The Ethical Digital Educator: Reimagining Teacher Education Under NEP 2020

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ABSTRACT

National Education Policy (NEP) 2020 presents a new direction for education in India, highlighting the importance of integrating technology smoothly, using multidisciplinary teaching methods, and fostering ethical values in learning environments. As digital tools become more common in higher education, teacher training programs need to prepare future educators not just as people who can use technology well, but as leaders who are aware of the ethical implications of their work. However, the traditional technology adoption models such as TAM, UTAUT, TPACK prioritizes the utilitarian metrics such as performance expectancy, effort expectancy and perceived utility more. These models often overlook the balance between the technical skills and the responsibility to act ethically in education.

This conceptual paper addresses this gap by introducing a new policy-based model for using technology in teacher education. This model is aligned with the goals of NEP 2020 and introduces two key ideas such as Digital Self-Efficacy (DSE) and Digital Ethical Responsibility (DER). These ideas are seen as important factors that help educators to use technology in ways that are both effective and ethical. This paper explains how an educator's confidence in using digital tools goes hand in hand with their ability to manage ethical risks such as protecting data privacy, upholding intellectual honesty, ensuring fair access to digital resources, and understanding how algorithms work. This combination helps educators to develop thoughtful and responsible teaching practices.

By focusing on ethical responsibility as an active part of technology use rather than just a result of it, this model offers a strong theoretical foundation for updating teacher training programs. Theoretically, it broadens the traditional models of technology acceptance to include the complex moral and social aspects of modern digital learning. Practically, it provides guidance for curriculum designers, teacher educators, and policymakers in creating programs that help develop educators who are skilled and ethically responsible.

Keywords*:* NEP 2020, Teacher Education, Technology Adoption Models, Digital Ethical Responsibility, Digital Self-Efficacy, Pedagogical Innovation.

INTRODUCTION

The higher education system in India during the twenty-first is undergoing a major transformation driven by technological advancements and government policies (Tilak & Biswal, 2015; Varghese & Malik, 2020). The introduction of National Education Policy (NEP) 2020 by the Ministry of Education, Government of India, marks a significant turning point in the country's educational history (National Education Policy, 2020). NEP 2020 presents a bold plan to position India as a global leader in knowledge by promoting diverse curricula, adaptable learning methods, integration of technology into education and a strong focus on ethics and values across higher education institutions (National Education Policy, 2020).

A key part of achieving the NEP 2020 goals is the modernization of teacher education. Institutions that prepare teachers and advanced programs like the Master of Education (M.Ed.) play a vital role in developing future educational leaders, curriculum designers, teacher trainers and research experts (National Council for Teacher Education, 2021). With the expansion of digital learning platforms such as DIKSHA, SWAYAM, PM eVidya, and virtual labs, teachers are now working in highly tech-enabled learning environments (National Education Policy, 2020; Williamson, 2017).

However, the quick adoption of digital tools, learning app and artificial intelligence in classrooms has raised several ethical concerns (Holmes et al.,2019; Selwyn, 2019). Problems related to student data tracking, biased algorithms, cheating, lack of access to technology, and ownership of digital content have made the use of technology in teaching a sensitive issue (Floridi, 2019; Regan & Jesse, 2019; Slade & Prinsloo, 2013). Educators today must not only to decide if they will use technology but also think carefully about how to use it in ways that respect human dignity, fairness and moral responsibility (Buckingham, 2015; Selwyn, 2016).

Although these challenges are becoming more common, most technology adoption models in education such as Technology Acceptance Model (TAM) (Davis F. D., 1986), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009) still focus on how useful or efficient a tool is.

These traditional frameworks emphasize practical benefits like expected performance and ease of use and often overlook moral responsibility as a measurable factor (Selwyn, 2019).

To address this gap in theory, this paper presents a new policy-focused model designed specifically for teacher education under the NEP 2020 framework. By introducing Digital Self-Efficacy (DSE) and Digital Ethical Responsibility (DER) as the two main ideas in the model, this paper redefines digital readiness from just having technical skills to becoming a well-rounded, morally grounded leader in teaching.

