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Integrating Technology For Sustainability: An SEM Study On Pupil Teachers' Attitudes And Technological Self-Efficacy Within UTAUT 2.0

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Abstract
Technology evolution is a dynamic process that has driven significant changes across various industries, including education. The rapid development of educational technology has transformed the traditional teaching-learning paradigm, necessitating new approaches for integrating digital tools into the classroom. This study is based on the premise that both pupils and instructors will play pivotal roles in shaping the future of education and that their technological self-efficacy will significantly influence the successful adoption of technology in educational settings. The study aims to assess the attitude of pupil teachers towards technology and their technological self-efficacy using the Unified Theory of Acceptance and Use of Technology (UTAUT) 2.0 model. The research hypothesis was tested using IBM SPSS AMOS 26.0, and the collected data were analyzed to evaluate the proposed relationships. The UTAUT 2.0 model served as the research framework, while Structural Equation Modeling (SEM) was employed as the analytical technique to validate the model. This research also aligns with Sustainable Development Goal 4 (SDG 4), which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. By investigating the technological readiness of pupil teachers, the study contributes to understanding how digital pedagogies can be leveraged to achieve educational inclusivity and quality, thereby supporting the broader objectives of SDG 4 in fostering innovation and quality enhancement in education.
Keywords: *Unified Theory of Acceptance and Use of Technology (UTAUT 2.0), Structural equation modeling (SEM), Pupil Teacher, Technological Self-efficacy, Attitude Towards Learning, Sustainable Development Goal 4 (SDG 4).*

INTRODUCTION

Today's education is changing quickly because of the way technology is being incorporated into pedagogy, learning outcomes, content delivery, and instruction. As traditional approaches move to digital platforms, technology is becoming more and more integrated into education. Teachers expand their teaching horizons and improve student learning by using digital materials and online technologies that are made available by organizations and governments (Agarwal & Ahuja, 2011). The use of e-learning platforms and Web 2.0 services is growing. To succeed in the digital age, educators must embrace technology in the classroom. Researchers propose that novel technologies enhance communication between teachers and students and facilitate instruction across the curriculum (Ahammad, n.d.; Alkan & Erdem, 2010). Technology improves accessibility to education and has an impact on the way content is taught. Through specific regulations, NEP2020 seeks to guarantee universal access to education, especially for underprivileged groups within society (Alharbi & Drew, 2014). SDG 4.0 "Quality Education" also ensures the upgradation of educational facilities and an effective learning environment for all. Pupil teachers will be the ones to carry on educational traditions in the future. Hence, their attitude towards technology and their technological self-efficacy becomes the driving forces for educational advancement. It is crucial for the process of teaching and learning (Dahri et al., 2023). It significantly affects how well students achieve learning outcomes in the classroom. Students can be assisted in completing learning tasks and given

knowledge via technology. Even though many institutions have made significant progress in integrating technology into the classroom, not as many of them have concentrated on how teachers perceive this integration (Eneizan et al., 2019).

The combination of technological self-efficacy and attitude towards technology promotes innovation in the classroom. Positive attitudes and great technological confidence make teachers more likely to experiment with different teaching tools, adjust to changing educational environments, and successfully prepare their pupils for a future driven by technology. Many models and theories discuss the development of technology (KORAL GÜMÜŞOĞLU, 2017; Lewis et al., 2013). Some of them are the Technology Acceptance Model (TAM), the Theory of reasoned action (TRA), the Unified theory of acceptance and use of technology (UTAUT 2.0), the Theory of task technology fit (TTF), etc.

