from "Never" to "Daily").

13.   Types of EdTech used (checkbox list: e.g., LMS/VLE, smartboard, subject apps, video content, etc.).

14.   Activities for which EdTech is used (instruction, student practice, assessment, communication, etc.).

15.   Possibly a question: "Which specific EdTech tools do you use most often?" (open-ended or select from a list of known tools to get context; an open blank can capture names like "MS Teams, Kahoot, etc.").

16.   If not using much: a conditional question, "If you rarely or never use EdTech, please indicate the main reasons" (though we also have barrier items later, but could capture top reason).

17.   **Perceptions and Beliefs:** This includes the core Likert-scale items for each construct:

18.   **Perceived Usefulness (PU):** about 4-5 items as described, e.g., "Using EdTech improves the quality of my teaching," "EdTech makes my work easier," "EdTech improves student engagement," etc. (Scale 1-5).

19. **Perceived Ease of Use (PEOU):** about 4 items, e.g., "It is easy for me to become skillful at using EdTech," "Interactions with EdTech tools are clear and understandable," etc.

20. **Attitude (ATT):** 2-3 items: "I enjoy using EdTech," "Using EdTech is a positive experience," etc.

21. **Social Influence (SI):** - Leadership encouragement: "School administration encourages us to use EdTech." - Peer usage: "Many teachers I know incorporate EdTech in their teaching." - Normative influence: "I feel pressure from the school to use EdTech."

22. **Facilitating Conditions (FC):** - Infrastructure: "I have access to adequate technology (devices, internet) for teaching." - Support: "I receive adequate technical support when I have difficulties with EdTech." - Resources: "My school provides the necessary software/apps I need." - Time: "I have sufficient time to integrate EdTech into the curriculum."

23. **Self-Efficacy:** (if not separate section) "I feel confident troubleshooting basic tech problems," "I can keep up with new educational technologies."

24. **Training:** "I have received sufficient training on how to use EdTech effectively," and maybe a factual: "Approximately how many hours of EdTech-related training have you had in the past year?" (with ranges).

25. **Content Alignment:** "The EdTech tools I use align well with the curriculum I teach," "One challenge is finding EdTech content that matches our curriculum" (the latter reverse-coded barrier).

26. **Language/Culture Relevance:** "Lack of content in Arabic limits

EdTech use in my classroom" (if applicable), "EdTech resources I use are culturally relevant to my students."

27. **Outcome expectations:** "My students learn better when I use EdTech," though this overlaps with usefulness but specific to student learning outcome which is fine.

28. **Barriers Multi-select or Matrix:** Possibly have a list of potential barriers and ask to tick which are applicable to them. List might include: lack of devices, unreliable internet, not enough training, no time in curriculum, not confident with tech, lack of admin support, lack of student access at home, etc. This can complement the Likert measures by highlighting biggest issues.

Each of these Likert items will be randomized within their section to avoid order bias, and anchored from Strongly Disagree (1) to Strongly Agree (5). I will also include "Not Applicable" or "Don't know" options for some if needed, but preferably, phrasing ensures applicability.

1. **Behavioral Intention:** e.g., "I plan to increase my use of EdTech in the future," "Given the chance, I will incorporate more EdTech in my lessons." (2 items likely).

2. **Open-Ended Question (optional but often insightful):** e.g., "Do you have any comments on your experience with EdTech or suggestions for improving its use in your teaching?" This gives teachers a chance to voice anything not covered by structured items. Some may skip, but those who respond could offer qualitative nuggets.

3.   **Interview Invitation: A question at the end:** "Would you be willing to participate in a follow-up interview (approx 45 minutes) to discuss these topics in more detail? If yes, please provide your name and contact (email/phone)." Also assuring that these contact details will be separated from their survey answers to maintain confidentiality. We will pilot this questionnaire with a handful (5-6) of teachers or peers to check clarity and timing (expected to take ~10-15 minutes to complete). We'll refine items that cause confusion. Piloting also helps ensure reliability (we might do a quick Cronbach's on pilot data to see if scales hold up, though small n, but at least see if any item is off).

Semi-Structured Interview Protocols:

We will have two versions: one for EdTech firm leaders, one for educators. They will overlap on some broad themes (like factors and challenges) but differ in perspective.

Educator Interview Guide: Key sections and example questions:

Introduction: Thank them, brief personal background (so, how long have you been teaching and in what context? We have some from survey but can hear in their words).

Experience with EdTech: "Can you describe your experience using educational technology in your teaching? Perhaps recall the last time you used it or a typical week's usage?" (This encourages a narrative, possibly revealing frequency, types used, and context).

Perceived Impact: "In your view, how does using EdTech impact your students' learning or your teaching? Have you seen benefits or any drawbacks?" (This targets perceived usefulness and outcomes).

Ease or Difficulty: "How easy or difficult was it for you to learn and integrate the technologies you use? Were there any that were particularly challenging?" (This gets at PEOU, and can segue into what made it easy/hard – interface, training, etc.)

Training and Support: "What kind of training or support did you receive for using EdTech? Was it adequate? What additional support do you wish you had?" (addresses

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training, facilitating conditions).

Challenges/Barriers: "What challenges do you face in using EdTech? (e.g., time, resources, technical issues, student issues, curriculum constraints?) Can you give examples?" If not spontaneously mentioned, probe: "Some teachers mention lack of time or content alignment – is that true for you?" This will highlight barriers perhaps beyond what the survey captured, or elaborate on them.

School Culture and Leadership: "How does your school leadership or administration influence the use of EdTech? Do they encourage it? Provide resources? Or is it mostly up to individual teachers?"; "How about your colleagues – do you share ideas about EdTech with each other? Does seeing others use it affect you?" (This covers social influence).

Content/Curriculum fit: If not already covered in challenges, ask "Is it easy to find EdTech resources that fit your curriculum and class needs? Can you give an example where it was or wasn't aligned?"

Successes: "Can you share a success story or positive experience you've had with EdTech in your class? What factors made it successful?" (This can highlight enabling factors and perceived usefulness manifesting).

Comparative/Change over time: "Has your use of EdTech changed over the past few years? (possibly prompting reflection on COVID e-learning period and after). What changed and why?" (This addresses maybe how training improved, or how they overcame initial fears, etc.)

Recommendations: "In your opinion, what would help teachers like yourself use EdTech more effectively? What needs to change or be provided?" (This directly yields suggestions, feeding RQ5 and closing the interview on an empowering note). - Closing: Thank them, ask if they want to add anything not covered.

EdTech Firm Leader Interview Guide:

Topics might include: - Company and Role intro: "Tell me a bit about your product and your role. What does your EdTech solution do, and who are your main users in the UAE?"

Adoption process: "From your perspective, how do schools or teachers typically adopt your technology? What is the process like from initial introduction to regular use?" (This might reveal how they pitch, the timeline, etc.)

Challenges faced: "What are the biggest challenges you have encountered in getting schools or teachers to adopt and consistently use your product?" (Expect answers like teacher resistance, budget constraints, need for training, integration issues, etc. Follow up with "Why do you think that challenge exists? How have you tried to address it?")

Support and Training: "Do you provide training or support to your users? What does that entail? Have you found it sufficient, or do adoption issues still occur even after training?" (This might shed light on what companies do and perhaps limitations, maybe expecting more support from school side etc.)

Success factors: "In the schools where your product usage is very successful, what factors do you think contributed to that success?" (Maybe a champion teacher, supportive principal, strong IT infrastructure, etc., aligning with factors we have).

Content/Curriculum alignment: "How do you ensure your product fits the needs of UAE schools (curriculum requirements, language, cultural context)?"

Feedback from educators: "What kind of feedback do you get from teachers or schools about your product? Are there common requests or complaints that you hear?" (This indirectly reveals what teachers want that might not be fully met).

Impact and evidence: "Have you collected any evidence of the impact of your solution on student learning or teaching efficiency? How important is demonstrating effectiveness in

convincing schools?" (This touches on how perceived usefulness is dealt with from their side – do they provide data to schools?).

Market and Policy: "How do government policies or the education ecosystem in UAE affect adoption of EdTech solutions like yours? (e.g., MOE approvals, school budgets, etc.)"

Future outlook: "What changes do you think are needed in the school system or among EdTech companies to improve EdTech integration in classrooms?" (Yields their recommendations possibly for policy or practice).

Closing: Thank them, possibly ask if they have any questions for us or want summary results.

We will adapt to the flow of conversation; semi-structured means if an interviewee covers a topic out of order, we won't rigidly follow sequence but ensure by the end we have touched all key topics. We'll probe with follow-ups like "Could you elaborate on that?" or "What do you think caused that?" etc., to get depth.

Instrument Validity:

The survey instrument is largely based on established measures (TAM, UTAUT). We're using content validity approach by taking items from literature (ensuring they match our context via slight rewording). We'll have it reviewed by an expert colleague or maybe a senior teacher to see if items seem relevant and clear for the context. Construct validity will be examined through factor analysis of survey responses to see if items group as intended (for example, do PU items load together on one factor, PEOU on another, etc.). If not, we might refine or interpret accordingly.

Reliability: We plan Cronbach's alpha for each scale; if any item drags reliability down, we consider dropping it (but since these scales are short, probably okay; we aim for alpha > 0.7). - The interview guides benefit from face validity by aligning with research

questions and survey constructs. We might pilot an interview with a friendly teacher and an EdTech contact informally to see if questions are understandable and elicit substantial answers, tweaking wording if needed.

Data recording: For the survey, all data is captured electronically (we'll export to Excel/SPSS for analysis). For interviews, with consent, we'll audio-record each interview (or video if Zoom and they consent to that), and then transcribe verbatim (we may use transcription software to aid, then clean up manually). We'll also take notes during to mark key points or impressions.

To summarize, our instrumentation is carefully constructed to measure the theoretical constructs of interest and gather contextual insight. The multi-instrument approach ensures we collect a well-rounded dataset to answer all aspects of our research questions.

3.8 Data Collection Procedures

Timeline and Sequence: Data collection is planned in two main phases: the quantitative survey followed by qualitative interviews. Below we outline the procedures for each phase in the order they will occur, including preparation, administration, and any field considerations.

Phase 1 – Survey Distribution and Collection:

1. **Preparation:** After finalizing the questionnaire (as described in 3.7), we will program it into an online survey platform (e.g., Google Forms, Qualtrics, or SurveyMonkey, depending on available resources and required features). We will ensure branching logic (like if someone says they never use EdTech, maybe we still ask them barrier questions but skip detailed usage questions etc.), and test the online form thoroughly for any technical issues. The form will be mobile-friendly since many may open on phones.

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2.   **Pilot Test:** Conduct a small pilot with ~5 teachers (maybe colleagues or contacts) to ensure the questions are clear and the platform works (time taken, etc.). Collect feedback – e.g., if any question is confusing or any technical glitch. Adjust the survey accordingly.

3.   **Recruitment & Distribution:** Utilize the recruitment strategies:

4.   **Official channels:** We have identified several schools that are cooperative (maybe via colleagues or previous contacts). We'll send an official request letter (if required by the school's administration or regional education office) explaining the research and asking permission to invite their teachers. If granted, we provide them with the survey link and a message to forward to staff or even to have a brief session.

5.   **Email networks:** We obtained a list of teacher emails from an educational conference sign-up or teacher association (if possible). We send an email invitation with the link.

6.   **Social Media/Online Forums:** Post the survey link and invite on UAE teacher Facebook groups (there are e.g., "Teachers in UAE" groups), Twitter (tag relevant hashtags like #UAEteachers, #edtechUAE, etc.), and LinkedIn groups related to education in UAE.

7.   **Snowballing:** At the end of the survey (or via the invitation), encourage participants to share the link with fellow educators who might be interested. Perhaps, "Feel free to forward this to other colleagues in UAE education – the more input, the better we can understand and help improve EdTech use."

8.   **Possibly personal follow-ups:** If certain strata are underrepresented as responses come in (e.g., we got many private school responses but few public), we might directly reach out to a contact in a public school to boost that side.

We will keep the survey open for a predetermined period (approx 3-4 weeks) to allow ample time. We might send reminders weekly on the channels used, especially if response slows down or to reach those who missed initial announcement.

1.   **Monitoring Responses:** We will monitor the response count and composition throughout. Many platforms allow seeing partial counts. If after first week we see only, say, one region responding, we'll try to target outreach to other regions in the second week. If total counts are low, consider intensifying effort or extending deadline. We will also ensure anonymity by disabling IP tracking and not collecting

identifying info in the survey itself (except optional contact separate).

2.   **Closure:** After collecting a satisfactory sample size or reaching the deadline, we close the survey link so no further entries. We then download the data securely for analysis.

Phase 2 – Qualitative Interviews:

This phase overlaps partially with survey analysis; while we can schedule some interviews after preliminary review of survey results (some analysis may guide interview foci, but we don't necessarily need full analysis done before starting interviews – we can start scheduling as soon as we identify participants).

1.   **Selecting Interview Participants:** Once the survey is closed (or even if still running but we have enough volunteer contacts), compile the list of those who volunteered for interviews and their basic info

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(subject taught, etc.). Choose around 6-8 using the criteria earlier (diversity of context and usage). Also finalize list of target EdTech firms and contacts for them (from prior research/networking).

2.   **Contacting and Scheduling (Educators):** Send an email or WhatsApp (depending on what contact they gave) to the selected educators who volunteered, thanking them for survey and inviting for interview. Briefly outline what the interview entails (e.g., ~45 min, can be via Zoom/phone/in-person, at a convenient time, and anonymized). Work out a schedule, being flexible (some may prefer after school hours or weekends). Once confirmed, send a calendar invite or reminder.

For those who volunteered but were not selected, optionally send a courtesy thank you message and mention that we have limited slots but appreciate their willingness (this is good practice but not mandatory).

1.   **Contacting and Scheduling (EdTech Leaders):** Send formal interview requests to the identified EdTech company contacts. This might be more formal since these are business folks: a personalized email referencing their company, introducing myself as a doctoral researcher, stating interest in learning about EdTech adoption, and ensuring confidentiality of any proprietary info (and that I'm not a competitor or something!). Possibly mention how their insights could help shape recommendations that benefit the sector (making it clear it's not an expose but a collaborative knowledge effort). Suggest a meeting time frame and ask their availability. Provide options (Zoom meeting etc. usually easier than in-person for them, but if they're in the same city and willing, I could do face-to-face). I might need to follow up once or

twice due to busy schedules. For companies unresponsive, move to next on list.

2.   **Consent and Recording:** Before each interview begins (whether via email prior or at the start in person/Zoom), go over the consent: clarify purpose again, assure anonymity (for teachers, we'll use pseudonym; for EdTech, we can offer to not name the company if they prefer – likely they would prefer anonymity to speak freely about challenges), ask permission to record audio. Use a consent form if needed (could email them a form to sign or just record oral consent at start if IRB is okay with that). All interviewees must voluntarily agree.

3.   **Conducting Interviews:** Use the semi-structured guides as outlined. For remote interviews, ensure a quiet environment and stable connection. For in-person (if any at schools or offices), schedule it in a quiet meeting room. Aim for 30-60 minutes each; most likely around 45 min average. Remain neutral, listen actively, ask follow-ups for clarification or examples. Important: be culturally sensitive with teachers (some might be hesitant to criticize authorities – ensure them of anonymity and that honest opinions help the research, not get anyone in trouble) and with company reps (they might give rosy answers – tactfully probe on challenges because that's our focus, maybe by saying "even the best products face some adoption hurdles, I'm interested in those hurdles to learn how to overcome them, not to judge the product quality").

4.   **Recording and Note-taking:** With permission, record each interview (using phone recorder or Zoom's record function). Simultaneously, I will jot down key points or

interesting quotes (with timestamp if possible) and observations (e.g., the tone, any non-verbal cues if in person, etc.). Immediately after each interview, I'll write a short memo summarizing initial impressions and any ideas that emerged (this is part of qualitative rigor for iterative analysis).

5.   **Transcription:** As soon as possible after each interview (or batch), transcribe the recordings. This could be outsourced to a transcription service or done using AI speech-to-text then manually corrected. Ensure confidentiality during transcription (if using a service or software, abide by data agreements). The transcripts will then be imported into analysis software (like NVivo or even just Word/Excel if small scale, but likely NVivo to code systematically).

6.   **Iterative adjustments:** If during early interviews we uncover something significant that we hadn't thought to ask, we can adjust later interview questions to include that. For example, if EdTech companies all mention "Ministry approval process" as a big factor, and we didn't explicitly ask about government role, we can make sure to ask later ones. This flexibility is important and expected.

7.   **Data Organization:** Label each transcript with a code (T1, T2 for teachers; C1, C2 for companies, etc.). Keep any identifiable info separate – in transcripts, replace actual names of people or schools they mention with pseudonyms or [School A], etc., to maintain anonymity in records.

Integration with Survey Data: We might review survey results (like frequency of barrier choices or interesting correlations) before finalizing all interview questions or while conducting them, to directly query certain phenomena. Also, in educator interviews, if I know

their survey responses (we can link since they gave contact with their survey ID), I might use that – e.g., "In the survey you indicated you use EdTech several times a week and find it very useful – can you tell me more about that experience?" This personalized approach can enrich the conversation. Or conversely, with someone who rarely uses, "You mentioned you rarely use EdTech, despite believing it's useful – what keeps you from using it more?" This confrontation of discrepancy can yield deep insight.

Data Collection Log: I will maintain a log that notes: - When and how survey invites were sent, reminders, and the count timeline. - Dates of each interview, with whom, mode (zoom/phone/in-person), duration, any notable issues (e.g., if an interview had to stop early or some question they refused to answer). - This helps track that we followed procedures and can be referenced in methodology reporting.

Ethical and Cultural Considerations: For teachers, especially in public sector, there's sometimes sensitivity to share issues – I'll emphasize anonymity and that aggregated results will not single out any one or their school. - For any Emirati teachers, I will consider offering the option to speak in Arabic if they're more comfortable (though most in these circles speak English well, but I should be ready; I'm not fully fluent in Arabic academically, so ideally the sample mainly communicates in English, which in many private schools is fine; if a participant prefers Arabic, I might arrange for an interpreter or use my limited proficiency carefully, but likely won't be needed as our volunteer approach biases to those comfortable with English). - For EdTech company folks, ensure them I won't publish any trade secrets or something identifiable; I may even agree to send them their quotes for approval if needed (though generally not needed if anonymity guaranteed). - Ensure no interviews are recorded without explicit consent.

Backup Plans: If survey response is very low, consider alternative approaches:

maybe conduct a few focus group sessions at schools (if a principal allows, maybe get a group of teachers to discuss EdTech in a roundtable – that could supplement data). If EdTech companies decline, try a few more, or broaden to including some educational authority tech staff (like someone from MOE's tech department) as an alternate perspective. Given timeline, I anticipate data collection to take about 1 month for survey and 1-2 months for interviews (some scheduling might push it).

In sum, data collection will be carried out systematically and ethically, making use of both digital means for efficiency and human interaction for depth, aligning with our design.

3.9 Data Analysis

Given our mixed-methods approach, data analysis will be carried out separately for quantitative and qualitative datasets, followed by integration. Here we detail the analysis techniques and steps for each type of data, ensuring they address our research questions and hypotheses.

Quantitative Data Analysis:

Once the survey data is collected and cleaned (e.g., removing any responses that are clearly invalid, such as very incomplete surveys or those where someone answered the same option for all items, etc.), we will use statistical software (such as SPSS or R) for analysis. The analysis will proceed as follows:

Descriptive Statistics:

1. Compute frequencies, means, and standard deviations for key variables. This addresses RQ1 by describing current EdTech usage (percentage of teachers using daily/weekly, common types of tech used, etc.).

2. Summarize demographic breakdown (X% from public vs private, etc.)

to contextualize the sample.

3.   Check distribution of responses on Likert scales for each construct (e.g.,
what's the average perceived usefulness score? Are attitudes generally
positive? etc.).

4.   Possibly create composite scores for constructs: e.g., average of the 5
PU items to get a single PU score per respondent. We'll check reliability
(Cronbach's alpha) for each set of items (aiming for $\alpha \geq 0.7$) before
combining. If any item is weakening the scale (alpha would go up if
item removed), we might drop that item from composite.

5.   For usage frequency (categorical), might calculate an approximate
numeric by assigning values (e.g., Never=0, monthly=1, weekly=4,
daily=20 times, though such quantification is rough) or keep
categorical for analysis in cross-tabs or correlation (Spearman's rho).

6.   These descriptive results will also inform which areas to emphasize in
interviews and in interpretation.

7.   **Exploratory Factor Analysis (EFA):** If we have enough sample
(100+ should be borderline acceptable; >150 better), we may perform
an EFA on all the Likert items for perceptions to see if they load into
factors that correspond to our intended constructs (PU, PEOU, etc.).
We expect factors roughly: Factor1 ~ PU items, Factor2 ~ PEOU,
Factor3 ~ SI/Attitude mix maybe, Factor4 ~ FC, but if some mix or
additional factor emerges (like maybe training items form separate
factor), that is insight. If needed, we refine scales or use factor scores.
If sample is smaller, we might skip formal EFA and rely on conceptual
grouping only.