LITERATURE REVIEW

Theoretical Background & critique of Classical Adoption Models

2.1 The utilitarian dominance in technology acceptance literature

For the past forty years, research on the adoption of educational technology has primarily drawn from information systems theory and social-psychological models (Ajzen, 1991; Davis F. D., 1989; Venkatesh et al., 2003).

Technology Acceptance Model (TAM): Introduced by Davis (1989) (Davis F. D., 1989),TAM suggests that the intention to use a system is shaped by two key beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). While TAM is effective in corporate software settings, using it in education reduces teaching to matter of operational efficiency (Selwyn, 2016).

Unified Theory of Acceptance and Use of Technology (UTAUT): This model was created by (Venkatesh et al., 2003) and later expanded into UTAUT-2 (Venkatesh et al., 2012). It integrates elements from eight major models and considers factors like Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Although UTAUT includes environmental and social elements, it still defines successful adoption in terms of productivity, without considering the moral responsibilities involved in teaching.

Technological Pedagogical Content Knowledge (TPACK): Developed by Mishra and Koehler (2006; Koehler & Mishra, 2009), this framework highlights the integration of technology, pedagogy, and content knowledge needed for effective teaching. While TPACK is an important standard for instructional design, it mainly serves as a tool for mapping knowledge. It does not address ethical issues, privacy concerns, or social inequalities that may arise with technology use (Buckingham, 2015; Selwyn, 2019).

2.2 Evolutionary Lineage of Adoption and their Theoretical Limitations

To understand why current models are insufficient for modern teacher education under NEP 2020, it is necessary to examine the broader historical trajectory of technology adoption theories. Over the past 40 years, adoption research has evolved through four major theoretical phases:

1. Psychological & Behavioral Foundations (1975-1991): Early frameworks like the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Interpersonal Behaviour (Triandis, 1977), Expectation Confirmation Theory (Oliver, 1980) and Theory of Planned Behaviour (Ajzen, 1991) established that behavior is driven by intentions, habits, and social norms. However, these models assumed complete "volitional control" (free will to use technology) and lacked constructs specific to digital interfaces and ethics.
2. Utilitarian & System Acceptance Frameworks (1986-1992): Models like TAM (Davis F. D., 1986), Social Cognitive Theory (Bandura, 1986), Perceived characteristics of Innovating (Moore & Benbasat, 1991), Model of PC utilization (Thompson et al.,1991) and the Motivational Model (Davis et al.,1992) introduced Self-Efficacy and intrinsic enjoyment. Yet, they evaluated technology adoption strictly as a tool for work output and individual job performance.
3. Decomposed, Artifact, & Task-Fit Models (1995-2000): Subsequent models include Igbaria's Model (Igbaria et al.,1995), Decomposed TPB (Taylor & Todd, 1995), Diffusion of Innovations (Rogers, 1995), Information system success model (DeLone & McLean, 1995), Task technology fit , C-TAM-TPB (Taylor & Todd, 1995) and TAM-2 (Venkatesh & Davis, 2000) introduced status (image), task fit, and system quality metrics. However, they remained silent on the moral obligations of educators regarding student data privacy or algorithmic bias.
4. Unified, Consumer, & Innovativeness Models (2003-2007): Modern extensions like UTAUT (Venkatesh et al., 2003), TAM-3 (Venkatesh & Bala, 2008), Uses and Gratification theory (Grellhesl & Punyanunt-Carter, 2012), UTAUT-2 (Venkatesh et al., 2012) and UTAUT-3 (Farooq, et al., 2017) added consumer metrics such as price value, hedonic motivation and personal innovativeness. While UTAUT-3 recognizes an individual's flair for exploring tech, it treats experimentation as purely technical curiosity, lacking any dimension of moral accountability.