Amongst these models, the Unified theory of acceptance and use of technology (UTAUT 2.0) has gained popularity because of its broadness and capacity for prediction related to technology adoption in different contexts. Various factors of the Unified theory of acceptance and use of technology (UTAUT 2.0) model were used to investigate the attitude of pupil teachers towards technology and their technological self-efficacy (Eneizan et al., 2019; Yavuzalp & Bahcivan, 2021). The Unified theory of acceptance and Use of technology (UTAUT 2.0) has come out as a strong framework for analyzing people's acceptance and use of technology across various domains. Key components, including Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Hedonic Motivation (HM), Social Influence (SI), and Habit, are all included in UTAUT 2.0, an expanded version of the model (Omar* et al., 2019). This study aims to expand and modify UTAUT 2.0 to the particular setting of pupil teachers, considering the opportunities and obstacles they face in their initial years of physical growth. The study aims to clarify the complex links between the several elements of UTAUT 2.0 and pupil teachers' technical self-efficacy through the use of Structural Equation Modelling (SEM). It is anticipated that the results will offer insightful information to practitioners, teacher training organizations, and educational policymakers who aim to improve the use of technology in teacher preparation programs. In the final analysis by identifying the variables affecting student teachers' technical self-efficacy and providing recommendations for enhancing their readiness for technologically driven educational environments, this study adds to the continuing conversation about technology in education.

LITERATURE REVIEW

The unified theory of acceptance and use of technology (UTAUT 2.0)

Various studies have used the Unified theory of acceptance and use of technology (UTAUT) as an introductory approach to measuring the adoption and use of technology. A decade ago, the Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh et al., (2003) was developed based on multiple conflicting acceptance models, with the goal of unifying research efforts in the technology acceptance literature. These models and theories are (a) The Theory of Reasoned Action (TRA), (b) Technology Acceptance Model (TAM), (c) Motivational Model (MM), (d) Theory of Planned Behavior (TPB), (e) Combined model of Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB), (f) Model of PC Utilization, (g) Social Cognitive Theory (SCT), and (h) Innovation Diffusion theory (IDT) (hakim Alshammari, n.d.).

Four theoretical constructs that describe factors influencing intention to use or usage behavior which are crucial as models for technology acceptance- formed the basis of the theory. Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) are these constructs. The theory takes into account moderating factors in addition to these variables, which regulate the relationships between different variables and intention to use. Gender, Age, Experience, and Voluntariness of use are the moderators. Later UTAUT2 model was integrated by Venkatesh et al., (2012) to overcome the limitations of UTAUT. The UTAUT2 framework consists of the same four constructs of UTAUT along with three new constructs Hedonic Motivation, Habit, and Price Value as antecedents of behavioral intention and use of behavior. The moderator variables were reduced to Age, Gender, and Experience only.

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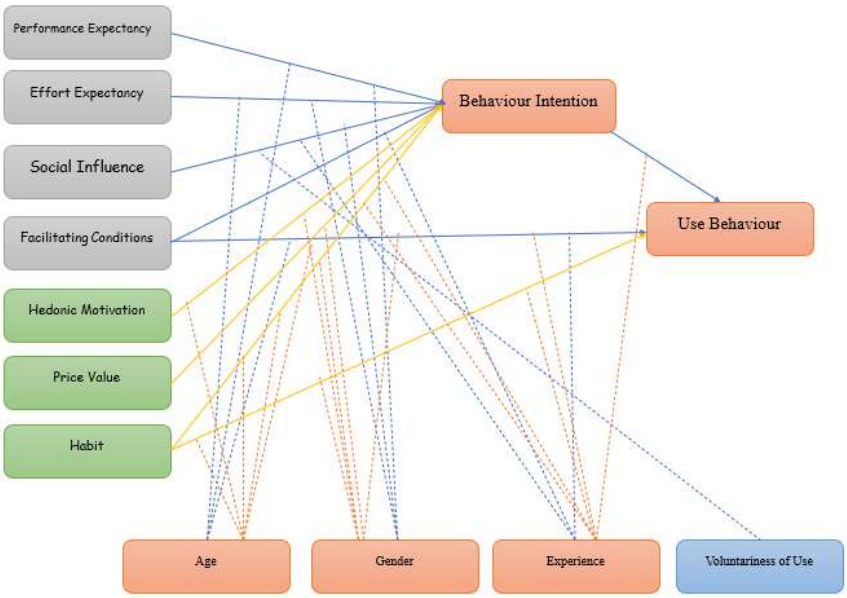