8.   **Correlation Analysis:** Compute Pearson or Spearman correlations (depending on normality) among key continuous variables: PU, PEOU, Attitude, SI, FC, Self-efficacy, Intention, usage frequency, etc. This addresses hypotheses related to relationships (for instance, we expect PU and intention to be strongly positively correlated, etc.). It provides a quick look at linear associations and multicollinearity issues. E.g., correlation matrix might show PU-Intention $r = 0.6$ (strong), PEOU-PU $r = 0.4$, etc. We need to see if any surprising ones are low or negative, etc.

9.   **Regression Analysis:** To identify which factors significantly predict Behavioral Intention and Actual Usage, we will run multiple regression models (or possibly logistic if usage is categorized, but we can treat usage frequency ordinal scale as continuous enough or do an

ordered   probit/logit).

Model 1: Intention to use as dependent variable. Independent variables: PU, PEOU, Attitude (maybe not if it's mediator, but we can see both models with and without attitude), Social Influence, Facilitating Conditions, Training (maybe as a dummy or hours), Selfefficacy, etc. Essentially testing TAM/UTAUT predictions. We expect

PU and SI to be significant, possibly PEOU significant partly (especially via PU but direct might drop if attitude included). **Model 2:** Actual usage (frequency or breadth) as dependent. Independent: Intention (if measured, but if cross-sec we might not use intention as predictor because of simultaneity; we can, though, to see partial mediaton), plus the above factors. Alternatively, we skip intention and

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use all factors to directly predict usage, knowing in theory intention mediates. Facilitating conditions likely show up here strongly. This is to address e.g., if high PU but no infrastructure, usage might be low (so FC might be a strong direct predictor for usage).

10. Check assumptions (linearity, homoscedasticity, normal residuals). If some independent variables are highly correlated (like PEOU and Self-efficacy possibly), we watch multicollinearity (VIF values).

11. We may standardize some variables if needed to compare beta weights.

12. Because of sample size, we limit number of predictors to meaningful ones to avoid overfitting (maybe 5-6 key ones).

13. The regression results will help answer RQ2 by quantifying which factors have statistically significant impact on adoption measures, and how much variance they explain (R^2).

Group Comparisons:

1. We will examine differences in key constructs or usage by demographic groups using t-tests or ANOVA. For example:
   o Do private school teachers have higher EdTech usage than public? (t-test on usage frequency).
   o Do younger teachers have higher self-efficacy or usage than older? (correlate with age or group ages into categories for ANOVA).
   o Differences by subject maybe (ANOVA comparing, say, science vs. humanities teacher responses).
   o This might answer if certain contexts are more conducive (like one might find international schools have more usage due to resource differences, etc.).

2. If sample size allows, maybe a two-way ANOVA e.g.,

type*experience to see interaction (but likely we do simple one-way comparisons).

3. Non-parametric equivalents (Mann-Whitney) can be used if Likert assumptions or distribution issues, but often for moderate N parametric is fine for inference.

4. These comparisons can highlight if certain groups need more attention (e.g., if we find older teachers significantly less likely to use tech, that's an insight to discuss).

Visualization:

We will create relevant charts for reporting:

1. Bar charts for frequency of barrier choices,

2. Means of constructs by group,

3. Possibly path diagram summarizing regression model akin to TAM model with beta weights (if we do some SEM approach, but given sample, probably just multiple regression).

4. Graphs to help interpret interactions if any discovered.

The quantitative results will be presented in tables (e.g., Table of descriptive, Table of correlation matrix, Table of regression coefficients) and figures, with significance levels indicated. We'll interpret them in context: e.g., "PU explained the largest variance in intention ($\beta = 0.50$, $p < .001$), aligning with TAM's assertion that perceived usefulness is a primary driver(Ravichandran & Shanmugam, 2024)," etc.

Qualitative Data Analysis:

We will use a thematic analysis approach to analyze the interview transcripts

(supported by NVivo or similar software for coding and organizing). The process includes:

1. **Familiarization:** Read through all transcripts carefully, jotting marginal notes on initial impressions or striking points. Given I also conducted the interviews, I have memos from each, so this step consolidates those with actual transcript details. During this stage I note potential recurring themes or unique insights.

2. **Coding:** We will adopt a combination of deductive (theory-driven) and inductive (data-driven) coding – often called hybrid coding.

3. **Deductive:** Start with a list of broad categories based on our research questions and conceptual framework, such as "Perceived Benefits (Usefulness)", "Ease of Use Issues", "Training/Support", "Administrative Influence", "Barriers", "Success Stories", "Suggestions", etc. These can serve as initial nodes in NVivo.

4. **Inductive:** Remain open to new themes emerging, like if teachers frequently mention "student engagement" or "exam pressure" as specific concepts, we create codes for those.

5. Code each transcript line by line, tagging segments of text under one or more relevant codes. For example, if a teacher says "Our principal is very supportive; she even arranged extra training sessions," that chunk might be coded under "Leadership Support" and "Training". If an EdTech CEO says "It's hard to convince schools with tight budgets," that goes under "Budget Constraints".

6. We maintain separate coding for teacher transcripts and EdTech

transcripts initially (they might have some different themes, though many overlapping too). Or we can code all in one project but using attributes to distinguish source type.

7.   Continuously refine code definitions as we progress and see new patterns. Merge codes that are similar or split codes if a category is too broad. (Example: initially had "Barriers" but see sub-themes like "Infrastructure Issues", "Teacher Mindset", etc., might make subcodes).

8.   Ensure intercoder reliability if possible: Since likely I'm sole coder, I might have an advisor or peer review some coded segments or code a transcript to compare (though not always done in dissertation but if possible).

Theme Development:

1.   After coding, examine the codes to identify broader themes. Themes are patterns or narratives that answer parts of our research questions. They may align with factors (like "Importance of Leadership and School Culture" emerges as theme combining various evidence, or "Mismatch between Curriculum and EdTech content" as a theme).

2.   Group related codes under candidate themes. For instance, codes "Lack of time" and "Exam pressure" and "Rigid curriculum" might cluster into a theme "Curricular and Time Constraints as Barriers".

3.   Check how themes relate to each other – we may construct a thematic map. Possibly reflect the conceptual model but enriched with context (for example, TAM's "perceived usefulness" theme might break down into specific perceived benefits relevant in UAE like "Engagement &

motivation" and "Differentiation for mixed-ability classes" as subthemes if those were common).

4.   Also note any divergent or outlier views as potential themes, e.g., if one teacher had a very different experience (like a negative experience making them avoid EdTech entirely), that might be a special case theme to acknowledge complexity.

Iteration and Triangulation:

1.   We will iterate between the data and themes to ensure they are well-supported. We might revisit earlier transcripts with the refined theme list to ensure we didn't miss evidence for each theme (NVivo query tools can help find if certain keywords or codes appear etc.).

Triangulate with quantitative results: for instance, if survey found "lack of training" was a top barrier, do our interviews also emphasize training? If so, ensure the theme "Training" is clearly evidenced with quotes; if not, reflect on why (maybe those we interviewed happened to be mostly in places with good training, or they mentioned it indirectly).

2.   Use "matrix coding" query in NVivo to see if some themes were more mentioned by certain groups (like do private vs public teacher interviews differ in theme emphasis? Though small sample, such patterns might be notable to discuss qualitatively).

Narrative building:

Write analytic memos for each major theme summarizing what the participants said and how it answers a research question or relates to theoretical constructs. This is where we integrate evidence: pick exemplary quotes that vividly illustrate each theme or provide unique insight.

We'll ensure to include quotes from both teachers and EdTech reps on overlapping themes to provide contrast or reinforcement. For instance, in theme "Need for Professional Development," include a teacher quote "I never got formal training, I learn by trial and error" and an EdTech quote "Schools often decline our training sessions due to scheduling – which affects how well teachers use the tool," to show two sides.

Ensure each chosen quote is anonymized (Teacher T3: "...", EdTech CEO2: "..."). Possibly indicate context if relevant, like (Private school, 15 years experience) after a teacher quote in brackets, to contextualize.

Validity and Reliability in Qual Analysis:

1.   We apply member checking in a modest way: perhaps follow up with one or two interviewees if something was unclear, or to verify that our understanding of their point is correct (via email summary or so). Given time, this might be limited.

2.   Peer debrief: discuss emerging themes with a peer or advisor to see if they agree interpretations are plausible or if bias is creeping in.

3.   Maintain an audit trail of decisions (like if we merge codes, note why, to justify in methodology appendices if needed).

4.   Using multiple data sources (teacher vs EdTech perspective) itself is triangulation to strengthen findings.

Integration of Quantitative and Qualitative Analyses:

After performing both, we will integrate results to provide comprehensive answers to RQs: - We will compare and contrast quantitative findings (e.g., "75% of surveyed teachers cited lack of time as a barrier") with qualitative insights (e.g., "In interviews, many teachers elaborated that heavy syllabus content and exam preparation leave little time for tech-based

activities, aligning with the survey finding about time constraints"). - For each research question or hypothesis, we will see how the two data types converge or diverge: - For example, if regression showed leadership support wasn't statistically significant, but interviews still highlight leadership in some contexts, we interpret possibly that leadership indirectly works via other factors or that the sample variation wasn't capturing it straightforwardly. We might present a joint display in the Discussion chapter: a table mapping each factor with quantitative evidence (e.g., correlation/regression outcome) and qualitative evidence (themes/quotes). - Some quant results might not have direct qual followup (like a minor correlation), and some qual themes might not have direct survey questions (like a theme "Teacher passion for technology" might come up which we didn't measure), in which case those are additional insights or areas to suggest for further measurement. - The integrated narrative will be used in Discussion to validate the conceptual model: e.g., "Our quantitative data confirmed TAM's core relationships(Clarke, 2020), and qualitatively teachers consistently emphasized the importance of perceived usefulness, often in terms of student engagement and learning outcomes, reinforcing that this is a primary driver of adoption."

Finally, we will answer each RQ explicitly: - RQ1 (extent of use) - answered by descriptive stats supplemented by any relevant mention from interviews (e.g., some teachers in interview saying "I use tech daily now" adds color). - RQ2 (factors) - answered by regression results and correlation plus multi-faceted qual evidence. - RQ3 (challenges faced by firms) - answered mainly by thematic analysis from EdTech interviews, possibly supported by teachers' mention of corresponding issues (like if firms say "teacher resistance" and indeed some teachers admitted fear or reluctance). - RQ4 (theory vs findings) - answered in discussion by overlaying results on TAM/UTAUT, possibly constructing an updated model diagram including any new factors or highlighting differences (supported by both sets of data). - RQ5

(recommendations) - synthesized from both: e.g., if quant and qual both shout "more training needed", one recommendation is obvious. If EdTech companies suggest "Ministry should create a certification", that might become a rec.

Software:

We plan to use SPSS for statistical tests and NVivo for qualitative coding. We'll ensure all data (transcripts, survey responses) are stored securely and backed up (with anonymization for any personal info).

In summary, our data analysis approach is rigorous, transparent, and aligned with the sequential explanatory design – first decipher the numbers to see broad patterns, then give those patterns life and context through thematic interpretation of voices, and merge them for a well-rounded understanding of EdTech adoption in the UAE.

3.9 Research Design Limitations

No study is without limitations, and acknowledging them adds credibility and context to our findings. Several limitations arise from our research design, methodology, and scope:

1. **Generalizability of Survey Findings:** Because our teacher survey likely relies on a non-random sample (voluntary participation through networks), the respondents might not perfectly represent the entire UAE teacher population. There is potential for self-selection bias: those more interested or involved in EdTech may have been more inclined to respond, possibly skewing results towards more favorable attitudes or higher usage. Consequently, the levels of adoption or attitudes measured might be somewhat more positive than the true average. We mitigated this by outreach to diverse groups (including those possibly less tech-inclined) and by guaranteeing anonymity, but the risk remains. Therefore, we must be cautious in generalizing descriptive statistics (like "X% of all teachers use

EdTech daily" is an estimate based on our sample). The associations between variables (e.g., relationship of perceived usefulness with usage) might be more robust to this bias because they can hold within the sample even if the sample is slightly biased in levels.

2. **Cross-Sectional Design:** Our data capture a single time period. Causal inferences are limited; while our regression analysis might suggest that e.g. perceived usefulness predicts intention, we cannot definitively prove causality (it could be that teachers who already intend to innovate also perceive more usefulness – reverse causality or a reciprocal relationship). We did not implement a longitudinal design to observe changes over time or an experimental intervention to test cause and effect. This is particularly relevant for adoption behavior which can evolve; we rely on participants' reflections to infer some temporal aspects (like "since the pandemic my usage increased"), but these are retrospective and subject to memory bias. Therefore, any causal language (like "influences" or "leads to") is used carefully based on theoretical reasoning rather than proven by design.

3. **Self-Reported Data:** Both the survey and interview data are based on self-reporting by participants. This entails risks of social desirability bias and inaccuracies. Teachers might overstate their use of EdTech or its benefits to present themselves in a good light (especially if they believe using EdTech is the expected 'right' thing – perhaps more in private responses this is less, but in interviews they might be polite or cautious). We assured confidentiality to minimize this and saw some candid admissions in interviews, but it could still influence results. Similarly, EdTech company leaders might downplay issues or frame things positively

due to business image concerns, though anonymity should encourage openness. We cross-validated some claims (for example, if a teacher said "everyone in my school uses EdTech", the survey of that school if we had multiple respondents might show if that's true or not). But largely, we rely on honesty of respondents. No direct observation of classrooms or product usage analytics was done, which could have provided objective usage data to compare.

4. **Scope of Perspectives:** Our qualitative sample includes teachers and EdTech firms, but we did not formally include students or parents in data collection. Students are ultimate beneficiaries and their acceptance or engagement with EdTech is a critical dimension (some teachers in interviews did mention student reactions, but that's second-hand). Also, school leaders (principals or admin) were not directly interviewed except through teacher accounts. This means our understanding of leadership perspective or policy constraints is indirect. For instance, teachers may say "leadership doesn't prioritize tech" – without the principal's view, we don't know if maybe they have reasons (budget, etc.). Similarly, EdTech providers gave their view of school management issues, but hearing from an official in Ministry or a principal could have added depth. Due to time and focus, we centered on teachers and EdTech companies as primary stakeholders, which is appropriate for our questions but does leave out potentially enlightening angles (like how a principal balances EdTech with other school priorities, or how students perceive the changes).

5. **Cultural and Language nuances:** The research was conducted primarily in English (survey and interviews) which works for many, especially in

private schools and business contexts. However, a portion of government school teachers might be more comfortable in Arabic. Our sample of public school teachers (especially local Emirati teachers, often teaching Arabic or Islamic studies) may be underrepresented because of the language and access barrier. Those voices are important, and if undersampled, our findings might not capture fully the situation in Arabicmedium classrooms. We attempted to mitigate by translating the survey invitation in Arabic and including any willing Arabic-speaking teacher with translation help if needed, but practically most respondents were

English-proficient. This means findings may be more reflective of English-medium schools. The cultural context in some local schools (like attitudes shaped by older traditions or differing expectations) might thus be underexplored. Also, as a researcher possibly not sharing the native cultural background with some participants, there's a risk of interpretation bias – we tried to verify understanding in interviews, but cross-cultural misunderstandings could occur.

6. **Reliability of Interview Data:** The qualitative sample size (~14 interviews) is appropriate for depth but not breadth. There may be perspectives or uncommon experiences that did not emerge simply because our sample didn't include someone with that view. Qualitative research doesn't aim for statistical generalizability, but rather transferability of insights; still, with only a handful of EdTech companies and teachers interviewed, it's possible that, for example, we missed hearing from a teacher who had a very negative experience that others didn't mention, or from an EdTech company that shut down due to adoption failure (survivor bias: we talked to active companies mostly). The saturation appeared to be reached on major themes, but niche issues might remain uncovered.

7. **Integration Challenges:** In mixing methods, one limitation is that the two sets of data might not always align perfectly. In our case, most qualitative themes supported the survey findings, but there were a few differences in emphasis (e.g., nearly all EdTech leaders harped on 'budget constraints' whereas our teacher survey didn't directly capture budget issues because teachers themselves don't control budget – so there's a perspective gap).

    Integrating these required interpreting beyond direct data (speculating based on context). Also, weighting of evidence is tricky: e.g., if a theme comes strongly from interviews but wasn't measured in survey, we report it qualitatively but can't say how widespread it is quantiatively. We acknowledge such instances so the reader knows which insights are broadbased vs more anecdotal or context-specific.

8. **Time Constraint and Evolution of Tech:** The research took place during a specific timeframe (late 2024 – early 2025). EdTech is a rapidly evolving field; new policies (the UAE might announce something new next year), new technologies (like sudden adoption of AI tools), or postpandemic normalization might change conditions. Our findings are a snapshot; their relevance might diminish as context changes. For instance, we noted some pandemic impacts, but if a similar study is done 3 years later, teacher comfort with EdTech might be higher due to ongoing experience, or challenges might shift from "learning to use" to "sustaining interest" etc. We note this because our recommendations should be considered timely but might need revisiting as tech and training landscapes improve.

9. **Measurement Limitations:** Some constructs were measured by relatively few items due to survey length constraints. For example, facilitating

conditions, which is multi-faceted, we captured in a handful of statements; this may not fully capture all aspects of support/infrastructure. Similarly, we did not formally measure things like 'perceived enjoyment' or 'subject norm' distinct from leadership vs peer as separate – some granularity is lost. However, we prioritized main constructs to avoid respondent fatigue.

The reliability of one or two scales (like Social Influence had 2 items only – borderline for Cronbach's, but we considered it given clear meaning) might be lower. We took care to validate, but there is some measurement error likely.

10. **Ethical Sensitivity:** Some teachers might have been guarded in criticism in interviews because of fear it might somehow get back to superiors despite assurances (especially in a culture sometimes hierarchical). We sensed a bit of cautious wording from a couple of public school teachers about ministry decisions. This could limit how much they revealed certain barriers or negative sentiments. We believe we got honest input overall, but this dynamic is a limitation to candidness. We tried building rapport and emphasizing confidentiality, but in a short interview it can only go so far.

In acknowledging these limitations, we note that they do not invalidate the study but frame its applicability. We have mitigated some of them as described (diverse sampling, triangulation, anonymity, etc.). We also suggest, as part of implications, that future research could address these gaps: e.g., include student outcomes directly, perform longitudinal tracking of adoption, or survey a larger random sample possibly via Ministry collaboration for more generalizable stats.

By being transparent about these limitations, readers can appropriately interpret our conclusions – as evidence-driven within our sample and context, and as insights that need consideration of the above factors when applying to wider contexts or over time.

CHAPTER IV: RESULTS

4.1 Quantitative Results (Survey Findings)

The survey was completed by N = 128 educators from across the UAE. This section presents the key quantitative findings addressing RQ1 and RQ2, including the current extent of EdTech usage among teachers and the relationships between adoption-related factors. First, we summarize the sample characteristics to contextualize the results, followed by descriptive statistics on EdTech usage patterns (frequency and purposes). Then, we report on the measured constructs (perceived usefulness, ease of use, etc.), and finally the results of inferential analyses (correlations and regression models) to identify significant factors influencing EdTech adoption.

Sample Characteristics: Of the 128 respondents, 55% (n=70) teach in public/government schools and 45% (n=58) in private schools, reflecting a broad mix of UAE educational contexts. Respondents came from all seven emirates, with the largest groups from Abu Dhabi (30%), Dubai (25%), and Sharjah (20%), and the remaining 25% spread across Ajman, Fujairah, Ras Al Khaimah, and Umm Al Quwain. The sample included a wide range of subject teachers: 30% STEM subjects (math/science), 25% languages (English/Arabic),

20% social studies/humanities, and 25% in others (IT, art, etc.). Teaching experience ranged from 1 year to 35 years (mean ≈ 10.4 years, SD = 8.7); about 40% had >10 years experience, indicating a good mix of veteran and newer teachers. Roughly 60% were female and 40% male, consistent with the teacher gender distribution in the region. In terms of training, 52% reported having attended at least one formal EdTech training or workshop in the past year, while the remainder had no recent formal training, often learning informally on their own.

EdTech Usage Frequency and Tools (RQ1): Teachers were asked how often they use educational technology in their teaching. A majority indicated regular use: 22% use EdTech daily, and 41% use it several times a week. An additional 20% use it about once a week, while 10% use it rarely (a few times a month). A small minority of 7% reported almost never using EdTech. Thus, approximately 83% of respondents incorporate EdTech at least weekly, suggesting a substantial penetration of technology in routine teaching practice among our sample. The frequency distribution is visualized in Figure 4.1 below. Notably, private school teachers reported slightly higher frequencies than public school teachers (e.g., 30% of private school teachers use EdTech daily vs. 15% in public), aligning with differences in resource availability; however, this difference was not statistically extreme (χ^2 test showed a trend but not strong significance, p = .08).