2.3 Balanced Perspective on Classical Adoption Models

While this paper highlights the limitations of classical models in addressing classroom ethics, it is important to recognize the significant contributions these models have made. Framework such as TAM, TPB, and UTAUT have proven to be robust, reliable, and highly successful in predicting user acceptance in business, office automation and voluntary consumer app environments. Their primary limitation is not a defect in their original design, but rather a matter of scope; they were created to measure organizational task efficiency and individual performance. In educational contexts, however, teachers are responsible for the welfare, privacy, and fair treatment of vulnerable students. Therefore, expanding these models to include ethical responsibility does not invalidate classical theories, but builds upon their strengths to meet the complex demands of modern classrooms.

Table 1: Evolution of Theories/Models studying technology adoption and their theoretical limitations

S. No	Theory/Model	Author(s)	Year	Constructs	Advancement	Critical Limitation in Educational Context
1	Theory of Reasoned Action (TRA)	Fishbein and Ajzen	1975	Attitude, Subjective Norm, Intention, Behavior	Established that teacher behavior is driven by intention rather than random action.	Assumes complete "volitional control" (ignores external constraints or non-voluntary barriers).
2	Theory of Interpersonal Behaviour (TIB)	Harry Triandis	1977	Intention, Social Factors, Affective Factors, Habits, Facilitating Conditions	Recognized that behavior is a function of intention plus ingrained habits and situational factors.	Overly complex and mathematically heavy for practical school IT implementation studies.

3	Expectation confirmation Theory (ECT)	Oliver	1980	Expectations, Perceived Performance, Confirmation, Satisfaction, Continuance Intention	Shifted focus from initial adoption to continuance, showing satisfaction depends on met expectations.	General marketing framework lacking constructs for cognitive interaction with computer interfaces.
4	Technology Acceptance Model (TAM)	Davis	1986	Perceived Usefulness (PU), Perceived Ease of Use (PEOU)	Simplified adoption into two technology-specific cognitive beliefs.	Highly reductionist; ignores environmental context, teacher agency, and ethical accountability.
5	Social Cognitive Theory	Bandura	1986	Personal Factors, Environmental Factors, Behavior, Self-Efficacy	Introduced Self-Efficacy (belief in capability) as a key driver of tech usage in a social setting.	Broad learning theory rather than a structured predictive model for specific technology artifacts.
6	Theory of Planned Behaviour (TPB)	Ajzen	1991	Personal attitudes, Subjective norms, Perceived behavioral control	Solved the "Volition" problem by adding Perceived Behavioral Control(PBC) to account for resources and skills.	PCB acted as a "black box" that failed to separate innovative traits from user constraints.
7	Perceived Characteristics of Innovating	Moore and Benbasat's (Moore & Benbasat, 1991)	1991	Relative Advantage Compatibility, Ease of Use, Image, Visibility, Trialability, Voluntariness	Added image, visibility, and voluntariness, proving that social status impacts teacher adoption.	It focused on the "innovation" broadly rather than specific Utilization Patterns of hardware.
8	Model of PC Utilization	Thompson	1991	Job-Fit, Complexity, Long-term consequences, Affect, Social Factors, Facilitating Conditions	Refined TIB specifically for personal computers, introducing Job fit, and long-term consequences.	It focused exclusively on Utilitarian work and ignored the intrinsic motivation or "fun" of learning
9	Motivational Model	Davis	1992	Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Behavioral Intention	Integrated Enjoyment and playfulness showing that users are often driven by intrinsic rewards.	Motivation was still treated as secondary to utility, which was insufficient for diverse user settings
10	Igbaria's Model	Igbaria, Guimaraes, & Davis	1995	Perceived Usefulness, Perceived ease of use, perceived enjoyment(intrinsic)	Proved that Perceived Fun is more influential than ease of use in non-work settings	Despite its accuracy, it was artifact-specific and didn't allow for district-wide policy planning
11	Decomposed theory of planned behaviour	Taylor and Todd	1995	Attitudinal Beliefs, (Compatibility, PEOU, PU), Subjective Norms, Control Beliefs(self-efficacy)	Broke Attitude, Norms and control into Managing Sub-Factors (e.g. Peer vs superior pressure)	Too data-heavy and complex for macro-level analysis of institutional spread
12	Theory of Diffusion	Rogers	1995	Innovators, Early Adopters, Early Majority, Late	Explained the "S-Curve" of adoption and identified Adopter categories	Measures the spread of the idea but ignores the quality of the system itself