Figure 1: Unified Theory of Acceptance and Use of Technology (UTAUT & UTAUT2) (Venkatesh et al., 2003, 2012)

Several studies have been done on the extension of the UTAUT2 model based on the acceptance of technology and its integration. The elements affecting teachers' use of mobile learning technologies (Alhwaiti, 2023; Dahri et al., 2023). Researchers used the UTAUT model to elate the constructs with the acceptance of technology. The obstacles related to technology adoption can be successfully overcome by enhancing teachers' innovative thinking and self-efficacy and by providing the required infrastructure and support. This study assessed the degree of self-efficacy, ICT usage habits, learning opportunities, affective needs, and attitudes toward using digital textbooks using the UTAUT model as a theoretical framework (Hermita et al., 2023; Yavuzalp & Bahcivan, 2021).

Technological Self-Efficacy of Pupil Teachers

Bandura's 1977 social cognitive theory initially focused on self-efficacy, which underwent revisions to incorporate aspects like teachers', learners', and technology's self-efficacy, especially in education. These modifications expanded the theory's applicability beyond education to various sectors and organizations. Technological self-efficacy, in the context of student instructors, refers to their belief and confidence in effectively using and integrating technology in educational settings. It encompasses competence in utilizing digital tools, resources, and applications for professional development, classroom management, and teaching. High technical self-efficacy teacher candidates are more likely to successfully navigate and use technology, adjust to new tools, and use technology to improve student learning and teaching (Scherer et al., 2019). Pre-service teachers generally have some degree of technology integration self-efficacy, which gradually increased as the pre-service teachers advanced in their grade levels (Caner & Aydin, 2021). Although there is still a need for improvement in every facet of technological self-efficacy, it has been identified as a characteristic that both helps and influences teachers' use of technology in the classroom. Since the components have been identified, teachers can regulate their tech self-efficacy. Teachers should take care of all the identified factors because it is they who will incorporate technology into the classroom. Therefore, a teacher's significant confidence and deep knowledge of their tech self-efficacy should be the first steps towards making teaching and learning more exciting with technology (Bakar et al., 2018). Every teacher education institution needs to have a high level of technical self-efficacy among its teachers since, based on their effectiveness, a variety of electronic resources are deployed in the classroom to enhance the learning environment (Sahoo & Panda, 2021).

An attitude of Pupil teachers towards technology

Regarding the use and integration of technology in educational contexts, student teachers' attitudes towards it are defined as their general disposition, beliefs, and perceptions. It includes their behavioral intents towards integrating technology tools and resources into their teaching methods, as well as their emotional reactions and cognitive assessments. The attitude towards technology has affected pupil teachers' use of Artificial Intelligence. An important conclusion of the study that could have implications for adopting AI-based goods is that people's attitudes toward technology are becoming increasingly positive (Ahammad, n.d.). Student instructors see technology for learning as positively constructive. Various learning technologies could be presented for each department within the context of the material development lesson, along with usage examples (Alkan & Erdem, 2010). E-learning significantly changes the way knowledge is disseminated, enhancing the caliber of teacher preparation and producing educators of international caliber. All kinds of teachers and learners can benefit greatly from e-learning. It is an efficient method of learning produced by fusing learning services and support with digitally supplied information. The aforementioned study shows that locality and gender have little bearing on the attitudes of B.Ed. Pupil teachers towards e-learning. Given that B.Ed. Student teachers have a very positive attitude towards e-learning and are thus expected to employ e-learning strategies for their learning, the current study indicates a higher likelihood that they will embrace it (Srivastava, 2023).