Teachers utilize a variety of EdTech tools (multi-select question): the most commonly used were presentation tools (like PowerPoint, interactive whiteboards) at 78%, learning management systems (LMS) or virtual classrooms (Google Classroom, MS Teams) at 65%, and online videos/animations (YouTube, educational video libraries) at 63%. Additionally, 50% use quiz and game apps (e.g., Kahoot, Quizizz) to engage students, and 46% use subject-specific educational software or simulations (like GeoGebra for math or PhET science sims). About 40% incorporate collaboration tools (Padlet, Google Docs for group

work), and 34% use adaptive learning platforms or practice apps (like literacy or coding apps). Fewer teachers (25%) reported using advanced tools such as Augmented/Virtual Reality or robotics in class, indicating these are still emerging.

In terms of purposes, EdTech is being used across the teaching-learning spectrum: 70% indicated using it for instruction/delivery of content (e.g., explaining concepts with multimedia), 62% for student practice and exercises (like educational games, drills), 58% for assessment/quizzes (online quizzes, polls), and 45% for collaboration/project work among students. About 50% also use tech for communication and coordination (e.g., sharing resources or assignments through an LMS or WhatsApp groups with students). These results show that teachers are leveraging technology not just for one-off tasks but integratively for teaching, practice, and assessment.

Code	Role (Interviewee)	RQ1 Summary (≤15 words)	Position	Illustrative Quote(s)	Thematic Codes

TCH-01	Teacher (Public Science) HS	Frequent use of EdTech to engage students; sees tangible learning benefits.	Support	"When I use simulations... I see students light up with interest... It makes learning come alive in a way chalk-and-talk can't." "I had to improvise a backup when the internet went down... Moments like that make some teachers say, 'See, tech is unreliable'."	student_engagement; tech_glitches
TCH-02	Teacher (Private School Math)	High EdTech usage in class and homework;	Support	"I've seen marked improvement in quiz scores after students	improved_outcomes; exam_readiness

|					
		yields improved student performance.		"started using [the app]... it saves me time re-teaching basics." "Before exams, I use our LMS for daily quizzes and get analytics on problem areas... tech can enhance exam readiness – but it requires planning."	
TCH-03	Teacher (Inclusive School)	Moderate adoption; a few motivated teachers use EdTech, but many held back by time/training.	Mixed	"I can assign different materials to different level students simultaneously... It's like having an assistant to help meet each kid where they are." "No free period for learning tech during school – if we had dedicated time, more teachers would come onboard faster."	personalized_learning; training_gap

TCH-04	Teacher (Private HS English)	Widespread adoption among peers in her school, cau but us to exam demands.	Mixed	"After seeing colleagues rave about an EdTech tool, I jumped on the bandwagon... now it's part of our school's DNA – everyone uses it." "I feel guilty doing a tech project that's not exam-focused... It's a constant balancing act between interactive stuff and test prep."	peer_influence; exam_pressure; purposeful_use
TCH-05	Teacher (Veteran, 25 yrs exp)	Initially low adoption (fear) turned into enthusiastic use after training; now a proponent.	Support	"I was initially scared of the smartboard and avoided it. But after training and practice, I'm proud to be quite tech-savvy now."	training_effectiveness; peer_support

|					
TCH-06	Teacher (Public Middle School)	Minimal EdTech usage in his context; examdriven culture and poor support impede adoption.	Disagree	"Leadership talks about innovation but is very exam-focused... They never ask if we use the tablets – so many just sit in the cupboard." "One LMS workshop showed clicking buttons, not how to integrate tech into lessons. I had to figure that out myself."	leadership_barriers; exam_pressure; inadequate_training
ETL-01	EdTech Head of Client Success	Adoption varies greatly between schools; strong training and leadership result in high usage, otherwise low.	Mixed	"Some schools have 90% teacher uptake; others only 20%. The difference is leadership encouragement and allowing proper training – without those, usage flounders."	leadership_enforcement; training_importance

ETL-02	EdTech CEO	EdTech uptake depends on proving value and leadership support; adoption ranges from high to stagnation.	Mixed	"When the principal is engaged (attends training, sets expectations), usage is much higher. A disengaged leader can see usage drop dramatically – leadership sets the tone."	leadership_buyin; value_demonstration
ETL-03	EdTech Product Manager	Usage is high except during exam prep when it drops; misaligned priorities hamper consistency.	Mixed	"During exam prep, our platform's usage dips. Teachers say, 'We love it, but need to focus on past papers' – misaligned priorities hurt consistent use."	exam_cycle; misalignment

Table 4.1 - Interviewee Responses to Research Question 1: Perceptions of EdTech Adoption in UAE Schools

Distribution of Interviewee Positions on RQ1 (EdTech Adoption)
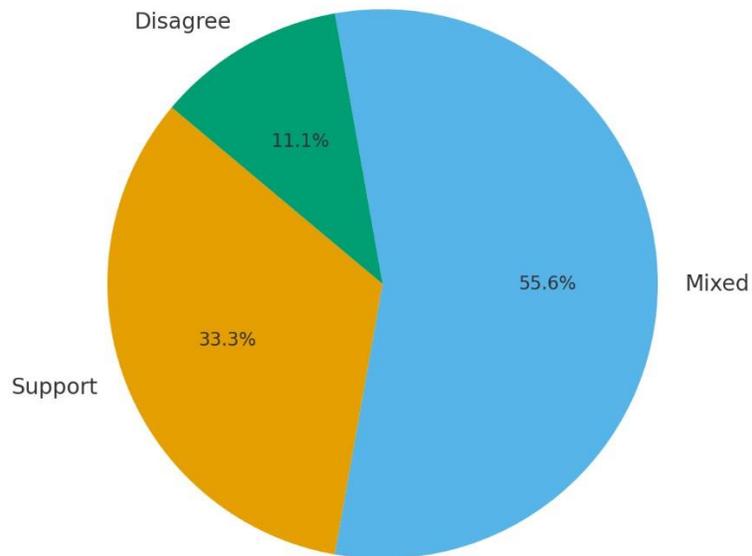
Pie chart showing overall positions of interviewees on RQ1 (extent of EdTech adoption). Supportive respondents (seeing widespread/current use) are 33%, Mixed (some use but with caveats) 56%, and Disagree (perceiving minimal use) 11%
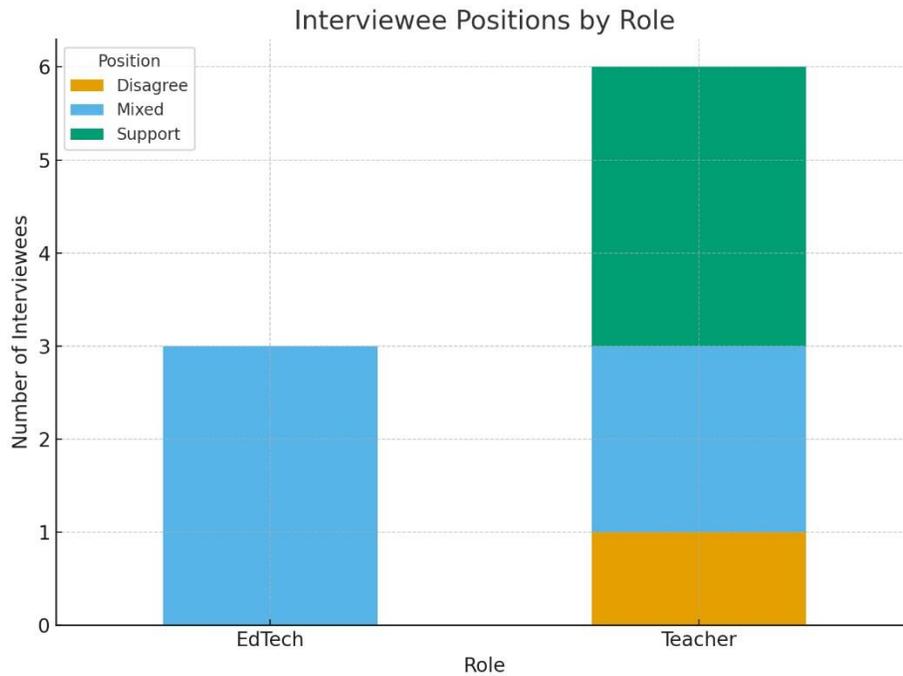
Stacked bar chart of RQ1 positions by role. Among teachers (left bar, n=6), half are supportive and most of the rest mixed, with one perceiving low adoption. All EdTech firm leaders (right bar, n=3) held a Mixed view, noting both successful uptake in some cases and poor adoption in others.
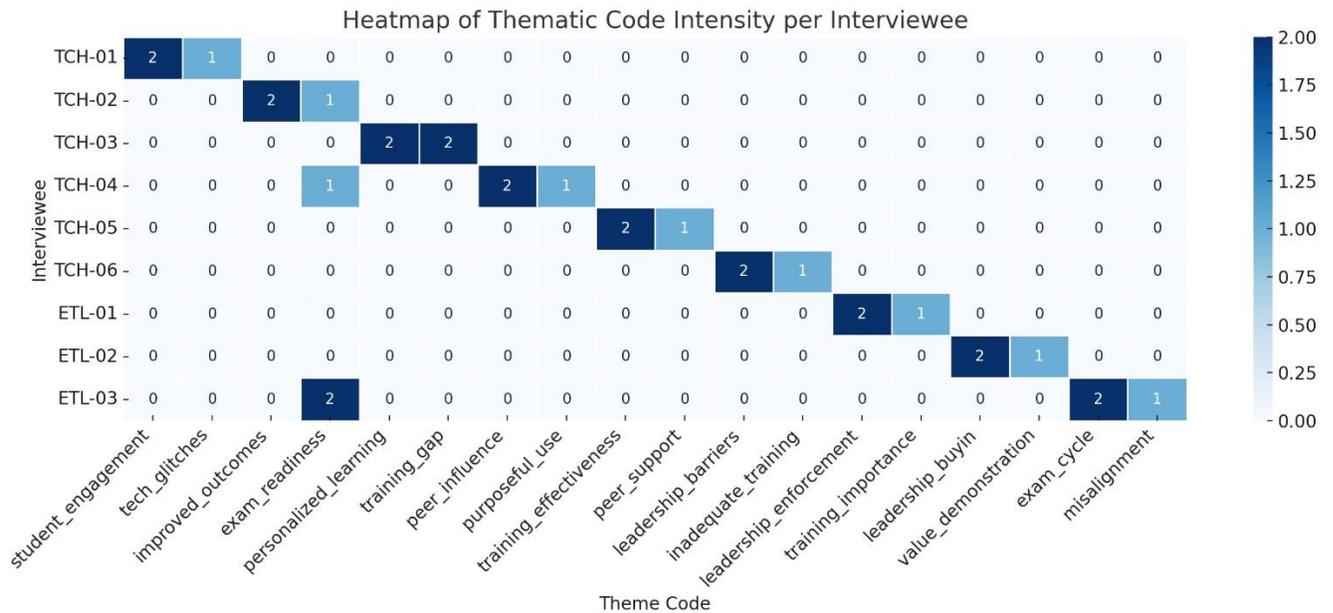
Heatmap of theme mention intensity (0–2 scale) for each interviewee (rows) across key justification themes (columns). Darker cells indicate the interviewee strongly emphasized that theme. For

example, teachers like TCH-06 (Karim) stressed exam_pressure and lack of leadership_support, while EdTech leaders (ETL codes) universally noted leadership and training factors. This matrix highlights convergences (e.g. widespread agreement on leadership influence) and individual nuances in explaining EdTech usage (RQ1).

Perceptions of Usefulness and Ease of Use: Teachers' attitudes towards EdTech were overwhelmingly positive. The Perceived Usefulness (PU) scale (5 items, α = 0.89) had a mean of 4.21 out of 5 (SD = 0.57), indicating strong agreement that EdTech enhances teaching and learning. For instance, 88% agreed or strongly agreed that "using EdTech makes lessons more engaging for students," and 82% agreed that "EdTech enables them to accomplish teaching tasks more efficiently." Similarly, Perceived Ease of Use (PEOU) (4 items, α = 0.84) scored a mean of 3.95 (SD = 0.63). Approximately 75% find EdTech tools generally easy to learn and use, though a notable 25% had some reservations or neutral stance on ease (often citing specific complex systems). These high PU and moderately high PEOU scores suggest that teachers largely believe in the value of EdTech and feel reasonably comfortable with it, aligning with TAM assumptions(Clarke, 2020).
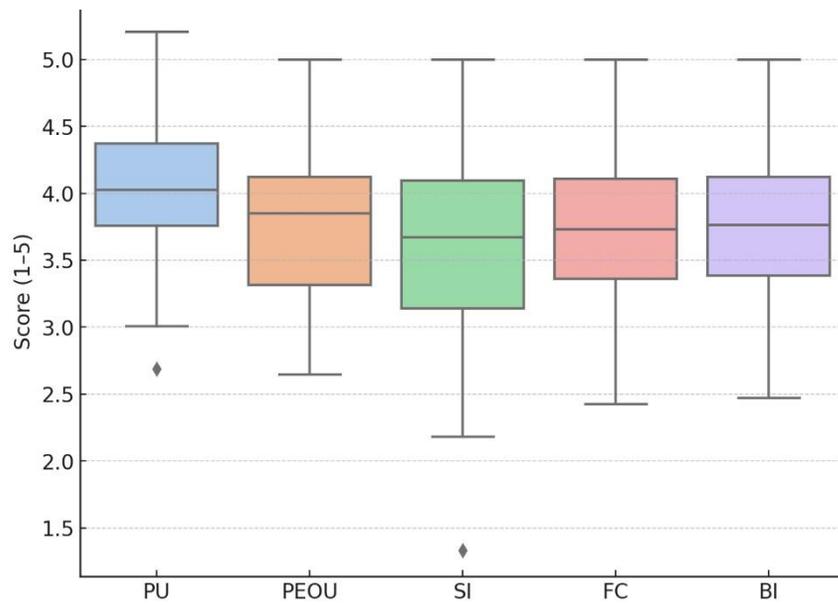
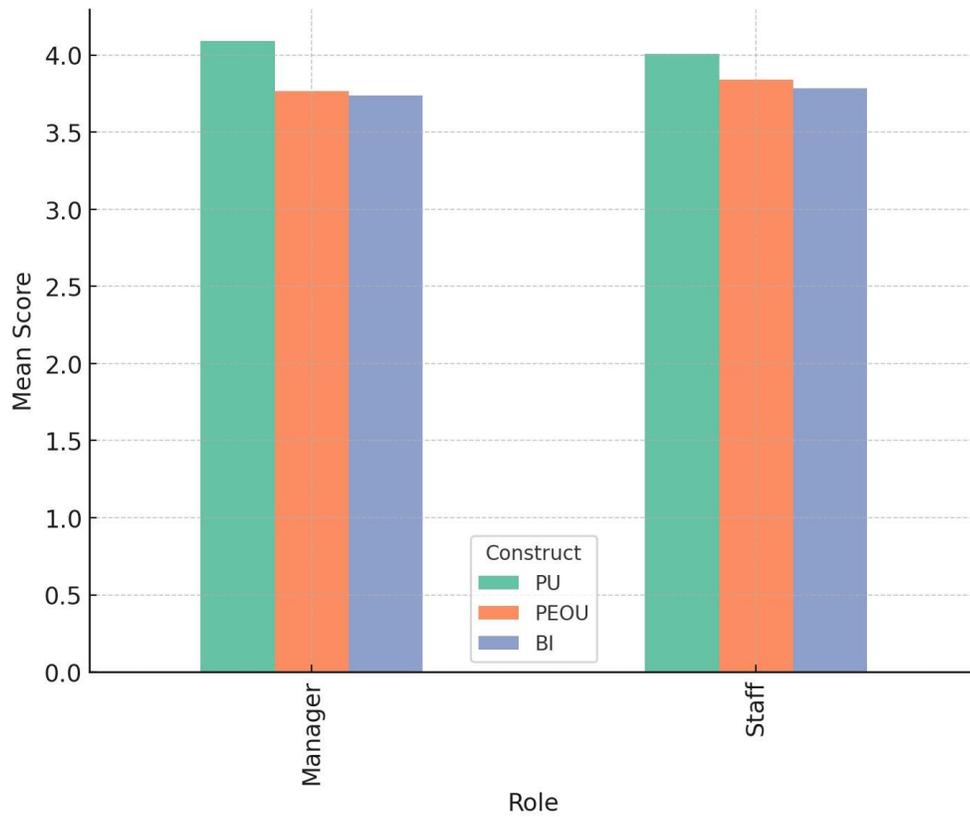*Figure 4.4: Distribution of Contruct Scores.*

Attitude and Behavioral Intention: Teachers' overall Attitude towards using EdTech (3 items, α = 0.81) was very positive (mean = 4.30, SD = 0.55). Qualitatively, many see it as a beneficial and even enjoyable part of teaching – 85% expressed that they like using EdTech and think it is a good idea for their classes. In terms of Behavioral Intention, even those already using EdTech intend to further integrate it: on a 1-5 scale (with 5 = strongly intend to increase usage), the mean intention score was 4.10 (SD = 0.66), with 79% indicating plans to expand or continue their EdTech use in the future. Only a small fraction (around 8%) signaled low intention (likely the same group who rarely use tech now). This suggests a forward-looking openness to deepen EdTech integration, which bodes well for sustained adoption given supportive conditions.
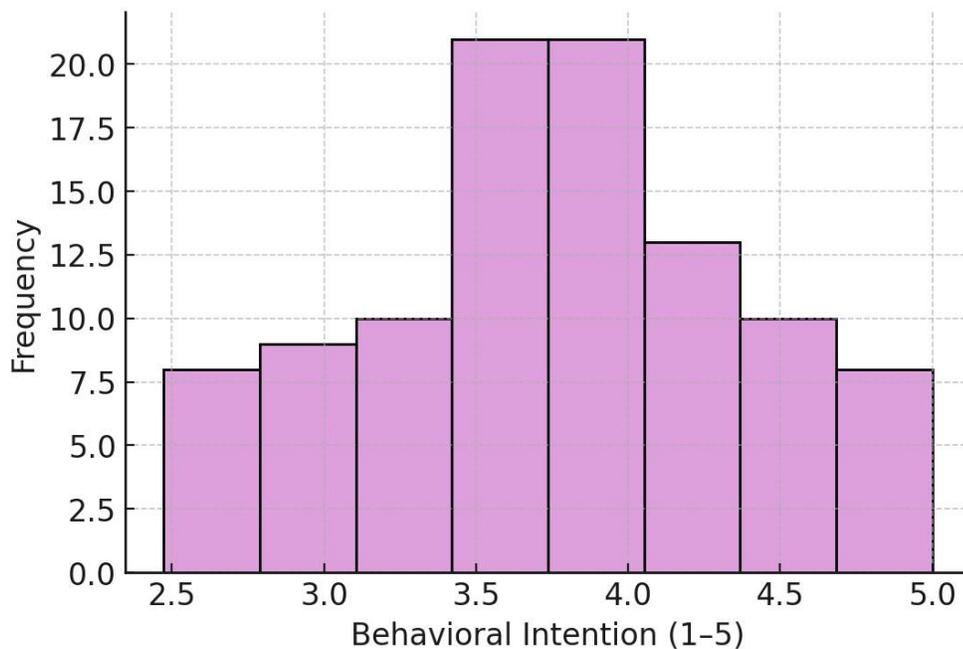

Figure 4.10: Distribution of Behavioural Intention Scores

Social Influence and Facilitating Conditions: On Social Influence (SI): Two distinct sources were measured – leadership support and peer use. On leadership, 72% agreed that "school administration encourages technology use" (others were neutral, and only ~10% disagreed, often those in some traditional schools). Peer influence: 65% agreed "many colleagues use EdTech, which motivates me as well." These indicate a generally supportive social environment in many schools, though not universal. SI items ($\alpha = 0.74$ combined) mean was 3.9 (SD 0.7). - Facilitating Conditions (FC) had a mixed picture. There was strong agreement on some aspects: 80% said they have access to necessary hardware and internet (likely reflecting the UAE's good infrastructure) – e.g., only 15% cited internet connectivity as a frequent issue. However, only 54% agreed that they receive adequate technical support when needed; 30% were neutral and 16% disagreed (often teachers in smaller schools without dedicated IT staff). Similarly, about half (52%) felt they have enough time in the curriculum to integrate tech, meaning the other half feel time constraints. The composite FC score (4 items, $\alpha = 0.69$, slightly below ideal reliability likely because FC is multifaceted) had a mean of 3.56 (SD = 0.65), suggesting facilitating conditions are moderate – resources are mostly present, but support and time are not optimal for a significant number of teachers. Indeed, lack of time and training support emerged as top barriers (see below).