	of Innovation			Majority, Laggards		
13	Information system success model	Delone and Mclean	1992	System Quality, Information Quality, Service Quality, System Use, User Satisfaction, Net Benefits	Identified 6 factors (Desired system characteristics) system quality, information use, user satisfaction, individual impacts and organizational impacts	A high-quality system can still fail if it does not align with Pedagogical Task
14	Task Technology fit	Goodhue and Thompson	1995	Task Requirements, Technology Functionality, Individual Abilities, Task-Tech Fit	Argued that technology only impacts performance if there is a Good Fit between the tool and task	Measures usage and impact but fails to explain User Intention
15	Combined model of TPB and TAM	Taylor and Todd	1995	Perceived Usefulness (PU), Perceived Ease of Use (PEOU) TPB Components Attitude (ATU), Subjective Norm (SN), Behavioral Intention (BI)	Successfully coupled technology beliefs (TAM) with personal control factors (TPB)	Lacked a measure for professional status and job relevance with TAM2 later added
16	TAM-2	Venkatesh and Davis	2000	PU, PEOU, Subjective Norm, Image, Job Relevance, Output Quality, Result Demonstrability	Added Subjective Norm, Image, Job Relevance, Output Quality, Result Demonstrability.	Still lacked determinants for PEOU (why is it easy?) and remained a fragmented framework
17	Unified Theory of Acceptance and use of Technology (UTAUT)	Venkatesh, Morris and Davis & Davis	2003	Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions	Synthesized 8 basic models into 4 core constructs, explaining up to 70% of variance in intention.	Built for mandatory workplace use and performed poorly when applied to elective educational apps
18	TAM-3	Venkatesh and Bala	2008	Extension of TAM-2 with computer anxiety and self-experience determinants	Integrated determinants of ease of use like Computer Anxiety and focused on training interventions	Remained purely utilitarian and ignored why users choose tools for personal gratification
19	Uses and Gratification Theory	Grellhesl & Punyanunt-carter	2012	Motivations (Information, Social), Behavioral Usage, Gratifications/Satisfaction	Focused purely on Intrinsic satisfaction, explaining why students use platforms for connection	Ignored environmental barriers and habits that constrain intention
20	UTAUT-2	Venkatesh, Thong and Xu	2012	Performance/Effort Expectancy, Social Influence, Hedonic	Added consumer metrics (fun, price, habits) to capture the	Traditional social pressure has changed, and UTAUT2 ignored the trait of proactive experimentation.

				Motivation, Price Value, Habit	"student/teacher as consumer" reality.	
21	UTAUT-3	Farooq	2017	UTAUT-2 Constructs + Personal Innovativeness	Added Personal Innovativeness as a primary predictor (user's inherent willingness to explore tech).	Focuses on technical flair/experimentation but lacks moral agency, privacy awareness, or equity metrics.

2.4 Comparative Critique: Classical Models vs Proposed Policy-Based Model

A thorough examination of these 21 frameworks highlights a consistent theoretical gap. Over the course of four decades in adoption research, models have developed from focusing on basic usefulness (TAM) to considering structural workplace factors (UTAUT) and consumer pleasure (UTAUT-2, UTAUT-3). However, as illustrated in Table 2, none of these traditional models include moral responsibility, data privacy, understanding of algorithms, or fairness in digital access as key factors influencing the acceptance of technology.