Literature Gap

The literature underscores the significance of pupil teachers' perception in enhancing the learning environment. In today's global era, teachers play a crucial role as leaders guiding students. Thus, their perception, attitude, and efficacy in integrating technology into education are vital. Past studies have explored technological self-efficacy and attitude toward technology separately or in combination. This study fills the research gap by integrating these aspects within the UTAUT 2.0 model. By doing so, it aligns with Sustainable Development Goal 4 (SDG 4): Quality Education, emphasizing the role of empowered and technologically competent teachers in delivering equitable, inclusive, and high-quality education for all.

Need and Importance of the Study

The purpose of this study was to fill a knowledge gap regarding the relationship between student-teacher attitudes toward technology and their level of technological self-efficacy. Using the UTAUT 2.0 model, this study explores the relationship between student teachers' attitudes toward technology and their technological self-efficacy. The studied literature emphasizes the many advantages of properly implementing technology integration in the classroom. Related literature talks about the technology acceptance and UTAUT2.0 model (Hermita et al., 2023; Kundu et al., 2021; Omar* et al., 2019; Scherer et al., 2019; Yulian et al., 2022). The present study addressed the gap in the literature by analyzing how the UTAUT2.0 factors PE, EE, SI, FC, HM, and HI of pupil teachers' tech self-efficacy and their attitude toward technology. Furthermore, the study contributes to the broader discourse on Sustainable Development Goal 4 (SDG 4): Quality Education, by emphasizing the importance of equipping future educators with the technological competence necessary to foster inclusive, equitable, and effective learning environments in the 21st century.

METHODOLOGY

Research Model

The acceptance of technology is the primary focus of the differentiation in the recognition of modern technological knowledge. A better paradigm for addressing the demands and changes of technology is UTAUT2. Venkatesh, Morris, and Davis established the UTAUT & UTAUT2 model. Two more constructs were added to the original four core constructs of this paradigm. It is important to note that the UTAUT model incorporates other theories—TRA, TAM, and others—that have already been stated and that address technology. Each item in the UTAUT2 model, together with the teacher's attitude toward technology and technological self-efficacy, was examined independently.

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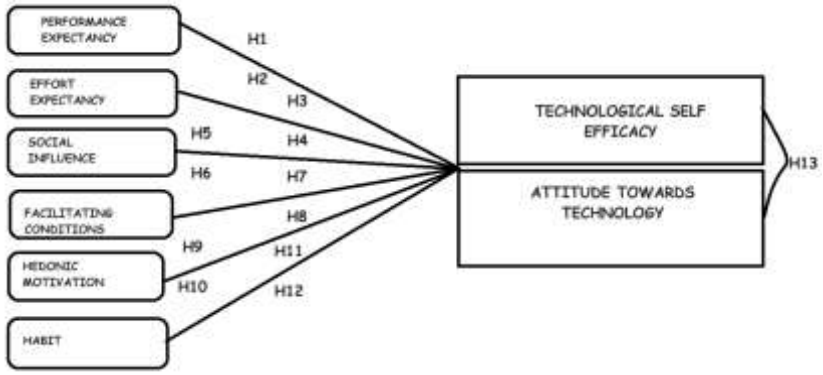

Figure 2: Research Model Framework

PERFORMANCE EXPECTANCY

A teacher's expectation that using a particular technology will help them perform better is known as their performance expectation. Researchers have demonstrated that performance expectancy has a major impact on student teachers' attitudes toward technology and their technological self-efficacy about their attitudes towards technology (Lu et al., 2009)

H_1: PE will positively influence the attitude of teachers toward technology.

H_2: PE will positively influence technological Self-efficacy.

EFFORT EXPECTANCY

The degree of convenience that a person utilizing technological equipment may experience is known as the "effort expectancy." It is a reliable indicator of whether technology will be accepted. Its definition is the degree of simplicity associated with the system's use (Venkatesh et al., 2016).

H_3: EE will positively influence the attitude of teachers toward technology.

H_4: EE will positively influence technological Self-efficacy.