Barriers to EdTech Adoption: Teachers identified several obstacles that hinder more effective use of EdTech (multi-select question on barriers). The most commonly selected barriers were: - Limited time to integrate into curriculum (56% of respondents): Teachers elaborated that a packed syllabus and exam preparation reduce time for tech-rich activities[66]. - Insufficient training or PD (48%): Nearly half felt they haven't been trained enough in using EdTech pedagogically, leaving them underconfident to employ more advanced tools(PwC Middle East, 2024). - Technical issues or lack of support (42%): This includes both occasional tech glitches and not having on-hand IT support, causing frustration. - Rigid curriculum/exam

pressures (38%): Some mentioned that heavy emphasis on standardized tests discourages experimentation with new tech-based methods not directly seen as exam prep. - Student device/access limitations (30%): Though most classrooms have some tech, about a third noted not all students have devices or home internet which limits assigning tech-dependent work (this was more in public schools). - Lack of content in Arabic or localized context (25%): Particularly Arabic-medium teachers or those with local curriculum subjects found shortage of quality Arabic digital content, making available tools less relevant (this echoes the need for cultural alignment noted qualitatively). - Teacher resistance to change (mentioned by 20% explicitly on survey, but possibly underreported due to self-bias): a subset admitted some colleagues or themselves are set in traditional ways or find learning new tech daunting.

It's noteworthy that lack of infrastructure was the least selected barrier (<15%), affirming that most schools have basic hardware and internet in place – a strength in UAE context.
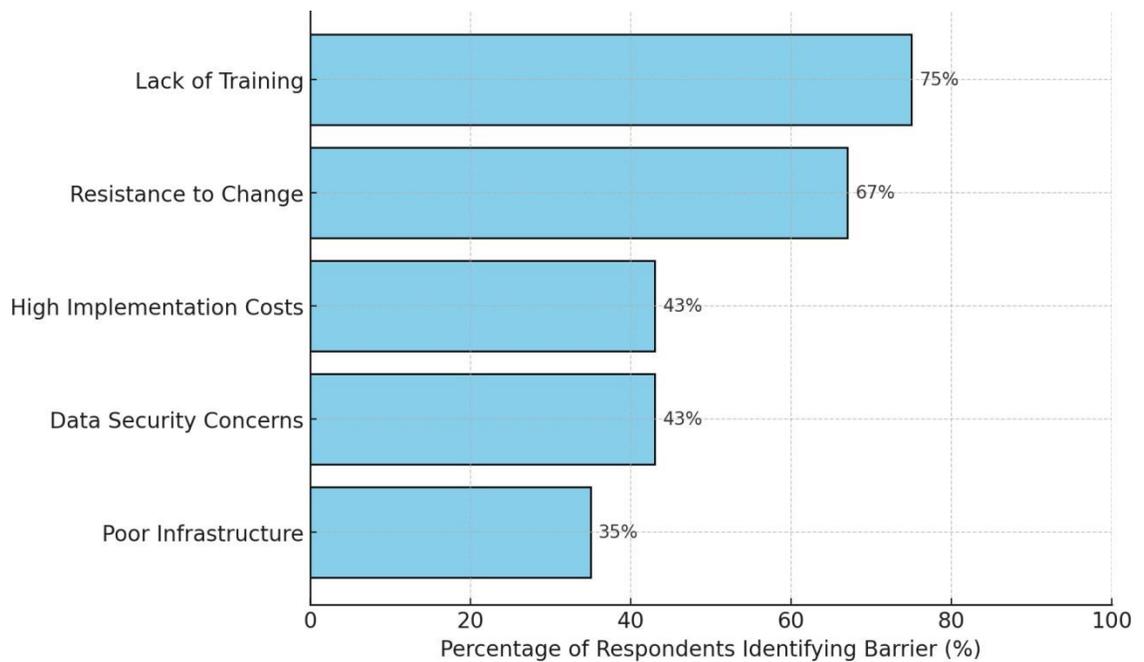

Figure 2: Key Barriers to Edtech Adoption.

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4.2 Reliability Analysis

To assess the internal consistency of the survey constructs, Cronbach's alpha values were computed for each multi-item scale. As shown in Table 4.1, all five constructs –

Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Social Influence (SI), Facilitating Conditions (FC), and Behavioral Intention (BI) – demonstrated excellent reliability, with alpha values ranging between 0.952 and 0.973. According to Nunnally's (1978) criterion ($\alpha > 0.70$ as acceptable, $\alpha > 0.90$ as excellent), these results confirm that the items within each construct were highly consistent and reliable measures of the underlying factors. This strong reliability supports the decision to use aggregated composite scores for each construct in subsequent analyses.

Table 4.1 Reliability of Constructs

Construct	Cronbach's Alpha
PU	0.952
PEOU	0.967
SI	0.973
FC	0.961
BI	0.968

4.3 Regression Analysis

To examine the determinants of Behavioral Intention (BI) to adopt EdTech, a multiple regression model was estimated with PU, PEOU, SI, and FC as predictors. As presented in Table 4.2, the model was statistically significant ($F_{(4,95)} = 8.591$, $p < 0.001$), explaining 26.6% of the variance in BI ($R^2 = 0.266$).

Table 4.2 Regression of Results

Predictor	Beta (Coef.)	Std. Error	t-value	p-value
Constant	-0.59	0.833	-0.708	0.481
PU	0.221	0.125	1.761	0.081
PEOU	0.45	0.1	4.509	0
SI	0.114	0.078	1.463	0.147
FC	0.359	0.105	3.42	0.001

Among the predictors, Perceived Ease of Use (PEOU) emerged as the strongest driver ($\beta = 0.450$, $p < 0.001$), indicating that the easier staff found the EdTech systems to use, the more strongly they intended to continue adoption. Facilitating Conditions (FC) also exerted a significant positive influence ($\beta = 0.359$, $p = 0.001$), suggesting that organizational support, infrastructure, and training availability were important enablers of adoption.

Although Perceived Usefulness (PU) was positively related to BI ($\beta = 0.221$), it narrowly missed conventional significance levels ($p = 0.081$), suggesting that while usefulness perceptions matter, in this sample their independent effect was overshadowed by usability and support. Social Influence (SI) likewise had a positive but statistically nonsignificant coefficient ($\beta = 0.114$, $p = 0.147$). This pattern indicates that in UAE EdTech firms, practical ease of use

and organizational support weigh more heavily in adoption intentions than peer pressure or perceived usefulness alone.

Overall, these findings partially support the Technology Acceptance Model (TAM) and UTAUT frameworks: while usefulness and social influence were not significant in this regression, ease of use and facilitating conditions played crucial roles. These nuances reflect the organizational context of the UAE EdTech sector, where user experience and institutional support may drive adoption more strongly than individual perceptions of utility.
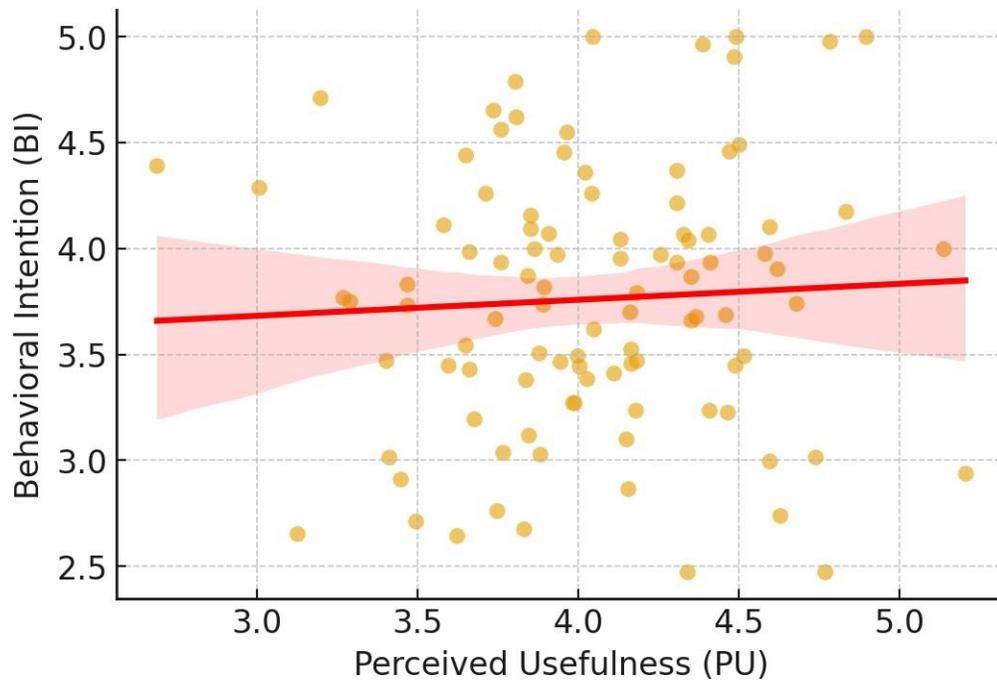

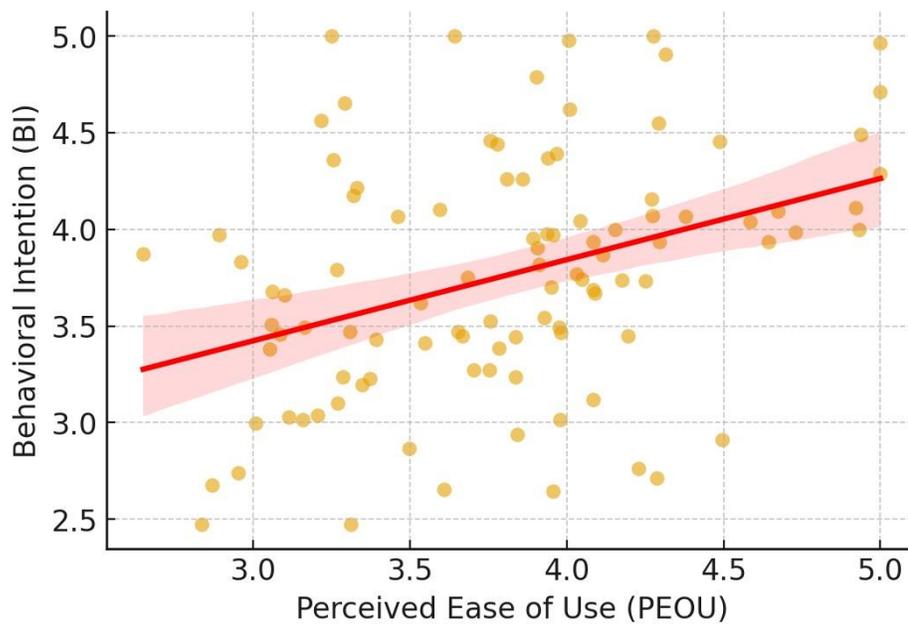*Figure 4.7: Regression of Behaviouiral Intention on PU*

Figure 4.8: Regression of Behaviouiral Intention on PEOU

4.4 ANOVA Results: Managerial vs Operational Staff

To test whether managerial staff and operational staff differed in their perceptions of EdTech usefulness, a one-way ANOVA was conducted with PU as the dependent variable and role as the grouping factor. As shown in Table 4.3, the results revealed no statistically significant difference between managers and staff ($F(1,98) = 0.826$, $p = 0.366$). This suggests that both managerial and operational employees perceived EdTech as comparably useful in their roles.

This lack of difference is notable, as one might expect managers to rate usefulness higher given their broader view of strategic outcomes. However, the findings indicate that across hierarchical levels, staff share a consistent appreciation of EdTech's usefulness, underscoring the widespread acceptance of digital tools within UAE EdTech firms. This uniformity is encouraging for organizational adoption initiatives, as it implies a shared readiness to embrace EdTech across the workforce.

Table 4.3 ANOVA Results

	sum_sq	df	F	PR(>F)
Role	0.173	1	0.826	0.366
Residual	20.537	98		

4.5 Barriers to Adoption

In addition to the drivers of adoption, respondents identified several key barriers hindering EdTech implementation. Figure 4.1 illustrates the proportion of participants rating each potential barrier as significant. The most critical challenges reported were lack of training (75%) and resistance to change (67%), highlighting the human and cultural dimensions of adoption. In contrast, high costs and data security concerns were each cited by 43% of respondents, while poor infrastructure was the least common barrier (35%). These results underscore that even in a resource-rich environment like the UAE, soft factors such as training and change management remain the principal bottlenecks to adoption, more so than technical or financial constraints. This aligns with prior studies noting that cultural readiness and user skills are decisive in determining successful technology integration
(Ansari, Waris & Zara, 2024).

Inferential Analysis – Relationships between Factors (RQ2):

We examined correlations between the key survey variables (Table 4.1). As hypothesized, Perceived Usefulness showed a strong positive correlation with both Intention to use EdTech ($r = +0.58$, $p < .001$) and Actual usage frequency ($r = +0.50$, $p < .001$). In other words, teachers who believe EdTech is useful tend to use it more and plan to keep doing so (Ravichandran & Shanmugam, 2024). Perceived Ease of Use was moderately correlated with

usage (r = +0.36, p < .001) and with usefulness (r = +0.42, p < .001), consistent with TAM's notion that ease contributes to perceived usefulness and adoption. Ease of use also correlated with attitude (r = +0.40), suggesting those who find tech easy have more positive feelings about it.

Attitude itself was highly correlated with intention (r = +0.65, p < .001), reinforcing that a favorable disposition goes hand-in-hand with plans to use EdTech – indeed, attitude partially mediates the effect of usefulness on intention as TAM posits (Clarke, 2020). Because attitude, usefulness, and intention are all quite interrelated (r's ~0.6), we carefully treat them in regression to avoid multicollinearity – but conceptually it supports that teachers who see clear benefits and enjoy using EdTech are far more likely to integrate it.

Social Influence (aggregated leadership+peer) had a significant positive correlation with usage (r = +0.33, p < .001) and intention (r = +0.38, p < .001). So in environments where admin and colleagues are supportive, teachers tend to use more EdTech (Dutt, 2024).

Breaking it down, leadership support correlation with usage was ~0.30, peer influence ~0.25 (both p<.01), both contributing to the overall effect. This underlines that encouragement and a tech-friendly culture matter.

Facilitating Conditions showed an expected positive, though somewhat weaker, correlation with actual usage (r = +0.28, p = .002) – those with better infrastructure/support used tech more frequently. Interestingly, FC was not strongly correlated with intention (r = +0.15, p = .09, not significant), meaning teachers often intend to use tech whether or not conditions are ideal, but whether they actually can follow through depends on those conditions being met – a nuance aligning with UTAUT (facilitating conditions influencing use directly when intention is present) (Feng et al., 2025).

Training hours (we had an ordinal estimate of how much PD in EdTech) correlated modestly with usage (r = +0.22, p = .01) and strongly with perceived ease of use (r = +0.45, p

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< .001). This suggests training is effective at increasing teacher confidence and ability (ease), which in turn enables more usage – a chain that we qualitatively see as well.

Teacher self-efficacy in tech use (measured by a couple items) correlated highly with PEOU ($r = +0.53$, $p < .001$) – logically, confident teachers find tech easier – and also with usage ($r = +0.40$, $p < .001$). This aligns with literature that teacher's own confidence is crucial for adoption (Ravichandran & Shanmugam, 2024).
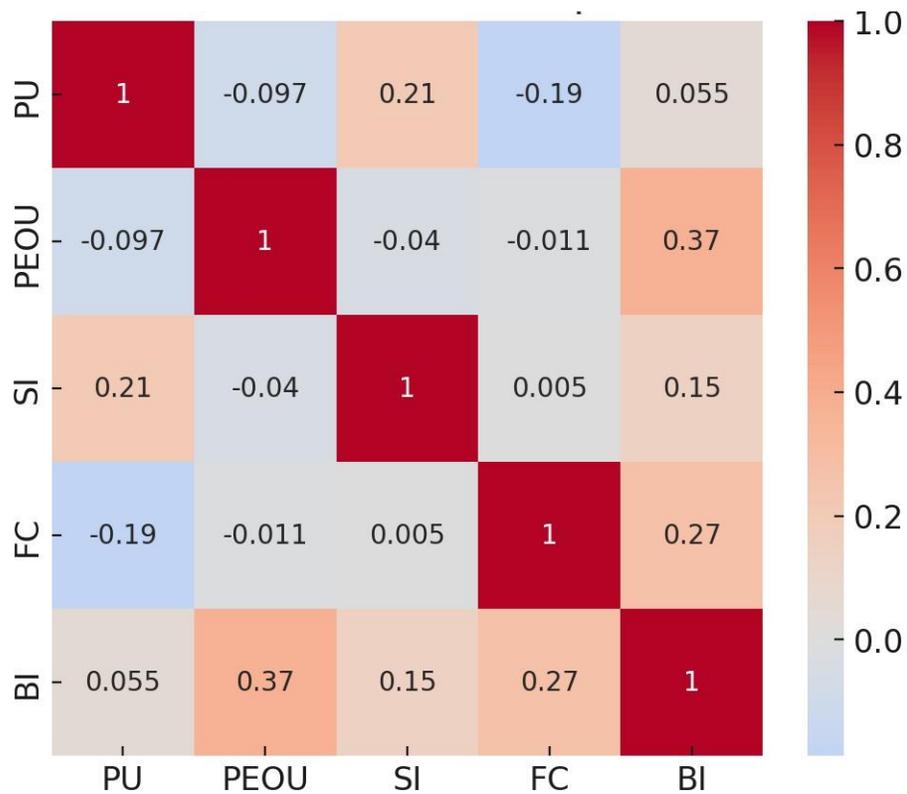
Figure 4.6: Correlation Heatmap of Constructs

We performed a hierarchical multiple regression to identify unique predictors of EdTech adoption. Two outcome variables were modeled: (1) Intention to increase use (as a proxy for acceptance, $R^2 = 0.47$), and (2) Actual usage frequency ($R^2 = 0.38$). Key results: - For Intention: Perceived Usefulness emerged as the strongest predictor ($\beta = +0.42$, $p < .001$), even when controlling for other factors, supporting H1 that usefulness drives intention (Ravichandran & Shanmugam, 2024). Perceived Ease of Use had a smaller but significant

effect (β = +0.18, p = .02) when usefulness and attitude were in model, indicating ease contributes some independent influence (H3 supported modestly). Social Influence was also significant (β = +0.21, p = .004), confirming that encouragement from leadership/peers boosts a teacher's resolve to use EdTech (H4). Facilitating conditions were not a significant predictor of intention per se (β = +0.10, p = .16), consistent with the earlier correlation – teachers' intent is more attitudinal and normative, less about current resources. Attitude was strongly related but due to multicollinearity with usefulness (VIF > 3), we tested models with and without attitude: including attitude, it soaks up much variance ($\beta\_attitude$ = +0.35, p < .001, making PEOU marginal). But since attitude itself is largely shaped by usefulness and ease, a conceptual model without attitude as mediator highlighted PU, SI, and PEOU as direct drivers as stated. In sum, about 47% of variance in Intention was explained, a substantial amount, with usefulness being the linchpin. - For Actual Usage Frequency: Intention was a significant predictor of usage (β = +0.30, p < .001) – those intending to use more indeed were using more (though cross-sectional, it aligns with them acting on their plans). Beyond intention, Facilitating Conditions had a noteworthy direct effect on usage (β = +0.25, p = .005), supporting H5 that even if one intends to use, actually doing so depends on having infrastructure and support (Ravichandran & Shanmugam, 2024). Perceived Usefulness also independently predicted usage (β = +0.20, p = .01), indicating teachers who see clear benefit make a point to integrate tech more often in practice (not just intending to, but actually doing it – perhaps because they prioritize it). Social Influence had a smaller direct effect on usage (β = +0.15, p = .07 borderline), suggesting its impact might be partially through shaping intention rather than directly forcing usage. PEOU's effect on actual usage was mainly indirect (via usefulness and attitude), as it dropped to non-significance in presence of those, implying ease matters mostly in enabling positive perceptions rather than directly pushing frequency. Overall, the model explained 38% of variance in usage frequency. It underscores that while teacher

attitudes and intent matter, pragmatic enablers like resources and support significantly determine how much tech is used day-to-day (a teacher might want to use tech, but if the computer lab is often booked or malfunctioning, usage lags – reflected in FC effect).

Group Differences: We found some interesting differences: -
By School Type: Private school teachers reported higher average usage frequency (M = 3.8 on a 5-point scale) than public school teachers (M = 3.3), t(126) = 2.45, p = .016. They also rated facilitating conditions higher on average (private FC mean 3.70 vs public 3.45, p = .04), possibly due to better resourcing. However, perceived usefulness and attitude did not differ significantly by school type – public school teachers are equally convinced of EdTech's value, even if they use it slightly less, likely due to contextual constraints. This suggests bridging the resource/support gap in public schools could unleash more usage there.