Table 2: Comparative Critique: Classical Adoption Frameworks vs Proposed NEP 2020 Policy-based model

Dimension	Classical Behavioral Lineage (TRA/TPB/TIB)	Classical Utilitarian Lineage (TAM/TAM-2/ TAM-3)	Unified & Consumer Lineage (UTAUT/UTAUT-2/ UTAUT-3)	Proposed Policy-based model
Primary objective	Predicting general human behavioral intentions	Predicting workplace computer acceptance and task speed	Synthesizing adoption drivers across corporate and consumer settings	Developing reflective, value-driven "Ethical Digital Educators".
Core driving constructs	Attitudes, subjective norms, perceived behavioral control	Perceived usefulness (PU) & Perceived Ease of Use (PEOU)	Performance/effort expectancy, hedonic motivation, personal innovativeness	Digital Self-Efficacy (DSE) & Digital Ethical Responsibility (DER)
View of technology integration	Neutral artifact subject to individual volition or habit	Workplace productivity tool to enhance job performance	Consumer commodity or lifestyle choice	Socio-political artifact requiring active moral agency and risk navigation
Ethical & Privacy Considerations	Absent, assumes user control without moral obligations	Absent, evaluates adoption purely through functional output	Absent, treats innovativeness as a willingness to experiment without risk metrics	Central Pillar operationalizes data privacy, AI ethics, algorithmic bias, and equity
Policy alignment (NEP 2020)	None (general social psychology framework)	None (Corporate/Administrative software framework)	None (commercial/ workplace consumer framework)	Fully aligned with NEP 2020 (Paras 15, 23, 11.8, 24), UNESCO (2018, 2023), OECD (2019a), World Bank (2020, 2021), NITI Aayog and UGC
Ultimate outcome state	Behavioral Intention (BI)/Actual Usage	System Usage/ Job Performance	Behavioral Intention & System Use	Ethical digital leadership & reflective pedagogical practice

2.5 Distinction of DSE and DER From Related Concepts

To clearly understand what makes the DSE-DER model unique, it is helpful to distinguish Digital Ethical Responsibility (DER) and Digital Self-Efficacy (DSE) from existing concepts like Digital Citizenship, AI Literacy, and TPACK. While these concepts are related, they focus on different aspects of technology use:

- Digital Citizenship vs DER: Digital citizenship (Ribble, 2015) usually focuses on general rules of online behavior, cyber etiquette, following copyright laws, and internet safety for any online user. In contrast, Digital Ethical Responsibility is specific to the professional work of teaching. It requires educators to actively protect student data privacy, audit educational apps for algorithmic bias, ensure fair access for underprivileged students, and guide learners on the honest use of artificial intelligence in the classroom.
- AI Literacy vs DSE and DER: AI literacy (Long & Magerko, 2020) mainly focuses on understanding how artificial intelligence works, recognizing AI-generated content, and knowing how to write prompts. While AI literacy provides technological knowledge, Digital Self-Efficacy (DSE) represents the teacher's practical confidence to solve technical issues and innovate during live teaching. Furthermore, DER provides the moral judgement needed to decide whether using an AI tool is genuinely beneficial fair, and safe for students.
- TPACK vs DSE and DER: TPACK (Koehler & Mishra, 2009) is a widely respected model that explains the kinds of knowledge teachers need to combine content, pedagogy, and technology. However, TPACK acts as a cognitive knowledge map and treats technology as value-neutral. It does not explain what teachers should do when faced with ethical problems like privacy violations, algorithmic discrimination or digital exclusion. DSE adds the element of active confidence and troubleshooting resilience, while DER adds the necessary moral framework to make responsible pedagogical choices.

2.6 Theoretical Vacuum in Modern Educational Technology Adoption

As shown through this systematic review, traditional theories of technology adoption focus on how quickly or easily an educator uses a tool, without considering how ethically that tool is incorporated. Even UTAUT-3 (Farooq, et al., 2017), the most recent major development in this area, defines Personal Innovativeness simply as an Individual's readiness to try out new technology. In today's environment, where generative AI, automated assessment systems, and commercial data collection are widespread, a willingness to use technology without moral responsibility can lead to serious problems in education (Regan & Jesse, 2019).