SOCIAL INFLUENCE

The degree to which someone is considered very significant and is assumed to use technology by others is known as their social influence. It concerns the opinions of significant and powerful individuals in the student's immediate environment about the value and application of technology (Venkatesh et al., 2016).

H_5: SI will positively influence the attitude of teachers toward technology.

H_6: SI will positively influence technological Self-efficacy.

FACILITATING CONDITIONS

The extent to which an individual believes that the technological infrastructure is in place to facilitate the usage of new technology is referred to as the Facilitating Conditions. It expresses the person's conviction that better technological support and infrastructure will enable more efficient use of technology (Venkatesh et al., 2016).

H_7: FC will positively influence the attitude of teachers toward technology.

H_8: FC will positively influence technological Self-efficacy.

HEDONIC MOTIVATION

Three new constructs were introduced in UTAUT 2, a recent expansion of UTAUT by Venkatesh et al. to investigate technology adoption and use in a consumer setting: hedonic motivation, price value, and habit (Venkatesh et al., 2016).

H_9: HM will positively influence the attitude of teachers toward technology.

H_{10}: HM will positively influence technological Self-efficacy.

HABIT

The behavior that a person engages in to develop a propensity to use technology freely is called a habit. It is the degree to which a person utilizes a system against their will (Venkatesh et al., 2016).

H_{11}: Habit will positively influence the attitude of teachers toward technology.

H_{12}: Habit will positively influence technological Self-efficacy.

ATTITUDE TOWARD TECHNOLOGY

"Attitude Towards Technology" (ATT) describes how student teachers feel about using technology in the classroom. Regarding how teachers feel about technology, this has a significant impact on how schools are set up and how children learn. It catalyzes innovative teaching strategies that improve classroom dynamics while meeting students' various requirements and learning preferences (Pan, 2020).

TECHNOLOGICAL SELF-EFFICACY

The belief in one's competence to use and integrate technology in educational settings is referred to here as technical Self-efficacy (TSE), and it plays a crucial role in determining the current state of technical education. It is described as the degree to which a teacher feels comfortable utilizing digital tools, platforms, and applications to inform their approach to integrating technology into the classroom. To prepare students for success in the 21st, teachers must develop and enhance their technological self-efficacy, as technology will continue to play a significant part in society(Bakar et al., 2018; Menon et al., 2017; Sahoo & Panda, 2021).

H_{13}: Pupil Teacher's Attitude toward technology and their technological self-efficacy are significantly related to each other.

SAMPLE

The sampling strategy employed was purposive. The targets were student teachers who had finished their internships in different schools. Data was gathered via the distribution of questionnaires both offline and online. Questionnaires were sent out based on participant availability. 451 replies in all were obtained. There were 149 men and 302 women who attended. A variety of university student teachers were included in the sample.

Item	Description	Total Sample	Percentage
Gender	Female	302	66.96 %
	Male	149	33.04 %
Age	20-25	382	84.70
	26-30	54	11.98
	31-35	15	3.32
Educational Background	Bachelor's	319	70.73
	Master's	132	29.27
	Others	0.00	0.00
Usage of Technology in Classroom	Rarely	58	12.86
	Occasionally	62	13.74
	Frequently	316	70.06
	Always	15	3.34
Technological Training	Yes	346	76.72
	No	105	23.28

Table 1: Demographic Information

INSTRUMENT

The information was gathered using an eight-section, structured questionnaire with a five-point Likert scale. A key influence on the research questionnaire came from Venkatesh, Morris, and Davis (2012). Researchers looked at the surveys using the UTAUT2 model, which has been applied to several other comparable studies, to create the questionnaire items. 51 teachers participated in a pilot study to assess the questionnaire's comprehensibility and clarity and to find any potential problems with the created research tool. As suggested by Hair and Klien, all of the values given in the table are deemed appropriate for additional investigation. Furthermore, all constructs' CR values should be above 0.8, the AVE values acquired should be greater than 0.5, and the recommended limit of >0.7 must be met by Cronbach's Alpha, which evaluates the data's internal consistency. The aforementioned results show that the

constructs have acceptable internal consistency and strong reliability(A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition, n.d.).