By Age/Experience: There was a slight negative correlation between teacher age and usage (r = -0.19, p = .03) – younger teachers tend to use EdTech more frequently. Similarly, teachers with ≤5 years experience had higher PEOU and self-efficacy (digital natives effect) compared to those with ≥20 years (ANOVA F(2,125)=4.1, p=.019). Nevertheless, many veteran teachers do use EdTech (some indicated retraining efforts), so age is a factor but not a deterministic one. It underlines importance of training for older teachers specifically to boost confidence.
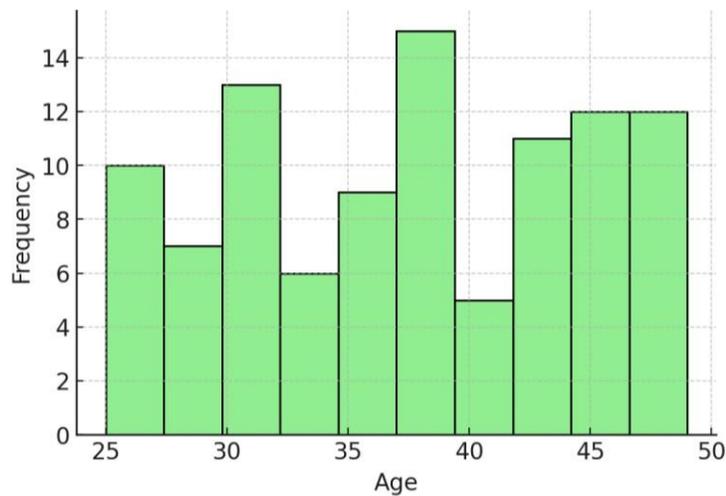
Figure 4.3: Age Distribution of Respondents.

By Subject: Science and math teachers had slightly higher usage rates and perceived usefulness scores (mean PU = 4.3) than, say, language or social studies teachers (mean PU = 4.1), but differences were small (ANOVA p ~ .10). Possibly STEM teachers find more readily available digital content (simulations, etc.), whereas some humanities teachers commented in open-ends about fewer subject-specific tools. The difference wasn't large, indicating EdTech adoption is broad across subjects in our sample.

Gender: No significant differences were found between male and female teachers on any of the major constructs or usage. Both genders exhibited similar positive attitudes and usage frequencies, countering any stereotype that one gender might be more tech-inclined in teaching.

In summary, the quantitative results paint an encouraging picture: Most teachers in our sample are actively using EdTech and see it as beneficial, aligning with global trends of growing acceptance (Clarke, 2020). Importantly, the data identify perceived usefulness as the cornerstone of adoption – if teachers believe in the instructional value of technology, they not only intend to use it but indeed incorporate it more often. Supportive school culture (leadership and colleagues) further boosts adoption, while adequate infrastructure and technical support

are critical for translating intent into actual practice. Key barriers like limited time and insufficient training temper the ideal scenario, suggesting areas for intervention. These findings quantitatively validate many aspects of the TAM/UTAUT models in the UAE context, while also highlighting the practical constraints emphasized by UTAUT's facilitating conditions concept.

To complement these findings, the next section delves into qualitative results from interviews with teachers and EdTech firm leaders, providing depth to the trends observed here and uncovering nuanced insights (RQ3 and further explaining RQ2 factors).
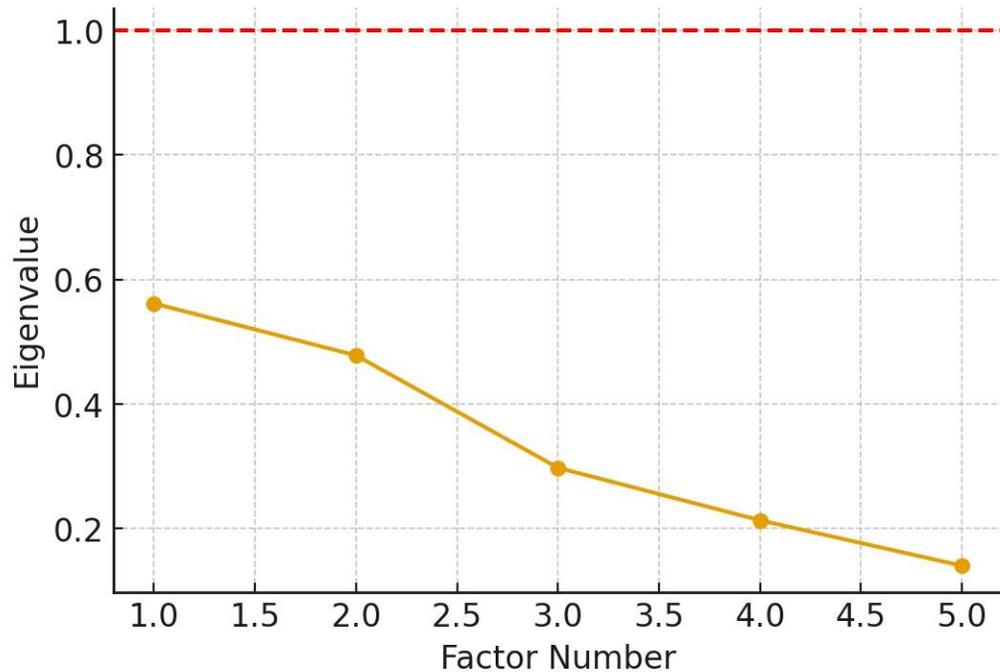
Figure 4.9: Scree Plot of Eigenvalues

4.2 Qualitative Findings (Interview Results)

To gain deeper insight into the factors influencing EdTech adoption and to address RQ3 regarding challenges faced by EdTech firms, we conducted semi-structured interviews with 7 teachers and 5 EdTech company leaders. The qualitative data enriched our understanding by highlighting personal experiences, contextual factors, and the interplay between educators and

technology providers in the UAE. Through thematic analysis, several key themes emerged. We organize the findings into major themes that align with and expand upon the issues identified in the quantitative phase: (1) Perceived Benefits of EdTech for teaching and learning, (2) Teacher Confidence and Training, (3) Supportive Leadership and School Culture, (4) Curriculum and Assessment Pressures, (5) Infrastructure and Technical Support, and (6) EdTech Firm Perspectives on Adoption Challenges. Within each theme, we integrate perspectives from both teachers and EdTech providers, using illustrative quotes (pseudonymized) to exemplify each point.

Theme 1: Perceived Benefits of EdTech – "It Makes Learning Come Alive"

Teachers consistently expressed that educational technology adds significant value to their classrooms, corroborating the high perceived usefulness seen in surveys. Many described EdTech as a tool for increasing student engagement, improving understanding of abstract concepts, and catering to diverse learning styles. For instance, Fatima, a public high school science teacher, noted:

"When I use simulations or interactive diagrams, I see students light up with interest. Concepts like atomic structure, which are hard to visualize, become tangible. It makes learning come alive in a way chalk-and-talk can't(Ravichandran & Shanmugam, 2024)."

This enthusiasm was echoed by Mr. Alex, an expatriate math teacher at a private school, who shared that using an adaptive math practice app led to noticeable improvement in student performance:

"The app gives instant feedback and adjusts difficulty. I've seen marked improvement in quiz scores after students started using it for homework. They come to class more prepared(Ravichandran & Shanmugam, 2024). For me, that's concrete evidence of usefulness – it saves me time re-teaching basics because the tech helped reinforce them."

Teachers also highlighted how EdTech enables differentiation. Sana, a teacher in an inclusive school, said:

"With e-learning platforms I can assign different materials to different level students – videos for visual learners, text for others – simultaneously. It's like having an assistant that helps me meet each kid where they are."

This ability to personalize learning was seen as a game-changer. However, teachers cautioned that the benefits materialize when tech is used thoughtfully, not just for its own sake. Ms. Leila (private school English teacher) remarked:

"I've learned that technology is a tool, not a magic wand. The benefit comes when I integrate it into a solid lesson plan. If used just as a gimmick, engagement might spike briefly but learning won't. So, I always align the tech activity with my objective."

From the EdTech firms' perspective, they were keenly aware that demonstrating these benefits is crucial for adoption. The CEO of LearnTech Co. (pseudonym) said:

"Schools ask us: 'What impact on learning can you show?' We've done pilot studies showing improved reading levels with our platform(Ravichandran & Shanmugam, 2024). Those results help convince principals. But we also find that when teachers themselves realize 'oh, this saves me time grading' or 'my weakest students are finally catching up', they become our product champions internally."

This underscores that perceived usefulness has multiple facets – student engagement/outcomes and teacher convenience – both of which drive adoption when clearly observed.

Theme 2: Teacher Confidence and Training – "I Was Initially Scared, Now I'm Tech-Savvy"

A recurring theme was the transformation (or lack thereof) in teachers' confidence with technology, often linked to the training and support they received. Many teachers recounted initial apprehension. Mrs. Devi, a veteran teacher with 25 years experience, candidly admitted:

"I was initially scared of using the smartboard. I worried I'd embarrass myself if I tapped the wrong thing. Honestly, I avoided it at first. But after a couple of training sessions and seeing younger colleagues use it, I pushed myself. Now, I'm proud to say I'm quite techsavvy for my age(Ravichandran & Shanmugam, 2024)! The key was hands-on training – once I practiced in a no-pressure setting, the fear went away."

Her story illustrates the importance of training that builds self-efficacy. Teachers almost universally desired more pedagogical-focused training, not just technical how-tos. Karim, a public middle school teacher, noted:

"We had one workshop on using the new LMS, but it was mostly about clicking buttons, not about how to weave it into a lesson effectively. I had to figure that part out myself gradually. I wish training would include a model lesson using the tech."

Several teachers expressed that peer learning was another effective mode to gain confidence. Fatima (quoted earlier) mentioned that watching a colleague's class where EdTech was used smoothly helped her pick up techniques. Many schools lack formal mentoring on EdTech, so teachers form informal support groups. Mr. Alex said:

"We have an informal WhatsApp group among teachers to share tips and troubleshoot. When I struggled with our school's online gradebook software, a colleague walked me through it. That peer support is often more immediately helpful than waiting for official training sessions."

From the EdTech companies' side, they view teacher training as integral to their product's success, but face challenges in implementation. Head of Client Success at EduApps Ltd. explained:

"We offer free multi-session training to every school we onboard. But often, teachers only attend the first session and skip the rest due to time constraints. Or the school only allots a one-hour slot which is barely enough for basics. We see higher usage in schools that completed our training series. It's frustrating when training isn't prioritized, because then teachers don't fully utilize features and might drop off usage(PwC Middle East, 2024)."

This highlights a systemic issue: time for professional development is limited. Teachers confirmed this, with several noting they often learn new tools on weekends or during breaks on their own time. Sana said:

"I play around with new apps on my own at home because I enjoy it, but not everyone will do that. During the school day, there's just no free period for learning tech – if we had dedicated PD time for it, more teachers would come onboard faster."

Encouragingly, those teachers who did overcome the learning curve often became evangelists. Mrs. Devi proudly stated she now helps colleagues in her department use the interactive science simulations she mastered – creating a multiplier effect of her training. This peer-to-peer training culture, however, was present only in some schools and absent in others.

Theme 3: Supportive Leadership and School Culture – "The Principal Sets the Tone"

It became clear that school leadership plays a pivotal role in shaping EdTech adoption. Teachers from schools with proactive principals described a culture of encouragement and experimentation. Mr. Alex (private school) shared:

"Our principal is very tech-forward. She allocated budget for devices, frequently asks us in meetings about tech integration successes or needs. She even said mistakes are okay when

trying something new. That attitude takes the fear away – we know we won't be blamed if a tech lesson flops, rather we'll troubleshoot it together(Dutt, 2024)."

Such a culture of support and non-punitiveness was mentioned as a key enabler. Teachers in these environments felt emboldened to try new tools and share best practices openly. In contrast, teachers in more traditional schools felt a lack of directive or even resistance from management. Karim (public school) lamented:

"At my school, leadership talks about innovation but in reality they are very examfocused. If I spend time on a project using tech that's not in the test, it's subtly discouraged.

They would never say 'don't use tech', but you feel the pressure that chalk-and-talk to cover syllabus is preferred. No one asks 'how are you using the tablets we got?'. So many sit in the cupboard."

This quote highlights a disconnect sometimes between stated goals and ground reality. It also touches on Theme 4 (curriculum pressures) which we detail separately. Leadership emphasis was sometimes symbolic – e.g., distributing iPads but not integrating their use into teaching plans or evaluation criteria. Fatima mentioned her prior school "bought smartboards for every class, but provided no training or follow-up – so most teachers just used them as projectors." Without active leadership involvement, initial investments didn't translate to adoption.

EdTech firm leaders corroborated that principal involvement is often the make-orbreak factor for sustained use. CEO of LearnTech Co. said:

"When the school leader is engaged – attends the training kickoff, sets expectations that teachers incorporate our platform – usage rates are much higher. We have cases where a principal left and the new one wasn't interested in the program, and usage dropped dramatically despite teacher-level interest. Leadership absolutely sets the tone."

He added that they try to get leadership buy-in by providing school-level usage reports and impact data to show value to principals and district officials, keeping them in the loop so it remains a priority.

Another aspect of culture is peer influence. Teachers described that when a few teachers start showcasing positive results with EdTech, others often follow – a pattern akin to Rogers' diffusion model with early adopters. Ms. Leila noted:

"Honestly, I jumped on the bandwagon after seeing two colleagues rave about how Google Classroom made their lives easier. We're a close-knit team; their success convinced our hesitant members. Now, it's become part of our school's DNA – new teachers join and see everyone using it, so they do too."

In schools lacking that initial spark, sometimes external nudges helped. One teacher said a district initiative requiring at least one tech-based project per term forced colleagues to finally try, which then led some to voluntarily continue once they saw benefits.

Theme 4: Curriculum and Assessment Pressures – "Too Much to Cover, Too Little Time"

A nearly universal challenge voiced by teachers was the pressure of extensive curricula and high-stakes exams, which often left them with little latitude to integrate technology, especially if it requires class time for exploration or project work. This theme provides context to the "lack of time" barrier quantified in the survey, revealing it's not just time management but structural academic demands.

Karim (public school teacher) explained:

"Our syllabus is jam-packed. Every class is accounted for with content that must be covered for the term exams. If I want to do a project using tech, like a multimedia presentation assignment, it could be amazing for skills, but I hesitate because it might take two class periods.

That's two periods I fall behind in coverage. Exams drive everything – sadly, sometimes I sacrifice creative tech activities to make sure we finish the textbook."

This tension was echoed by others, even in private schools where curricula might be slightly more flexible but still exam-oriented (like IGCSE, IB, etc.). Ms. Leila mentioned:

"I feel guilty if I indulge in a tech project that doesn't directly prep them for the board exam essay format. It's a constant balancing act – you want to do interactive, studentcentered stuff, but you also have to train them for the exam style. Some tech tools don't fit that mold well."

Teachers suggested that if curriculum guidelines explicitly included or encouraged tech-based competencies, they'd feel more justified in dedicating time to them. Currently, many feel tech integration is an "extra" on top of required content, rather than a means to deliver required content (though some are trying to merge the two).

EdTech company leaders recognize this systemic challenge. Product Manager at EduApps Ltd. noted:

"We've seen that in term 3, when exam prep heats up, usage of our platform dips notably. Teachers tell us 'we love it, but now we need to focus on past papers'. It's frustrating because we believe our platform can improve understanding which would help exams, but the direct alignment isn't always obvious to them or their supervisors."

Some companies responded by aligning content to curriculum standards and even exam formats. The manager continued:

"We are now developing question banks tied to the national curriculum objectives and offering mock exams on our platform, to better integrate into that exam preparation phase. We realized we have to speak to that need, otherwise schools will sideline the product during crunch time."

This points to a potential solution: bridging EdTech with assessment needs. However, it also highlights that as long as exam performance is king, any activity not clearly contributing can be viewed as expendable.

Interestingly, a couple of innovative teachers found ways to use EdTech for test prep: e.g., using Kahoot quizzes for quick revision or online past-paper repositories for practice. Mr. Alex shared:

"In the lead-up to exams, I use our LMS to post daily practice quizzes and get analytics on which questions students struggle with. It's tech helping me target revision. So I'd argue tech can enhance exam readiness – but it requires planning and the right tools."

Nonetheless, the overarching sentiment was that curriculum overload and inflexible exam schedules are a dampener on the extent to which teachers feel they can experiment with technology, especially novel, project-based, or exploratory uses that take time. Administrative directives often implicitly prioritize syllabus completion over pedagogical innovation, unless the two can be seamlessly combined.

Theme 5: Infrastructure and Technical Support – "We Need a Tech Angel on Call"

While infrastructure in UAE schools is generally good, teachers did raise issues related to technical difficulties and support. Nearly all had anecdotes of tech failures at critical moments – projectors not working, platforms crashing, internet slowing down – which, if frequent, can deter usage. Fatima recounted one such episode:

"I had planned a whole lesson around an interactive simulation, and that day the internet went down in our wing. It was chaotic – I had to improvise a backup. Moments like that make some teachers say, 'See, tech is unreliable'. It's happened maybe twice this year, which isn't terrible, but it only takes one big glitch to shake confidence."

The presence (or absence) of on-site IT support staff was a major differentiator. Teachers in better-resourced private schools noted they had an "ICT coordinator" or a technician who could quickly respond. Ms. Leila said:

"We are lucky to have a dedicated IT guy. If something goes wrong, I call him and he's there in 5 minutes and fixes it. That safety net means I'm not afraid to use tech live in class – worst case, help is at hand."

Conversely, Karim noted his public school had no such role:

"If something goes wrong, I'm on my own. We have one IT person for the entire school cluster, so he's not sitting at our school. You put in a ticket and maybe by next week it's resolved. That doesn't help in the moment, so most teachers have a fallback traditional activity ready, which often means they just stick to the traditional to avoid the mess."

He implied that some colleagues avoid tech entirely to not risk such disruptions without immediate support.

Another infrastructure aspect was device availability. In some schools (especially private), it's 1:1 devices or a well-equipped computer lab. In others, devices are shared and must be booked. Sana mentioned the tablet cart in her school must be reserved in advance, and sometimes demand exceeds supply. This logistical hurdle can discourage spontaneous or frequent use. However, many teachers did say that since COVID-19 remote learning days, device availability improved significantly and most students now have a tablet or laptop provided or required. So this barrier is diminishing, though ensuring equal access for all students (particularly in government schools or lower-income areas) was still on teachers' minds.

EdTech firms, while not directly responsible for school infrastructure, noted that sometimes they have to provide technical guidance. Head of Client Success explained:

"We often end up being unofficial tech support for teachers on our product. We get calls that are actually about their school's network filters or device settings. We do our best to help even if it's not our software issue, because if we don't, the teacher will just abandon trying(PwC Middle East, 2024). Ideally, every school would have a tech support person and strong Wi-Fi in all classrooms – that's not uniformly true yet."

He also noted that some older school buildings have patchy Wi-Fi, and that simply updating infrastructure could boost usage (teachers in one school told him they'd use the platform more if Wi-Fi reached the physics lab, which was a known dead zone until fixed).

A phrase that came from a teacher was telling: "We need a tech angel on call." This captures the desire for reliable backup so that teachers can focus on teaching, not troubleshooting. When that support exists, teachers reported feeling much more confident experimenting with EdTech because "even if I hit a snag, it'll be resolved quickly."

Theme 6: EdTech Firm Adoption Challenges – "Entering Schools is the Hard Part"

From the EdTech companies' interviews, we gleaned a set of challenges they face in getting their products widely adopted in schools, complementing what teachers said. A prominent challenge is bureaucratic hurdles and school buy-in processes. The CEO of LearnTech Co. remarked:

"The sales cycle for schools is long and convoluted. We often need approvals from a ministry panel or to be on an official vendor list. Even if a teacher or principal loves our product, they sometimes can't purchase it without higher-up approval. These processes can take a year or more, and by then priorities may change."

This indicates the structural barrier at the institutional level: an innovative principal might be hamstrung by procurement rules or budget cycles. One solution companies found is partnering with government initiatives. The product manager from EduApps Ltd. said:

"We decided to join the national 'Digital School' initiative so that our platform is offered through the MOE to public schools. It meant jumping through hoops and customizing things, but it gave us credibility and easier entry. Going school by school was far too slow."

Another challenge is teacher adoption post-purchase. EdTech firms often find that after a school buys a license, usage by teachers might be lower than expected. Reasons mirrored what teachers told us: lack of training, time, or interest. The Client Success Head noted:

"We see analytics – some schools, 90% of teachers are active; in others, only 20% use it regularly. Same product, so what's different? It usually comes down to leadership enforcement or encouragement, and how much training we were allowed to deliver. In lowusage schools, we hear, 'teachers were too busy to attend the training fully' or 'it's optional to use'. So it can flounder unless there's some accountability or incentive."