Constructs	Items	Loadings (λ)	Cronbach's α		Composite Reliability	Average Variance
Performance Expectancy	PE1	0.734				
	PE2	0.786	3	0.852	0.864	0.682
	PE3	0.743				
Effort Expectancy	EE1	0.829				
	EE2	0.749	3	0.783	0.898	0.606
	EE3	0.768				
Social Influence	SI1	0.774				
	SI2	0.898	3	0.923	0.920	0.741
	SI3	0.923				
Facilitating Conditions	FC1	0.968				
	FC2	0.829	3	0.829	0.829	0.624
	FC3	0.863				
Hedonic Motivation	HM1	0.921				
	HM2	0.986	3	0.863	0.855	0.663
	HM3	0.726				
Habit	HA1	0.820				
	HA2	0.746	3	0.912	0.896	0.748
	HA3	0.724				
Attitude Towards Technology	ATT1	0.936				
	ATT2	0.823				
	ATT3	0.746	5	0.830	0.923	0.699
	ATT4	0.774				
	ATT5	0.764				
Technological Self-Efficacy	TSE1	0.780				
	TSE2	0.734				
	TSE3	0.864	5	0.944	0.794	0.685
	TSE4	0.763				
	TSE5	0.749				

Table 2: Confirmatory Factor Analysis

DATA ANALYSIS

Excel was used to analyze the research model, IBM SPSS was used to perform the demographic analysis, and IBM SPSS Amos was used for additional analysis. Structural equation modeling (SEM) is utilized in this investigation. SEM is a strong statistical technique used for analyzing and representing intricate relationships between variables related to the social sciences, economics, psychology, and various other disciplines. Beyond conventional statistical techniques, this advanced analytical strategy enables researchers to examine both observed and latent (Unobserved) variables at the same time. SEM is a complete framework that integrates numerous regression and factor analysis components. The measurement model and the structural model are the two primary parts of the model. These two layered frameworks offer a comprehensive understanding of complex phenomena (Hair et al., 2019).

Structural Model: It looks at the relationships between latent variables.

Measurement Model: It establishes the relationship between latent variables and their observed indicators.

MEASUREMENT MODEL ANALYSIS

To evaluate the connection between a latent variable and its observed indicators, a measurement model with a variety of parameters and statistics is used. It contains Cronbach's Alpha reliability coefficient, validity indices such as discriminant and convergent validity, and fit indices like the Root Mean Square error of approximation (RMSEA) and the Comparative Fit Index (CFI), among others. Tables 1 and 2 below display the analysis. Before data validation, the researcher removed any outliers from the data. Items with SFL<0.6, α <0.7, AVE<0.6, CR< 0.6, or CR>AVE were classified as outliers. To make sure that every item chosen satisfies the minimal requirements, five items were eliminated from the measuring scale based on the previously specified forms. To validate the measurement model, the researcher computed discriminant validity, confirmatory factor analysis, and discriminant factor analysis after defining. The following observations were approved since they meet the requirements for approval. Every calculated result fell within the accepted significant range. Internal consistency reliability was found in the data, as evidenced by the following ranges: CA from 0.78 to 0.94, which is greater than 0.7; SFL from 0.734 to 0.986, which is greater than 0.6; CR from 0.794 to 0.923, which is greater than 0.6; and ABE from 0.69 to 074, which is greater than 0.6. Measurement model fit indices, such as absolute fit measures (chi-Square, df, GFI, AGFI), incremental fit measures (NFI, TLI), and parsimonious fit measures (CFI, RMSEA), were evaluated to further validate convergent validity (Hair et al., 2019). The measurement model fit metrics demonstrated overall model fit and confirmed convergent validity, satisfying the minimal requirements for model fit, as indicated by the results in Table 3.