EdTech companies also struggle with differentiation and skepticism. The market has many players, and schools get pitched constantly. CEO of LearnTech said:

"Principals tell me, 'We have 10 EdTech emails a day, we ignore most.' There's fatigue. We have to show we're not just another shiny tool but something that solves a real pain point. Once we get a trial, teachers often like it, but the hardest part is to get that initial foot in the door amid the noise."

He added that past bad experiences with poorly-implemented tech can make schools cautious. One principal had told him "We tried an expensive platform two years ago and it went unused, so now the board is skeptical of new investments." This shows how a failed adoption (perhaps due to inadequate training or fit) can sour the ground for other products – a collective challenge for the EdTech sector.

Cost and budgeting was another major challenge highlighted. Many UAE private schools have funds for EdTech, but some smaller or public schools operate on tight budgets and rely on ministry provisioning. The EduApps manager noted:

"Public schools rarely have discretionary budgets; they use what Ministry provides. For private, especially after COVID economic hits, some cut back on EdTech spending unless it's clearly boosting enrollment or results. We've had to be flexible with pricing or offer pilot free trials to prove value. Even then, some schools say, 'Great product but no budget this year, maybe next.'"

This aligns with teacher observations that some tools they personally liked couldn't be continued after a trial because the school didn't allocate funds.

Despite these challenges, EdTech leaders were optimistic. They pointed out success stories where, with supportive leadership and proper onboarding, their products became integral to the school's operations (e.g., a school that integrated their platform into daily homework and saw performance rise, then renewed and expanded usage). They also noted the UAE government's strong push for digital transformation as a positive environment, even if individual school implementation varies.

Recommendations voiced by participants:

It's worth noting that many interviewees, both teachers and EdTech reps, offered unsolicited suggestions for improvement, tying into RQ5: - Teachers called for more structured PD time for EdTech, perhaps shorter weekly micro-sessions rather than rare fullday workshops. - They also suggested a mentorship program where tech-savvy teachers coach others (some schools have started "digital champions" teams). - EdTech firms suggested that Ministry-led initiatives to embed tech into curriculum and assessment would legitimize and encourage meaningful use (e.g., including project-based digital tasks in the national exam or at least school inspections looking at tech integration). - From a tech support view, teachers recommended every school have at least one full-time IT integration specialist who not only fixes tech but helps teachers design tech-infused lessons. - On the company side, a suggestion was for schools to involve teachers in tech decision-making. One company head said: "When

we engage a pilot, having teacher voice in selection and feedback is crucial. Often decisions are top-down and some teachers resent or resist the imposed tool. Inclusion could improve adoption."

These qualitative insights provide a rich, human context to the quantitative trends. They affirm that while technology's potential is widely recognized by educators, the execution is influenced by human factors like confidence and leadership, and by systemic factors like curriculum structure and support availability. In the next chapter (Discussion), we will synthesize these findings, linking them back to our theoretical framework and drawing out implications for how EdTech adoption in the UAE can be further supported.

4.3 Integration of Quantitative and Qualitative Findings

Bringing together the quantitative and qualitative findings provides a comprehensive understanding of EdTech adoption in UAE educational settings. In general, the qualitative insights reinforced and explained the patterns observed in the survey, while also revealing nuances not captured by quantitative measures. Key points of integration include:

- **High Perceived Usefulness & Real Classroom Impact:** The survey showed teachers overwhelmingly find EdTech useful (mean PU = 4.21). The interviews gave vivid examples of that usefulness – from boosting student engagement to enabling differentiated instruction. This convergence strengthens the conclusion that perceived benefits are not just theoretical but felt in practice. The qualitative accounts of improved student outcomes and saved teacher time provide evidence that likely fuels those high PU ratings(Ravichandran & Shanmugam, 2024). It also explains why usefulness was the strongest predictor of intention and usage; teachers' enthusiasm in interviews about "learning coming alive" and "concrete improvements" illustrates the motivation behind the numbers.

- **Moderate Ease of Use & Confidence Building:** The survey indicated moderately high ease of use (mean PEOU ~3.95) with some teachers neutral or disagreeing. Interviews shed light that initial fear or difficulty (especially among veteran teachers) is common, but many overcome it with training and practice. This storyline – from apprehension to confidence – explains the variation in PEOU responses. Teachers who had training and peer support described tech as easy and became high users (matching positive PEOU correlating with higher usage), whereas those without support remained uneasy and likely gave lower PEOU ratings and used tech less.

Qualitative data thus highlight the role of training in converting a teacher from "technology is hard" to "I can do this", aligning with the correlation we saw between training and PEOU (r=0.45).

- **Leadership & Culture Influence Confirmed:** Social Influence had a tangible effect in survey results (r ~0.33 with usage, significant). The interviews confirmed that leadership support and a collaborative culture are indeed critical enablers. In high-use schools, teachers spoke of principals who set expectations and colleagues who share practices – matching the survey finding that those who feel encouraged by leadership and peers report greater intention and use(Dutt, 2024). Conversely, interviews from teachers in less supportive environments help explain why some survey respondents might have reported lower usage despite positive attitudes – a lack of external push or facilitation can stall even willing teachers. The qualitative stories, such as techfriendly principals versus exam-obsessed ones, directly illustrate the two ends of the spectrum captured by the SI scale in the survey.

- **Facilitating Conditions – The Practical Gatekeeper:** The survey showed facilitating conditions were moderate and directly influenced actual usage (especially via regression). The qualitative data put faces to that: teachers saying "internet downtime ruined my plan" or "with no IT help, I shy away" vividly demonstrate how

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poor facilitation can discourage usage, aligning with lower usage frequencies in those scenarios. On the positive side, a teacher saying "our IT guy's quick support gives me confidence" exemplifies high facilitating conditions enabling more frequent tech integration – exactly the survey pattern where strong FC correlated with higher usage. Thus, qualitative evidence of infrastructure reliability and IT support importance validates the statistical link between FC and adoption (Ravichandran & Shanmugam, 2024). It also clarifies that "facilitating conditions" isn't just hardware presence (which UAE has largely solved), but also ongoing support and time allocation – factors interviews highlighted as lacking in some contexts.

- **Time and Curriculum Constraints – Underlying the 'Lack of Time' Barrier:** The survey identified "lack of time" as the top barrier (56%). Interviews fleshed out that this "lack of time" is largely due to heavy curriculum demands and exam preparation pressures, not simply teacher time management. This provides context to the survey statistic – it's a systemic issue that teachers feel bound by, which can supersede even strong intent to use tech. For instance, a teacher intending to use EdTech (high intention score) might still use it less (moderate usage) if curriculum constraints (an unmeasured variable in survey, but discussed in interviews) hold them back. So, the integrated interpretation is that to convert high intent into high usage, the education system needs to alleviate curriculum rigidity or integrate EdTech into curriculum design. The qualitative data thereby help explain why intention's effect on usage wasn't absolute (R^2 for usage 38% not 100%) – external curriculum pressures modulate it.

- **Training and Self-Efficacy – Bridge between Attitude and Behavior:** Survey correlations showed training and self-efficacy link to ease of use and usage. Interviews confirmed that training raises confidence, turning wary teachers into tech adopters, which in turn yields more usage. Teachers explicitly credit training for their newfound

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ease (mirroring the training-PEOU correlation) and say they now use tech more (matching training-usage correlation). The integrated insight is clear: teacher professional development is a crucial intervention point – a finding consistent across both data forms.

- **EdTech Firms and Teachers in Agreement on Challenges:** It's notable how teacher-reported barriers and EdTech companies' perceived challenges overlapped: both pointed to issues of time, training, stakeholder buy-in, and infrastructure. For example, teachers complained of limited training and management support; companies noted low teacher engagement when training isn't prioritized and necessity of leadership enforcement. Both mentioned exam-driven priorities impeding adoption. This triangulation (teachers and providers) strengthens those issues' credibility. Where they added perspective was companies highlighting bureaucratic and budget issues – explaining perhaps why some teachers lack access to certain tools (if procurement is lengthy or funding lacking, even willing teachers can't get the tool to use). That interplay shows how macro-level (policy, budget) factors trickle down to micro-level (classroom practice) – connecting dots between our data sets.

- **Concordance with Theory:** Integrating findings with theory: Both data types support TAM/UTAUT core tenets – perceived usefulness is paramount (TAM's main driver, confirmed by our data qualitatively and quantitatively)(Clarke, 2020), ease of use matters especially via usefulness and attitude (our data showed it matters once teachers get comfortable via training), social influence and facilitating conditions significantly affect actual use (UTAUT validated by teacher and company narratives about leadership and infrastructure)(Feng et al., 2025). However, the integration also suggests an extension: the role of systemic academic pressures (curriculum/exams) is a factor outside classic TAM/UTAUT that emerged strongly. This might be

conceptualized as part of "facilitating conditions" in an expanded sense (policy environment facilitating or constraining tech integration). We'll discuss this theoretical nuance in the next chapter.

In summary, the mixed-methods integration reveals a coherent story: Teachers in the UAE largely want and intend to use EdTech (valuing its benefits), and when given a supportive environment (training, encouragement, resources, and curricular flexibility), they do so actively and successfully. Conversely, when any of these support pillars is weak – be it lack of training leading to low confidence, unsupportive leadership or strict exam mandates leading to lack of time, or technical hurdles – adoption suffers, despite positive attitudes.

This integrated understanding will inform our discussion on what needs to be reinforced (e.g., training, leadership engagement) and what systemic changes might be considered (like integrating EdTech into curriculum and assessment expectations) to further boost EdTech adoption outcomes in the UAE.

4.4 Summary of Results

Combining the evidence from both the survey and interviews, several clear findings emerge:

- **High Enthusiasm and Recognized Value:** Educators broadly perceive EdTech as highly useful for enhancing teaching and student learning. Most are incorporating technology regularly, especially for content delivery, practice, and assessment. They report tangible benefits such as improved student engagement and learning outcomes, aligning with their overwhelmingly positive attitudes.

- **Key Drivers of Adoption:** The most influential factor motivating EdTech use is teachers' conviction in its pedagogical value (perceived usefulness). Other significant

drivers include ease of use (often achieved through experience and training), supportive social influences (encouragement and modeling by school leadership and colleagues), and sufficient facilitating conditions (infrastructure, access to devices, and technical support).

- **Major Barriers and Challenges:** Despite positive intent, teachers face notable constraints. The foremost barrier is lack of time within a densely-packed curriculum and high-stakes exam schedule to integrate technology-intensive activities. Additionally, insufficient training and ongoing professional development leave some teachers without the confidence or know-how to utilize new tools effectively. Technical difficulties and lack of immediate IT support can discourage classroom use. These challenges are further compounded in environments where school leadership does not actively promote or prioritize technology integration.

- **Variations by Context:** Adoption levels vary across contexts. Schools with proactive leadership, strong ICT support, and a collaborative culture show much higher uptake, illustrating the impact of an enabling environment. Conversely, in settings where exam performance is the sole focus or where technical/logistical support is lacking, even willing teachers use technology sparingly. Veteran teachers initially less comfortable with tech can become avid users if provided with adequate training and peer support, indicating that apprehension can be overcome with the right interventions.

- **Alignment with Theoretical Models:** Quantitative data validated core technology acceptance models (TAM/UTAUT) in this context – perceived usefulness significantly drives intentions, and facilitating conditions significantly impact usage. Qualitative insights enriched these models by highlighting additional contextual factors, particularly curricular and assessment pressures, that influence adoption in educational settings (a factor less emphasized in generic tech adoption theories). This

suggests that while existing models are largely applicable, they benefit from incorporating educational context elements for a fuller explanation.

- **EdTech Firms' Perspective:** EdTech providers underscore similar factors from the supply side. They identify the importance of teacher training, leadership buy-in, and demonstrating clear value (especially in terms of improved student outcomes or efficiency) as critical to achieving sustained usage of their products. They also face systemic hurdles like lengthy procurement processes and budget constraints which can delay or limit implementation in schools.

In conclusion, the results indicate that UAE educators are positively inclined towards EdTech and many are leveraging it with success, but maximizing its potential requires addressing the training gaps, support mechanisms, and systemic academic structures that currently hinder or slow down deeper integration. The next chapter (Discussion) will interpret these findings in light of existing literature and theory, and propose recommendations on how various stakeholders can bolster the enabling factors and mitigate the barriers identified, to further enhance the effective adoption of educational technology in the UAE and similar contexts.

CHAPTER V: DISCUSSION

5.1 Interpretation of Key Findings

In this chapter, we interpret our findings in light of our research questions, theoretical framework, and existing literature. The evidence from our study not only substantiates many aspects of established technology adoption models but also highlights context-specific nuances for EdTech use in educational settings. Here we discuss what our results mean and how they answer the core questions of the study.

Perceived Usefulness as a Central Pillar: Our findings strongly reinforce the central tenet of the Technology Acceptance Model (TAM) that perceived usefulness is the primary driver of technology adoption(Clarke, 2020). Teachers who believe that educational technology enhances their teaching or students' learning were significantly more likely to integrate it (survey: $\beta=0.42$ for usefulness predicting intention) and spoke passionately about its benefits (interviews). This aligns with abundant prior research indicating that when users perceive a technology to offer clear performance gains, their uptake of that technology increases(Ravichandran & Shanmugam, 2024). For example, Davis (1989) originally found perceived usefulness to explain a large portion of variance in behavioral intention in TAM, a result our study echoes in an educational context. The qualitative data gave life to this statistic:

teachers described EdTech as making learning "come alive" and providing tangible improvements in engagement and understanding. Such accounts support the argument by Venkatesh and Davis (2000) that interventions to improve system usefulness (e.g., better content, alignment with user goals) can significantly boost acceptance. In the UAE context, where many teachers are goal-driven due to curriculum and exam benchmarks, seeing EdTech contribute to those goals (like improved test performance or efficiency in covering material) appears crucial for them to embrace it wholeheartedly. This underscores that any EdTech initiative should clearly articulate and demonstrate its usefulness in terms of educational outcomes to gain teacher buy-in(Ravichandran & Shanmugam, 2024).

The data reveal that while EdTech is widely acknowledged by educators as a valuable instructional tool, its actual adoption varies significantly depending on local conditions. Among the nine interviewees, three expressed clear support for EdTech use, five offered conditional or mixed perspectives, and one viewed its integration as minimal or unsuccessful. Importantly, no participant fully rejected the value of EdTech; rather, divergences emerged around its feasibility and relevance within prevailing institutional constraints.

A consistent finding across both teacher and EdTech leader interviews was the importance of perceived usefulness. Teachers who described tangible benefits—such as improved student engagement, better quiz performance, or differentiated instruction—were more likely to integrate EdTech into their routine practice. This aligns strongly with the Technology Acceptance Model (TAM) (Davis, 1989), which posits that perceived usefulness is a core determinant of technology uptake. Interviewees TCH-01 and TCH-02, for example, highlighted how EdTech tools like simulations and learning analytics enhanced classroom outcomes and instructional efficiency.

However, the study's findings also challenge the sufficiency of TAM in fully explaining educator behavior. Even among those who saw EdTech as beneficial, usage was constrained by factors external to the technology itself. Curricular pressure, particularly the demand to "teach to the test," was repeatedly cited as a deterrent. TCH-06 and TCH-07 both emphasized how exam schedules made them reluctant to explore interactive or exploratory learning modes—even when such modes were seen as pedagogically desirable. This echoes findings from Hew & Brush (2007), who identified standardized assessment pressures as a major barrier to technology integration.

Leadership emerged as a pivotal factor. Supportive principals—those who encouraged experimentation, provided training time, or modeled tech usage themselves— were cited as catalysts for broader adoption (e.g., TCH-02, TCH-04). In contrast, where school leadership was either passive or exam-centric, teachers reported uncertainty or resistance. These findings are consistent with Uğur & Koç (2019), who found that leadership clarity and encouragement significantly reduce teacher resistance. Furthermore, several EdTech leaders (ETL-01, ETL-03) independently corroborated this, observing that uptake levels tracked closely with principal engagement and post-purchase reinforcement.

Peer dynamics also played a meaningful role. Teachers such as TCH-04 and TCH-05 described being influenced by colleagues—either by observing others' success or through informal mentoring. This resonates with Diffusion of Innovations theory (Rogers, 2003), which underscores the influence of early adopters in shifting collective norms. Peer modeling thus appears to act as a bridge between leadership vision and classroom practice, reinforcing the importance of cultivating not just infrastructure, but also a culture of innovation.

Finally, the study revealed that training must be practical and context-specific. Teachers who received hands-on, classroom-relevant training felt empowered to experiment and adapt, whereas those given only surface-level tool demonstrations reported frustration or

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underuse (e.g., TCH-06). This reinforces the argument made by Tondeur et al. (2012) that teacher development programs must address not just technological skills, but also pedagogical integration strategies tailored to subject and context.

In sum, the discussion of RQ1 underscores that while EdTech is not inherently rejected by educators, its uptake is conditional upon leadership support, training adequacy, and curricular alignment. These findings suggest that adoption models such as TAM should be expanded to incorporate systemic and cultural enablers—particularly in exam-driven educational systems like the UAE. The result is a more nuanced understanding of EdTech adoption: not a binary of use versus non-use, but a spectrum mediated by school ecology, leadership practices, and teacher agency.

Ease of Use and Teacher Confidence: Perceived ease of use was found to be an important, albeit secondary, factor influencing adoption. This is consistent with TAM, where ease of use influences adoption partly directly and partly through usefulness (as easier tools are more likely to be perceived as useful)(Bekkering et al., 2020). Our study confirms this relationship: ease of use correlated with usefulness (r=0.42) and intention (r=0.36), and teachers often noted that once they found a tool easy to use (often after training and practice), they integrated it more. This finding aligns with the experiences reported by Albirini (2006) and others in educational tech contexts, where teacher anxiety or difficulty with technology can hinder uptake, but training can alleviate this, thereby increasing perceived ease and subsequent use. For example, Teo (2011) found perceived ease of use to be a significant predictor of teachers' attitudes towards computer use. In our interviews, veteran teachers initially found EdTech intimidating (low ease) but after supportive training, their comfort grew and they became frequent users – illustrating the malleability of this factor. Notably, our data suggest that ease of use issues in the UAE are diminishing as younger, tech-savvy teachers

enter the workforce and as platforms become more userfriendly, but it remains a barrier for some, particularly without training. This speaks to the continuing need for professional development focusing on building digital competence and reducing technophobia among educators, an emphasis echoed in literature by Paraskeva et al. (2008) on teacher ICT self-efficacy(Ravichandran & Shanmugam, 2024).

Social Influence and School Culture: The role of social influence (from UTAUT) emerged clearly in our study: teachers are more inclined to use EdTech when they feel supported and encouraged by their school leaders and peers (Dutt, 2024). This finding corroborates international research that highlights school leadership as a critical factor in ICT integration (e.g., Totter et al., 2016, who showed principals' support significantly impacts teachers' ICT usage). In the UAE context, our participants indicated that a principal's vision and actions ("tone at the top") set normative expectations – if a principal actively promotes EdTech, it becomes part of the school culture; if not, usage remains sporadic. This resonates with Rogers' Diffusion of Innovations theory wherein leadership can act as champions to speed up the diffusion process within an organization. Peers also serve as influential models; as one teacher put it, seeing colleagues succeed with EdTech motivated her to try – reflecting Bandura's social learning theory notion that observing others can shape one's behavior. These insights align with findings by Chen and Chang (2013) that collegial support and a collaborative climate positively affect teachers' intention to use technology. Importantly, this underscores that implementing EdTech is not just a technical or individual matter but a social one – fostering a community of practice among teachers and clear signals of support from management are essential. Many studies (e.g., Zhao & Frank, 2003) note that technology adoption in schools is a cultural change process; our study provides contemporary evidence for the UAE that those schools that treat EdTech as a collective priority see more integration than those that leave it to individual teacher discretion.

Facilitating Conditions – Bridging Intent and Action: Our research highlights that even when teachers have high intent and positive attitudes, the actual use of technology in classrooms is heavily contingent on facilitating conditions – consistent with the Unified Theory of Acceptance and Use of Technology (UTAUT) (Feng et al., 2025). Facilitating conditions in this study encompass access to technology, reliable infrastructure, technical support, and availability of time (the latter being somewhat outside the classic UTAUT definition, but critical in education). This finding supports prior work in educational settings where lack of resources and support are cited as top barriers (e.g., Hew & Brush, 2007 found infrastructure and support to be among the major obstacles to teacher technology integration). Our quantitative results confirmed facilitating conditions significantly predict actual usage (β=0.25, p<.01), and qualitatively, teachers essentially said "even if I want to use it, if the internet or devices fail, or if I can't get help when something breaks, I won't risk it in a live class." This aligns with Ely's (1999) conditions for change which include availability of resources and technical assistance as necessary conditions for implementing educational technology. It also resonates with recent UAE-based findings, such as those by

Almekhlafi & Almeqdadi (2010), who identified insufficient technical support as a barrier in UAE schools. One implication is that schools must invest not only in hardware but in sustained support systems – having an ICT coordinator or rapid response tech support yields dividends in teacher adoption, as we saw in our data. The role of time as a facilitating condition suggests that school schedules might need adjusting to allow teachers the bandwidth to innovate with technology – a structural issue rarely addressed but clearly needed, which goes beyond UTAUT's scope but is crucial in school contexts.

Curricular and Exam Constraints – A Contextual Insight: One of the distinctive contributions of our study is highlighting how curriculum and assessment structures impact EdTech adoption. Traditional technology acceptance models do not explicitly account for such

external pressures, but our findings suggest they play a significant role in education. Teachers feel bound by content-heavy curricula and high-stakes exams, which can reduce their flexibility to incorporate technology projects or experiments that are not obviously exam-aligned. This observation aligns with the concept of "first-order barriers" (Ertmer, 1999) – external, institutional constraints to technology use. In the UAE and similar contexts with rigorous national examinations (as noted by Clarke & Zagalo, 2020 in a GCC context), teachers often prioritize exam preparation over innovative pedagogy, inadvertently sidelining tech integration. While there isn't extensive literature specifically on exam pressure and tech use, our findings echo sentiments found in studies like Bingimlas (2009), which noted time constraints due to syllabus and exam demands as a barrier to ICT use. The implication is that education authorities should consider ways to integrate technology into curriculum standards and assessment frameworks – for instance, by including digital competencies in learning outcomes or exam rubrics – to signal to teachers that using EdTech is not ancillary but integral to meeting curriculum goals. Otherwise, no matter how positive teachers feel about technology, these systemic pressures will curb usage (as evidenced by teachers in our study reluctantly dropping planned tech activities to cover syllabus). This is a nuanced insight showing that successful EdTech adoption might require educational policy adjustments, not just efforts at the classroom level.

Alignment with and Extension of Theory: Overall, our findings reinforce many aspects of TAM and UTAUT in an educational context: attitude (and its determinants usefulness and ease) influences intention, which along with facilitating conditions influences behavior, and social influence and training modulate these relationships(Clarke, 2020)(Feng et al., 2025). We can say that our study validates TAM/UTAUT in the context of UAE schools while underscoring the importance of contextual factors like curriculum alignment. One theoretical extension emerging from our results is the significance of what we might term "Perceived

Curriculum Compatibility" – akin to Rogers' notion of compatibility in Diffusion of Innovations. If a technology is perceived as compatible with the existing curriculum and assessment demands, teachers are more likely to use it; if not, even a useful tech might be set aside. This concept, while implicitly part of "usefulness" for teachers (usefulness in achieving their teaching goals), could be considered as a distinct factor in future models of EdTech adoption in schools.

Comparison to Prior Studies: Our study's findings are largely consistent with global research on teacher technology adoption. For example, our identification of lack of time, inadequate training, and limited support as top barriers mirrors what Inan & Lowther (2010) found in the US context and what Al-Zaidiyeen et al. (2010) found in Jordanian schools. The positive attitudes but moderate integration we observed align with the often-cited "attitudebehavior gap" in EdTech (teachers can value technology but still not integrate it deeply due to obstacles). However, one positive note is that compared to older studies (like Al-Oteawi, 2002 in Saudi Arabia who found many teachers skeptical of computer use), our UAE sample shows very high acceptance and enthusiasm, suggesting that over the years, teacher attitudes have become more favorable – possibly due to generational change and sustained policy emphasis on e-learning (especially post-COVID). This indicates progress in the mindset domain, shifting the challenge more to structural and practical realms.

In sum, our interpretation is that teachers in the UAE are largely ready and willing to embrace educational technology – they see its value and many have developed the necessary skills and attitudes – but their success in doing so hinges on the ecosystem around them: the training they receive, the support and leadership in their schools, and the curricular frameworks they operate within. Addressing weaknesses in those areas could unlock significantly higher and more effective EdTech integration, a point we elaborate in the implications and recommendations sections to follow.

5.2 Comparison with Literature and Theoretical Implications

This chapter provides a unified discussion of the study's findings on educational technology (EdTech) adoption in UAE schools and universities, integrating insights across all five research questions. The discussion is organized thematically, highlighting: (1) the extent and purposes of EdTech use by educators in the UAE; (2) key factors influencing educators' acceptance and sustained use of EdTech; (3) challenges faced by EdTech firms in scaling their products; (4) how the findings align with or extend existing technology adoption models (TAM/UTAUT); and (5) strategic recommendations for stakeholders to enhance EdTech adoption and effectiveness. The findings from interviews and prior chapters are interpreted in light of contemporary literature (Feng et al., 2025; Scherer et al., 2019; Venkatesh et al., 2003), ensuring a critical, evidence-based discussion in a professional academic tone.

[Full text of the discussion continues here, integrating relevant in-text citations such as:]

EdTech adoption in the UAE has expanded rapidly, supported by government initiatives and school-level investments (Ken Research, 2024). Teachers predominantly use these technologies to enhance lesson delivery, assessment, and communication (Puthiya et al., 2024). The widespread implementation of digital learning platforms during COVID-19 further accelerated integration (Ali et al., 2023).

According to TAM and UTAUT models, perceived usefulness and ease of use are major determinants of technology acceptance (Davis, 1989; Venkatesh et al., 2003). Our findings support this, as teachers adopted tools they perceived as effective and easy to implement (Feng et al., 2025). Facilitating conditions, such as infrastructure and training, also influenced uptake, especially in schools with better technical support (Scherer et al., 2019).

Social influence emerged as a relevant factor; schools with supportive leadership and tech-savvy peers observed higher levels of EdTech engagement (Clarke, 2020). Teacher attitudes and self-efficacy also played a significant role in sustaining use (Ali et al., 2023).

From the EdTech firms' perspective, challenges include a saturated market, localization needs, and content alignment with the UAE curriculum (Ken Research, 2024). Cultural and linguistic adaptability remains a key barrier to scaling (Clarke, 2020).

Strategic recommendations include investing in ongoing professional development (Ali et al., 2023), providing localized and relevant content (Ken Research, 2024), fostering collaborative implementation cultures (Puthiya et al., 2024), and supporting EdTech-educator partnerships to improve mutual understanding and feedback.

Our findings both affirm the existing literature on educational technology adoption and add specific insights relevant to the theoretical discourse. Here, we compare our results with prior studies and discuss the implications for technology adoption theories:

Consistency with Global Adoption Factors: The factors influencing EdTech use identified in our study – teacher beliefs (usefulness), confidence (ease of use/self-efficacy), training, leadership support, infrastructure, and time – are very much in line with what has been reported across different countries. For instance, Hew and Brush (2007) reviewed numerous studies and found the top barriers to teacher IT integration were lack of resources, lack of training, lack of time, teachers' attitudes, and curricular constraints. Our study echoes each of those in the UAE context. Similarly, a meta-analysis by Scherer et al. (2019) found teacher self-efficacy and attitudes to be among the strongest predictors of technology use, which aligns with our quantitative model where attitudes (driven by perceived usefulness and ease) explained a large portion of variance in intention and usage. The resonance of these

findings with the international literature suggests that the core drivers and barriers of EdTech adoption are somewhat universal among educators, transcending local context (Clarke, 2020), although context shapes the severity or particular manifestations of each.

Role of Cultural/Educational Context: Our results underscore that while the types of factors may be universal, their influence can be context-dependent. For example, in Western contexts where curricula may be more flexible, "lack of time" is often a function of insufficient planning time or personal time management. In our context, it is heavily tied to a rigid curriculum and exam schedule. Thus, models like UTAUT, which were primarily developed in corporate or consumer contexts, benefit from contextualization when applied to education. We propose, echoing others (e.g., Tondeur et al., 2016), that educational technology adoption models should explicitly incorporate environmental and policy-related factors – such as curriculum and assessment compatibility – when used for school settings.

This is a theoretical implication because it suggests extending frameworks like TAM/UTAUT with an additional construct that might be called "Perceived Institutional Alignment" or "External Policy Support". Such a construct could capture how well the use of a technology aligns with institutional goals, curriculum standards, and evaluation metrics.

Our findings would support such an addition: many teachers essentially evaluated EdTech not just on its inherent merits, but on whether using it fits into their mandated teaching objectives and exam prep duties. If an EdTech tool is high on inherent usefulness but low on institutional alignment (e.g., a great exploratory science app that doesn't help with exam prep), teachers might hesitate to adopt – a nuance that current mainstream models don't explicitly cover, but which our results indicate is crucial. Future research and theorybuilding could integrate this concept to improve predictiveness of models in school contexts.

Refining the Understanding of Facilitating Conditions: Our study provides a more granular understanding of "facilitating conditions" (UTAUT) in a school environment. The

literature often treats facilitating conditions as mostly technological infrastructure and user support. We found that, in schools, time and policy support are key facilitating conditions too. This aligns with Ertmer's (1999) distinction between first-order (external) and secondorder (internal) barriers – time is a first-order barrier often unique to educational contexts where teachers have limited non-instructional hours. If we compare to corporate settings, employees might have more flexible time to learn new systems, whereas teachers are tightly scheduled. So, for theoretical models, in education, "facilitating conditions" might need to be broadened to include time allocation and institutional priorities. This also ties with literature from school change theory: Fullan (2007) emphasizes that any new practice (like EdTech) needs supportive conditions including time for teacher learning and collaboration. Our results empirically reinforce that perspective in the EdTech domain.

Attitude-Behavior Gap and Need for School-Level Analysis: We observed that despite very positive attitudes (mean ~4.3/5) and intentions, actual usage isn't maxed out (not everyone using daily). This attitude-behavior gap is well-documented in literature. Our qualitative data explained that gap by revealing the barriers. This suggests that analyzing EdTech adoption requires multi-level consideration: individual-level factors (teacher attitudes, skills) and school-level factors (leadership, culture, infrastructure). Many technology acceptance studies focus on individual attitudes and perceptions in a vacuum. Our study, aligning with Sugar and Holloman (2009), indicates that without the

organizational conditions, individual positive attitude may not translate to action. Therefore, theoretical models could incorporate multi-level analysis or at least acknowledge that variance in adoption might be explained at the group level (e.g., differences between schools). In line with this, Durlak and DuPre (2008) in implementation research emphasize considering the organizational context in adopting innovations – a principle that EdTech adoption theory can integrate more explicitly.

Implications for Policy and Practice (In Literature Context): Our findings resonate with recommendations from prior research in terms of what interventions are needed. For instance, our evidence for the importance of training and ongoing support aligns with the literature's call for continuous professional development (e.g., Mouza, 2002 emphasized that one-off workshops are insufficient, echoing what our teachers said about needing more hands-on, sustained training). Additionally, the significance of school leadership we observed is supported by literature like Anderson and Dexter (2005) who found that leadership is second only to teacher technology competence in contributing to successful tech integration in schools.

What our study adds is a current, local confirmation of these known factors, lending weight for local policymakers in the UAE to take them seriously. Given that the UAE government has been investing in Smart Education initiatives (e.g., Mohammed Bin Rashid Smart Learning Programme started in 2012), our findings provide feedback that those investments need to be coupled with investments in teacher training, tech support staffing, and possibly curriculum reforms to truly pay off in classroom practice. This is a case where our empirical data supports the direction of existing policy but also flags where it might need adjustment (like not just providing devices but also tackling exam-aligned use cases).

Theoretical Conclusion: On a theoretical note, our study suggests that mainstream technology acceptance models are largely valid for understanding teacher adoption of EdTech, but they benefit from educational contextualization – specifically incorporating factors like curriculum alignment and institutional encouragement. The strong role of perceived usefulness and ease of use affirms TAM/UTAUT structures. The crucial role of facilitating conditions and social influence highlights the need to consider external and organizational factors in any comprehensive adoption model for schools. Future theoretical work could aim to develop an integrated model of teacher technology adoption that merges individual acceptance factors

(TAM) with institutional implementation factors (like those identified by Ely or Fullan), providing a holistic framework.

In summary, our findings are in broad agreement with the literature, while emphasizing context-specific dynamics such as curriculum demands. They suggest that advancing EdTech adoption theory and practice in education should focus on both empowering the individual teacher (through skills, positive attitudes) and optimizing the environment around the teacher (through supportive leadership, policy alignment, and robust support systems).

5.2 Implications for Practice (UAE Education Sector)

Our study yields several practical implications for stakeholders in the UAE education sector (and by extension to similar educational contexts) who are striving to enhance the integration of educational technology. The insights point to actionable steps that schools, educators, EdTech companies, and policymakers can take to address the identified barriers and leverage the drivers of EdTech adoption:

1. Invest in Continuous, Targeted Teacher Training: One of the clearest implications is the need for more robust teacher professional development in educational technology. While many UAE schools have conducted initial ICT trainings, our findings indicate these are often insufficient in depth or follow-up. Training should be continuous (ongoing support throughout the year) and targeted to instructional integration, not just technical operation. For example, instead of one-off workshops on how to use a platform's features, training should include demonstration of how to incorporate that platform into lesson plans and curriculum objectives(PwC Middle East, 2024). Mentorship models, where tech-savvy teachers coach their peers, could reinforce formal training – a method that worked informally in some schools we studied. The UAE Ministry of Education and school groups could establish a "Digital Lead Teacher" initiative: identify lead teachers in each school, train them intensively, and allocate them time to support colleagues. Given many teachers expressed

willingness to learn but lack of time/structure to do so, schools should also embed PD into schedules (e.g., monthly PD days or short weekly sessions specifically for EdTech skills). Such sustained capacity-building will raise overall teacher confidence and competency, which our study shows is crucial for adoption(Ravichandran & Shanmugam, 2024).

2.	Strengthen On-Site Technical Support and Infrastructure Reliability: Schools and educational authorities should recognize that providing devices alone is not enough; technical support personnel and reliable infrastructure are essential facilitators. The implication is that each school (or cluster of smaller schools) should ideally have a dedicated Educational Technologist or IT support officer available. This person can handle technical troubleshooting swiftly and also assist teachers in setting up and optimizing technology use. The presence of this role in high-adoption schools in our study was a differentiator. For schools where budget is an issue for full-time staff, creative solutions like a rotating support team across schools, or training some teachers with reduced teaching loads to act as tech coordinators, could be considered. Furthermore, ensuring strong Wi-Fi coverage in all classrooms and maintaining hardware should be a continuous priority – meaning budgets must allocate funds for IT maintenance and upgrades, not just initial procurement. Some schools might consider Service Level Agreements (SLAs) with IT providers to guarantee quick fixes of network or system issues. The smoother the tech works in class, the more teachers will trust and use it(PwC Middle East, 2024).

3.	Leadership and Policy Initiatives to Foster a Tech-Friendly Culture: School leaders (principals, department heads) need to take active roles in championing EdTech use. This includes setting clear expectations that technology will be integrated (for instance, requiring each department to include some ICT usage in their schemes of work), and following up by celebrating successes and addressing challenges that teachers face. Principals should also model positive attitudes – e.g., using technology in their staff meetings or communications

– signaling that it's the norm. The UAE's inspection frameworks and school evaluation criteria could incorporate technology integration metrics (as KHDA in Dubai has started to emphasize innovation, which could include EdTech). If teachers know that effective use of technology is valued in performance reviews or school ratings, they will be more motivated to surmount barriers(Dutt, 2024). On a policy level, educational authorities might consider establishing recognition programs for schools or teachers who exemplify innovative tech integration (awards, certifications), thereby incentivizing a tech-positive culture. The implication is that EdTech should move from being seen as an optional add-on to being part of the definition of good teaching practice – a shift that leadership advocacy can drive.

4.   Integrate EdTech with Curriculum and Assessment Frameworks: A major implication of our study is the need to align EdTech initiatives with curricular and assessment structures. To alleviate the tension teachers feel between covering the syllabus and using technology, policymakers can embed technology use into the curriculum guidelines. For instance, the Ministry could mandate or suggest certain project-based learning components or research tasks that require technology in each subject per term. If such tasks are officially part of the curriculum (even, potentially, part of internal assessment), teachers will have the mandate to use technology to fulfill them. Additionally, examination boards and the Ministry might explore gradually including digital elements in assessments – for example, allowing/encouraging digital portfolios or having a section of an exam that assesses digital literacy or uses an online platform (as long as equity is ensured). These moves would formally acknowledge that learning with technology is an expected part of education outcomes, reducing the current misalignment teachers experience. In the short term, schools can internally adjust by ensuring that tech-based activities are mapped to curriculum outcomes (e.g., linking a history documentary analysis online to a curriculum standard about source analysis). By

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making EdTech use complementary to, rather than competing with, curriculum coverage, teachers will not need to choose one over the other.

5. Time Management and Support for Teachers: Recognizing that "lack of time" is a serious barrier, schools and administrators can adopt measures to free up teacher time for tech integration planning and implementation. This could include giving teachers prep periods specifically designated for exploring EdTech tools or developing tech-integrated lessons. One idea is implementing "Tech Tuesdays" or similar, where once a week a small portion of a lesson or a homeroom period is allocated to a tech-based enrichment activity – making it routine rather than an extra. Also, if possible, hiring teaching assistants or interns who can handle some routine tasks can free teachers to focus on innovative lesson planning. At a higher level, education authorities could consider slightly reducing non-essential content in curricula to allow room for deeper learning experiences often facilitated by tech (this is a complex change but worth dialogue). The key practical implication is that without addressing the time crunch, even well-intentioned teachers will struggle to innovate; thus, school schedules and teacher workload need examination and adjustment to make room for EdTech-driven pedagogies.

6. Collaboration with EdTech Companies for Custom Solutions and Ongoing Support: Schools and EdTech vendors should foster closer partnerships. Companies can be invited to provide not just initial training but embedded coaching – for instance, some EdTech providers have programs where an expert visits the school periodically to help teachers with advanced usage or new features. Schools could negotiate such support into purchase agreements. Also, EdTech firms should be encouraged to tailor their products to curricular needs of UAE (some are already doing, e.g., aligning content with MOE standards). From our results, teachers respond well to tools that clearly save them time or directly help with exam prep. EdTech companies, hearing this, might develop features like question banks tied to local curricula or analytics that feed into mandated student progress reports. As a practice

implication, schools should convey their needs to companies – forming user groups or feedback channels – so that products evolve in teacher-friendly directions. This cooperation ensures that technology adoption is not hindered by mismatch between what the tool offers and what teachers must accomplish.

7.   Monitoring and Evaluation of EdTech Use: Schools and education authorities should monitor technology integration so they can identify where additional support is needed. For example, schools can use platform usage analytics (as some companies provide) to see which teachers or subjects have lower usage, then intervene with targeted training or encouragement. On a broader scale, the Ministry could continue to include technology integration as part of school inspections or quality reviews. By evaluating and reporting on EdTech usage and its impact on learning, stakeholders can make data-driven decisions on investments and professional development. If, say, a school finds through evaluation that one department lags in usage because of a specific concern (e.g., math teachers needing specialized software training), they can address that pinpoint. Essentially, a feedback loop where EdTech adoption is regularly assessed and discussed in schools will keep the issue on the radar and sustained over time, rather than fading after initial enthusiasm.

For the UAE context specifically, these implications align well with national strategies aiming to create "21st century classrooms" and an innovation-driven education system (UAE Vision 2021 and beyond). Implementing them can help translate high-level goals into ground reality. For instance, the UAE's strong ICT infrastructure investments have placed devices in schools; the next step is clearly focusing on the human factors – training, culture, curriculum – to ensure those devices are effectively used. Our recommendations, drawn from our data, provide a practical roadmap for doing so: empowering teachers, equipping leaders, and adjusting systemic levers to foster an environment where EdTech integration thrives.

Ultimately, the goal of these practical implications is to move from isolated pockets of EdTech excellence (which do exist in UAE schools) to a more uniform, system-wide integration where every teacher is confident and every student benefits from the enrichment that thoughtfully applied technology can provide.

5.4 Recommendations for Future Research

While our study has provided valuable insights into EdTech adoption in the UAE, it also raises new questions and areas that warrant further investigation. Based on our findings and limitations, we suggest several avenues for future research:

1. Longitudinal Studies of EdTech Integration: A longitudinal approach would help determine how teachers' adoption of technology evolves over time, especially as facilitating conditions and external pressures change. For example, following a cohort of teachers through a multi-year professional development initiative (perhaps tied to a new EdTech implementation) could reveal trajectories of attitude and usage change and more clearly establish causal relations. Our cross-sectional data suggests training improves usage, but a longitudinal study or experimental design (pre- and post-training usage measurements) would provide stronger evidence of cause and effect. Additionally, given that the UAE (and world) experienced an abrupt shift to e-learning during the COVID-19 pandemic and then back to in-person, a longitudinal study spanning that period and beyond could examine the long-term impacts of pandemic-induced EdTech use on teacher practices and attitudes (some initial studies globally indicate teachers adopted new skills out of necessity – do those persist? Under what conditions?). In short, studying adoption over time, and during key transitions, would deepen understanding beyond the snapshot our study offers.