	Absolute fit measures (AFM)			Incremental fit measures (IFM)		Parsimonious fit measures (PFM)	
Construct	χ^{2}/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
PE	1.968	0.981	0.912	0.978	0.948	0.984	0.042
EE	1.834	0.987	0.942	0.972	0.987	0.986	0.041
SI	1.878	0.973	0.967	0.977	0.973	0.978	0.043
FC	1.982	0.972	0.934	0.984	0.981	0.987	0.043
HM	1.839	0.942	0.944	0.974	0.972	0.972	0.041
HA	1.961	0.977	0.943	0.988	0.981	0.985	0.042
ATT	1.752	0.963	0.932	0.970	0.958	0.924	0.044
TSE	1.939	0.948	0.938	0.973	0.926	0.975	0.043

Table 3: Model Fit Indices

A test called discriminant validity is used to identify the distinctions between components to ensure that their meanings do not overlap. The indicator's outer loading should have a greater value significance than the relationship between the other components as a result of the discriminant validity test. It shows how much a certain construct varies from other constructs. The Heterotrait – Monatrait Ratio and the Fornell & Larcker Criterion can be used to evaluate it. Discriminant validity in this study was computed using the Fornell & Larcker criterion. They put forth the standard metric, along with the recommendations that each construct's AVE be compared to the construct's inter-construct correlation and that the variance between all other reflectively measured constructs in the model should not exceed their AVEs. The bolded numbers in Table 4 have higher values than the other numbers. According to the computed analysis, the data's discriminant validity for each component is sufficient (Hair et al., 2019).

****	PE	EE	SI	FC	HM	HA	ATT	TSE
PE	***00.834***							
EE	00.726	***00.846***						
SI	00.624	00.643	***00.924***					
FC	00.683	00.524	00.599	***00.826***				
HM	00.742	00.682	00.542	00.628	***00.793***			
HA	00.546	00.692	00.639	00.692	00.609	***00.821***		
ATT	00.346	00.546	00.543	00.599	00.623	00.549	***00.864***	
TSE	00.591	00.629	00.502	00.523	00.689	00.628	00.643	***00.921***

Table 4: Discriminant Validity

ASSESSMENT OF STRUCTURAL MODEL

A few elements of the measurement model are examined first, then the structural model. This is done to determine whether or not the model may be used for additional structural modeling. All of the measured model's analyzed outcomes fell within reasonable bounds when it came to the structural model's evaluation. The accepted and rejected relationships between the various UTAUT2 model structures with the Attitude Towards Technology (ATT) and Technological Self-Efficacy (TSE) are displayed in the table below. The findings show a substantial association between Performance Expectancy (PE) and effort Expectancy (EE) Attitude toward technology (ATT) and Technological Self-Efficacy (TSE). Social Influence (SI) and Attitude Towards Technology (ATT) have a substantial link, but not with Technological Self-Efficacy (TSE). Moreover, Attitude Towards Technology (ATT) and Technological Self-Efficacy (TSE) are closely related to Hedonic Motivation (HM) and Habit (HA). The model goes on to claim that there is a noteworthy correlation between Attitude Towards Technology (ATT) and Technological Self-Efficacy (TSE) (A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Second Edition, n.d.; Hair et al., 2019).

Hypotheses	DV ← IV	T Value	P Value	Results
H_1	ATT← PE	3.24	0.000	Accepted
H_2	TSE← PE	4.63	0.000	Accepted
H_3	ATT ← EE	4.38	0.000	Accepted
H_4	TSE ← EE	5.01	0.000	Accepted
H_5	ATT ← SI	3.69	0.000	Accepted
H_6	TSE ← SI	0.82	0.163	Not Accepted
H_7	ATT ← FC	0.38	0.271	Not Accepted
H_8	TSE ← FC	0.63	0.152	Not Accepted
H_9	ATT ← HM	4.23	0.000	Accepted
H_{10}	TSE ← HM	3.89	0.000	Accepted
H_{11}	ATT ← HA	4.82	0.000	Accepted
H_{12}	TSE ← HA	3.19	0.000	Accepted
H_{13}	ATT ←→TSE	4.68	0.000	Accepted