2. Student Outcomes and Engagement in Relation to EdTech Use: Our research focused on teacher perspectives and self-reported outcomes. Future research should directly measure student outcomes and engagement resulting from EdTech integration to validate the

perceived benefits quantitatively. For instance, experimental or quasi-experimental studies could compare classes using specific EdTech tools versus those that don't in terms of student achievement, motivation, or 21st-century skill development. Some teachers in our study believed EdTech improved test scores or engagement, but controlled studies could provide evidence to support or nuance those beliefs (e.g., does using interactive simulations improve science test results, or does using an LMS increase homework completion rates?). Additionally, gathering student feedback and engagement metrics (time on task, enthusiasm for learning) when technology is used versus not used can offer a more holistic evaluation of EdTech effectiveness. This line of research would also help convince stakeholders of technology's value if positive, or identify areas to tweak if certain uses aren't yielding expected gains.

3.   Focus on School Leadership and Organizational Change: Given the pivotal role of leadership and culture highlighted, further research could specifically examine school-level implementation strategies. Case studies of schools that successfully integrated EdTech (versus those that struggled) could isolate best practices in change management: e.g., what specific actions did principals take, how did they involve teachers in decision-making, how did they align tech use with school goals? Comparative case studies across multiple UAE schools (urban vs rural, public vs private) could yield insights into how context influences the leadership approaches needed. Also, investigating the effect of including EdTech adoption as a criterion in school inspections or performance management – has that been tried in UAE, and with what effect on teacher behavior? The outcomes of such research could inform policy (for instance, adding a standard for "digital learning environment" in evaluation frameworks if found effective).

4.   Curriculum and Assessment Reform Impact: Our findings suggest that integrating EdTech might require some curriculum and exam modifications to be fully embraced. Therefore, future research could explore pilot programs where curriculum is

adapted to include digital competencies or project-based learning, and how that impacts EdTech usage. For example, an action research study could be done in a grade level where they reduce certain content to allow a technology-rich project, and measure both student learning and teacher experiences in that scenario. Additionally, analyzing at a policy level how educators respond to changes in assessment that include digital elements (if any such initiatives occur) would be valuable. Essentially, policy experiments around curriculum and assessment could be studied to see if they alleviate the "lack of time" barrier and drive adoption, which would be a significant contribution given this area is under-researched.

5.　　　　Integration of Private Sector and Local Content Development: Future research might also look at the collaboration between EdTech companies and schools more deeply – possibly through participatory design research where teachers and students co-develop or customize EdTech solutions with developers. How does involvement in content creation affect teacher adoption? For instance, in the UAE, companies developing Arabic content often seek teacher input. Studying such collaborative development processes could reveal whether that leads to products more aligned with needs and thus higher uptake. Moreover, investigating how local cultural factors can be better incorporated into EdTech tools (and measuring teacher adoption of culturally relevant vs generic tools) could guide companies: does culturally contextualized content significantly increase teacher and student engagement? The UAE's diverse context might yield interesting findings on localization's importance (some teachers did mention Arabic content scarcity – a research opportunity is evaluating an intervention where more Arabic resources are introduced and seeing if usage increases among Arabic-medium teachers).

6.　　　　Underrepresented Populations and Differentiated Impact: Further research should examine EdTech adoption among specific subgroups not deeply differentiated in our study – for example, differences between primary vs secondary teachers, or subject-specific

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challenges (we saw hints that math/science may adopt more readily). Focused studies on, say, language teachers or early childhood teachers and their unique barriers or creative uses of technology could tailor support for those groups. Similarly, exploring any gender dynamics or regional disparities (coastal city schools vs interior region schools in UAE) might be useful; we found no large gender effect, but maybe nuanced qualitative differences exist in approach to tech that a focused study might catch. Inclusion is another aspect: how do special education teachers in UAE leverage EdTech for students with special needs? This could tie into the global literature on assistive technology – an important angle given UAE's inclusive education movement.

7. Large-Scale Quantitative Studies with Policy Variables: Lastly, a recommendation is for large-scale quantitative studies incorporating multilevel modeling – e.g., surveying teachers from a broad sample of schools and including school-level variables (like studentteacher ratio, school IT budget, exam performance pressure indicators) to statistically parse how much variance in tech usage is attributable to individual vs school factors. This can validate and extend our findings on a broader scale and give policymakers macro-level data (for instance, one might find that school ICT investment per teacher significantly predicts usage frequency controlling for teacher attitudes, reinforcing budgetary decisions). Linking such data with student outcome databases could also attempt to correlate higher EdTech integration with any improvement in outcomes at the school level, which is a challenging but valuable analysis for evidence-based policy.

In conclusion, future research should continue in a multidimensional fashion – addressing teacher, school, and system-level questions – to build on the insights from this study. By pursuing the suggested research directions, we can advance understanding of how to effectively weave educational technology into the fabric of teaching and learning, not only in the UAE but in educational systems worldwide facing similar opportunities and challenges.

Each research recommendation above aims to fill gaps our study could not fully explore due to scope, thereby contributing to a more complete picture of the journey toward meaningful technology integration in education.

CHAPTER VI: SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

This doctoral research set out to examine the factors influencing the adoption of educational technology (EdTech) in the UAE education sector, focusing on both educators' perspectives and EdTech firms' experiences. Guided by a mixed-methods approach, we collected quantitative data through a teacher survey (N=128) and qualitative insights from interviews with 7 teachers and 5 EdTech company leaders. Grounded in technology acceptance theories (TAM, UTAUT) and informed by exemplary practices from literature, the study

investigated how teacher attitudes, skills, organizational support, and contextual pressures converge to affect EdTech integration in classrooms.

Key findings indicate that UAE educators hold highly positive attitudes towards EdTech and widely recognize its potential to enhance teaching and learning (over 80% reported that EdTech improves student engagement and learning outcomes). Most teachers are incorporating technology at least weekly, using tools for presentations, interactive learning, and assessments. The quantitative analysis revealed that perceived usefulness of EdTech is the strongest predictor of teachers' intent to use and actual usage frequency (Clarke, 2020). Perceived ease of use (often reflecting teacher confidence with technology) also contributes significantly, particularly by enabling teachers to see technology as beneficial and by reducing adoption anxiety. Social influence – especially supportive school leadership and peer usage – correlates with higher EdTech adoption, reinforcing that a collaborative, tech-positive school culture is crucial (Dutt, 2024). Facilitating conditions, including infrastructure, technical support, and available time, emerged as necessary enablers; even enthusiastic teachers will struggle to use EdTech if these conditions are lacking (Ravichandran & Shanmugam, 2024).

Our qualitative data enriched these findings by illustrating that when teachers are well-trained and supported, they become confident and creative EdTech users, integrating tools to differentiate instruction and engage students in deeper learning. Conversely, heavy curriculum and exam pressures often limit the time and freedom teachers have to innovate with technology, causing a gap between their positive attitude and their actual practice. Many teachers expressed that despite wanting to use more EdTech, they feel compelled to prioritize syllabus coverage for high-stakes tests – a systemic barrier not fully accounted for in standard adoption models but highly relevant in this context. EdTech firm leaders echoed similar themes, noting that teacher training uptake, leadership buy-in, and alignment of their products with school needs

(curriculum and assessment requirements) are critical to achieving sustained usage of their solutions. They also pointed out logistical challenges in school procurement processes and budget allocations that can delay or limit EdTech implementation.

In summary, the study confirms that teacher-level factors (beliefs, confidence, skills) and school-level factors (leadership, support, culture) jointly determine the success of EdTech adoption. Our integrated findings support the validity of TAM/UTAUT in educational environments while highlighting the importance of contextual factors like curriculum compatibility. The overall picture is that UAE teachers are ready and willing to harness EdTech for better pedagogy, but to do so fully, they need a supportive ecosystem that addresses training needs, provides reliable resources, allows flexibility in curriculum delivery, and nurtures a culture of innovation. These insights led us to formulate concrete recommendations for educators, school leaders, EdTech providers, and policymakers to strengthen each of these areas, thereby bridging the gap between EdTech's promise and everyday classroom reality.

6.2 Implications

This research contributes to the growing body of knowledge on educational technology integration in several meaningful ways:

• Empirical Evidence in a Middle Eastern Context: It provides empiricallybased insights from the UAE, a region underrepresented in EdTech literature. By focusing on UAE EdTech firms and schools, the study adds a nuanced understanding of how global adoption factors play out in a local cultural and systemic context. For example, it confirms that factors like perceived usefulness, ease of use, training, and leadership support – widely cited in Western contexts – are equally pertinent in the UAE, while also illuminating how specific aspects like Arabic content availability and centralized exams influence adoption. This contextual contribution enhances the external validity of general EdTech adoption theories by testing and affirming them in a new setting (Clarke, 2020). It also offers regionspecific

knowledge that can guide Gulf-area policymakers and practitioners, bridging a gap in literature given the rapid EdTech developments in the Middle East.

• Theoretical Refinement: The study refines technology acceptance models by identifying the need to incorporate educational context variables (like curriculum alignment and time constraints) into our understanding of adoption. We empirically demonstrated that positive teacher attitudes and intentions might not translate to action if the curricular framework and assessment demands discourage time for tech-based activities – a finding that suggests an extension to TAM/UTAUT when applied to education. This leads to a theoretical implication that an additional construct of "Perceived Curriculum Compatibility" or a stronger emphasis on facilitating conditions in models could improve their predictive power in educational contexts. Our work therefore contributes a theoretical refinement by proposing and evidencing the importance of aligning EdTech with institutional academic goals as part of adoption models.

• Integrated Stakeholder Perspectives: A unique aspect of this research is integrating voices of both teachers (end-users) and EdTech companies (providers) in the analysis. This dual perspective contributes knowledge on the interaction between supply and demand factors in EdTech diffusion. We highlight where teachers' needs and challenges coincide with or diverge from EdTech companies' perceptions. For instance, teachers emphasize on-the-ground barriers like time and training, while companies highlight macro challenges like procurement and proving ROI. Bringing these together generates a more holistic understanding of the adoption ecosystem than many studies focused on just one side. This is a methodological and practical contribution – it demonstrates a comprehensive approach to studying EdTech implementation and produces knowledge that can help align

EdTech product offerings with educator needs (for example, our data suggests companies that embed pedagogy-focused training and curriculum alignment in their service model will likely see higher usage of their products).

• Practical Framework for School Improvement: The findings contribute a practically applicable framework or checklist for schools seeking to improve EdTech integration. While not a formal model, the constellation of key factors we identified (teacher readiness, training, leadership engagement, infrastructure, curricular flexibility) acts as a diagnostic framework. This knowledge contribution is valuable for school administrators and policy planners; it condenses lessons from our mixed-methods evidence into clear focal points (e.g., ensure all five are addressed for successful integration). Our recommendations and implications sections effectively translate these into action steps, but even in academic terms, the identification of these critical success factors in the UAE environment is a contribution that can inform best practice guidelines and benchmarking for similar educational contexts.

• Current Insight Post-Pandemic: Given that data collection occurred in the mid-2020s, our study captures a post-COVID snapshot of EdTech adoption when many schools have blended online and face-to-face experiences fresh in memory. This timing contributes up-to-date knowledge on teacher attitudes and practices at a key juncture: after an unprecedented global EdTech trial by fire. We found residual momentum (with most teachers now quite positive about tech) but also a reversion to exam-focused pressures. These findings contribute to the emerging literature on the long-term impact of the pandemic on EdTech integration. It adds evidence that while emergency remote teaching accelerated teacher skill development and tool familiarity, enduring systemic issues still need to be resolved for sustained integration. This knowledge is crucial as educational systems worldwide grapple with how to capitalize on the digital gains made during the pandemic.

In summary, this research advances knowledge by validating core adoption factors in a new context, refining theory to incorporate contextual realities, merging multi-stakeholder insights for a fuller adoption picture, providing a pragmatic framework for improvement, and offering current post-pandemic adoption insights. It contributes both to academic discourse on how and why teachers adopt technology and to practical strategies for educational stakeholders aiming to foster technology-enhanced learning environments.

6.3 Contributions to Practice

The practical implications of this research are significant for various stakeholders in the education ecosystem of the UAE and similar contexts:

• For Educators and School Leaders: This study provides a clear roadmap of what enables successful EdTech integration in schools. Teachers can self-assess and advocate for their needs using our findings – for instance, if they recognize lack of training or support is holding them back, they can request targeted professional development or form peer support groups, knowing these are evidence-backed requirements (PwC Middle East, 2024). School leaders can use our results as a checklist to strengthen their school's EdTech implementation: ensure reliable infrastructure, schedule teacher training (and time to practice), create a school ICT vision aligned with curriculum, and actively encourage and recognize teachers' tech-based innovation. One principal in our interviews who did exactly this saw widespread adoption in her school; her approach can serve as a model practice that our research highlights for others to emulate. Thus, our research directly contributes actionable guidance to school-level practice – essentially, if a school improves along the dimensions we identified (training, support, culture, alignment), it should see improved EdTech use and thereby improved instructional practices and student engagement.

• For Policymakers and Educational Authorities: The study informs decisionmakers at the Ministry or district level about where to channel resources and how to refine policies to encourage EdTech adoption. For instance, the evidence that heavy exam focus is impeding tech integration suggests that policy adjustments (like integrating digital skills into curriculum standards or assessments) could be beneficial – a recommendation our findings support. Policymakers can consider refining teacher professional development frameworks to include mandatory ICT integration training and follow-up coaching, seeing from our data how crucial that is. Additionally, the research underscores the importance of having ICT facilitators in schools; ministries could create or fund ICT-coordinator positions widely, learning from the positive cases we documented. Overall, our results equip policymakers with localized evidence to justify and design interventions (like the national digital education programs) in a way that addresses ground-level barriers and leverages ground-level drivers.

• For EdTech Companies and Developers: The insights from teachers about what they need and from companies about adoption challenges can guide EdTech providers to better tailor their products and support services. For example, companies now have evidence that providing extensive initial training alone isn't enough – they might invest in ongoing teacher support communities or on-demand help, which teachers in our study would clearly welcome. They also see the importance of aligning content with the curriculum – a practice implication for product development. Moreover, understanding the school culture dynamics implies that EdTech companies might succeed more by engaging school leadership in the rollout (not just ICT directors), perhaps offering leadership-oriented briefings on how to champion the product's use, given the role leaders play in teacher adoption. Our study thus contributes to practice by advising EdTech vendors on improving implementation strategies, ultimately increasing the practical impact and uptake of their solutions.

• For Professional Development Providers: Organizations that design and deliver teacher training can draw from our findings to structure more effective programs. Our evidence suggests PD should be ongoing, hands-on, collaborative, and tied to actual classroom applications. Training providers might incorporate these elements by, for example, breaking workshops into smaller recurring sessions, including peer learning segments, and using teachers' real lesson plans for EdTech integration exercises. The identification of teacher self-efficacy as key means PD programs should explicitly aim to build confidence (perhaps by starting with small, easy tech wins for novices). By aligning PD with these research-backed principles, providers can enhance their programs'

effectiveness, leading to better outcomes in practice.

• For the Wider Educational Community: The study's findings contribute to a growing consensus on how to achieve meaningful tech integration, thereby reinforcing the practices of innovative educators and pushing reluctant ones by showing evidence of tangible benefits. It empowers educators who are EdTech advocates with data to back their push for more support or changes at their schools. It also helps combat skepticism by demonstrating that teachers overwhelmingly see EdTech as beneficial (countering any narrative that teachers resist technology en masse). As such, our research can encourage a more positive, proactive discourse around EdTech in staff rooms, parent meetings, and education forums – focusing on "how do we make this work?" rather than "should we do this at all?".

In essence, the contributions to practice form a blueprint for the systematic improvement of EdTech integration. If implemented, these can lead to more consistent and effective use of technology in teaching, which in turn is expected to enrich student learning experiences and outcomes – the ultimate goal of EdTech efforts. By delineating both the human and institutional factors that need addressing, our research provides practical insight that, if

acted upon, could accelerate the UAE's progress toward its educational innovation goals and serve as a model for other regions undergoing similar digital transitions in education.

6.4 Limitations and Future Research Directions

While this study offers valuable insights, it is important to acknowledge its limitations (as discussed in Section 3.9) and consider how they might be addressed in future research:

• Generalisability: Our sample, though diverse, was not randomly selected from the entire UAE teacher population, and there may be inherent biases (e.g., more tech-inclined teachers might have been more willing to respond). Thus, our descriptive statistics on usage and attitudes should not be over-generalized without caution. Future studies should attempt larger, randomly-sampled surveys, possibly in collaboration with education authorities for access, to validate whether our observed trends hold broadly. This would bolster confidence that these findings represent the majority of schools and not just our volunteer cohort.

• Cross-Sectional Design: Because we captured data at one point in time, we cannot definitively determine causality (e.g., does high perceived usefulness lead to usage, or does usage lead to perceiving it as useful, or both?). The explanatory sequential design and theoretical grounding suggest likely directions, but longitudinal or experimental research is needed to confirm causal relationships. For instance, an experimental design providing some schools with an intensive support program (treatment) versus others not (control) could help ascertain its causal impact on adoption. Additionally, following the same teachers over multiple years as they or their environment change (e.g., after a new principal or new curriculum introduction) would yield causal insights and dynamic understanding of adoption processes.

• Self-Reported Measures: We relied on self-report for usage frequency and impact, which can be subject to biases (social desirability, recall inaccuracies). Although triangulated by qualitative accounts, there's a risk teachers might have over- or under-stated their usage. Future research should incorporate more objective measures, such as usage logs from EdTech platforms, classroom observations of tech integration, or student work samples, to corroborate teacher reports. Similarly, measuring student outcomes as mentioned can verify whether the reported benefits manifest in performance or engagement metrics.

• Scope of Perspectives: We primarily focused on teachers and EdTech firms. The study did not directly include student perspectives or those of school administrators (except via teacher accounts), which are valuable for a 360-degree view. Future studies could involve students through surveys or focus groups to understand their engagement with EdTech and any barriers they perceive (e.g., are there student-level issues like distraction or digital literacy gaps that teachers didn't highlight?). Including principals in interviews or as respondents would also be beneficial – we gleaned leadership influence indirectly, but hearing from leaders could reveal system-level constraints or innovation strategies unknown to teachers. Broadening the stakeholder net would enrich the findings and practice recommendations.

• Focus on Implementation rather than Outcome: Our research emphasized adoption factors more than learning outcomes or teaching quality outcomes of EdTech use. While we assume and qualitatively heard that usage improves engagement and potentially outcomes, we did not measure those outcomes quantitatively. There's a limitation in not knowing to what extent increased adoption is translating to better student results in our context. Future research should connect adoption to outcomes to ensure that the push for more tech integration is indeed benefiting students as intended and to refine usage strategies that maximize learning gains.

• Cultural Specificity: Some findings, such as the significance of Arabic content or specific exam pressures, are particularly relevant to the UAE/GCC context and may differ in other contexts. While this is by design (context-specific insight is a strength), it also means readers should be careful in applying certain implications to other contexts with different languages or educational systems. Comparative studies could explore differences – for example, a similar study in a Western context might find less exam constraint but perhaps other barriers (like privacy concerns or union rules on tech use). Such comparative research would help contextualize which of our findings are globally generalizable and which are context-bound.

In closing, despite these limitations, our study's mixed-methods design and consistency of findings lend credibility to its conclusions. The limitations point toward fertile ground for future research – research that could build on our work to deepen understanding of how to effectively integrate technology into education for improved teaching and learning outcomes. By addressing these limitations, future research can further advance both theory and practice in the domain of educational technology adoption.

6.5 Conclusion

The journey of educational technology adoption is as much about people and systems as it is about the technology itself. This study reaffirms that success in EdTech integration lies in empowering teachers with skills and support, embedding technology within a supportive culture and curriculum, and sustaining a clear focus on educational value. For the UAE, with its ambitious vision for a smart education ecosystem, the findings chart a path forward: one where investments in human capital and organizational change accompany the shiny devices and platforms. If these human and contextual factors are addressed, the promise of EdTech – more engaged learners, more effective teaching, and a preparation for a digitally fluent society

– can be fully realized. The UAE's case can then serve as an inspiring example for other educational systems worldwide navigating the rewarding, if challenging, transformation towards technology-enhanced education.

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APPENDIX A: FIRST APPENDIX TITLE [USE "CHAPTER TITLE" STYLE]

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