Table 5: Result of Hypotheses Testing

CONCLUSIONS

The adoption of technology is a complex, gradual process that goes beyond merely acquiring software and hardware, requiring the development of essential infrastructure and resources over time. This study serves as an initial exploration into the adoption of technological applications in education, utilizing the UTAUT 2.0 model as a framework. The results of this study revealed a strong positive correlation between pupil teachers' attitude towards technology (ATT), technological self-efficacy (TSE), Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Hedonic Motivation (HM), Habit (HA) indicating that pupil teachers are impacted by the constructs defined in the UTAUT2 model in the adoption of technology in the educational process. This is expected, as teachers are generally willing to embrace technology if it aids in improving their job performance and strengthens their interactions with others. This study aimed to be innovative by giving a twist to the existing technology acceptance theories and paving a new road for different technological self-efficacy theories to be developed (Alharbi & Drew, 2014; Dahri et al., 2023; Teo et al., 2012; Yulian et al., 2022). This study lays the groundwork for future research on the significance of technology integration in the global education era and its influence on pupil teachers' attitude towards technology and their technological self-efficacy using the UTAUT2 model. It can be used for further study on the technological adoption of teachers in various ways.

This study offers insights into how pupil teachers' attitudes toward technology influence their technological self-efficacy using the UTAUT2 model. It contributes to educators' understanding of

technology use in education. Findings confirm the UTAUT2 model's effectiveness in explaining technology adoption across various levels. By integrating technology effectively, educators can create more inclusive, engaging, and personalized learning environments—an essential step toward fulfilling the vision of Sustainable Development Goal 4 (SDG 4): Quality Education. In this context, fostering technological self-efficacy among pupil teachers is not merely an academic requirement but a strategic imperative for future-ready education systems.

By integrating technology effectively, educators can create more inclusive, engaging, and personalized learning experiences, which are crucial for achieving the targets of SDG 4 (Quality Education). Utilizing technology is crucial for improving university work environments and enhancing pupil teachers' performance and creativity, especially considering the prevalence of Generation Z, who are digital natives. According to John Dorsey, some statistics on Generation Z usage of technology conclude that 95% own a smartphone, 83% own a laptop, 78% own advanced gaming, 29% use their smartphones past midnight, etc. Therefore, it becomes important on the part of the teacher to make themselves tech-Lover so that they can deal with them in the classroom learning. Taking into account the need for teachers' training seminars/Workshops based on new features of technology should be developed and designed for teachers that will contribute to the professional development of teachers (Coyle, n.d.; Hakim Alshammari, n.d.; Kundu et al., 2021).

LIMITATIONS AND PRACTICAL IMPLICATIONS

Despite the care given to all the steps of the study. Firstly, the sample population can be scaled up for much specific generalization. The applicability to other states must also be investigated to generalize the findings. Second, the study is delimited to the student teachers only, it can also be conducted on the in-service teachers. Also, this study did not analyze any correlation between the age and experience of the pupil teachers and their acceptance level of technology. The generalizability of findings may be limited to the specific demographic of pupil teachers.

Future research could explore more objective measures and extend the investigation to diverse educational settings. The UTAUT2 model has one construct, behavior Intention. Further research can be done on the concept related to behavior intention and attitude of pupil teachers towards technology and their technological self-efficacy. Studies can have different moderator variables in aligning with different constructs (Yavuzalp & Bahcivan, 2021). The practical consequences of these findings for educational policymakers and teacher training programs are noteworthy. It is possible to create focused treatments and strategies to promote positive technology acceptance by thoroughly understanding the complex variables that affect student instructors' attitudes and technical self-efficacy. By acknowledging the complex nature of these connections, educational institutions can better equip upcoming teachers to successfully incorporate technology into their lesson plans.

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