RESEARCH METHODOLOGY

This paper is a conceptual and theoretical study, so it does not depend on collecting data directly from the field or conducting empirical surveys. Instead, it uses an integrative literature synthesis and conceptual analysis methodology (Jaakkola , 2020; Torraco, 2025). This integrative conceptual approach is widely acknowledged in educational and social science research as a thorough method for evaluating existing theories, connecting separate areas of study, and developing new theoretical ideas.

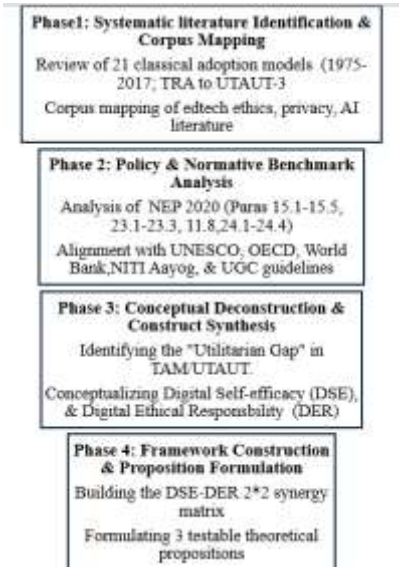

Fig1: Conceptual Research Methodology Phases

3.1 Methodological Protocol & Search Strategy

To ensure the selection of sources was systematic and transparent, the literature search was conducted following a clear protocol across four major academic databases: Google Scholar, Web of Science, Scopus and ERIC.

Search Period: 1975 to 2026

Keywords and Search Strings: The search used combinations of Boolean terms:

The conceptual synthesis was carried out in four structured phases:

("technology acceptance model" OR "UTAUT" OR "TAM" OR "TPACK" OR "technology adoption") AND ("teacher education" OR "pre-service teachers" OR "educator readiness") AND ("ethics" OR "data privacy" OR "algorithmic bias" OR "digital citizenship" OR "AI ethics")

Inclusion Criteria:

1. Foundational peer-reviewed theoretical models on technology adoption published between 1975 and 2024.
2. Official policy documents and guidelines from recognized educational and governmental bodies (NEP 2020, UNESCO, OECD, World Bank, NITI Aayog, UGC).
3. Peer-reviewed literature focusing on digital ethics, data privacy, student tracking, and AI in educational settings.

Exclusion criteria

1. Studies focusing solely on technical hardware specifications without educational applications.
2. Articles on commercial software adoption that have no relevance to teaching or learning environments.
3. Unverified opinion pieces or blogs lacking academic or policy standing.

Through this process, 21 major technology adoption theories and 8 policy benchmark documents were identified and analyzed across four structured phases:

Phase 1 (Systematic corpus identification): Comparing of 21 major adoption theories such as TRA (1975) to UTAUT-3 (2017)

Phase 2 (Policy & Normative Analysis): Analyzing NEP 2020, UNESCO, OECD, World Bank, NITI Aayog, and UGC ethical Frameworks.

Phase 3 (Conceptual Deconstruction & Gap Identification): Applying domain-bridging techniques (MacInnis, 2011) to identify the lack of attention to moral agency, privacy, bias, and equity in utilitarian models.

Phase 4 (Model Synthesis & Typology Construction): Bringing together Social Cognitive Theory (Bandura, 1977, 1986) and Information Ethics (Floridi,1999, 2019) to develop DSE and DER, formulate the 2x2 matrix, and propose testable hypotheses.

Conceptual Findings and Proposed Model Synthesis

In a conceptual paper, the findings refer to the developed theoretical framework, clear definitions of constructs, types of interactions, and formal statements or propositions that are drawn from the integration of existing literature (Jaakkola , 2020).

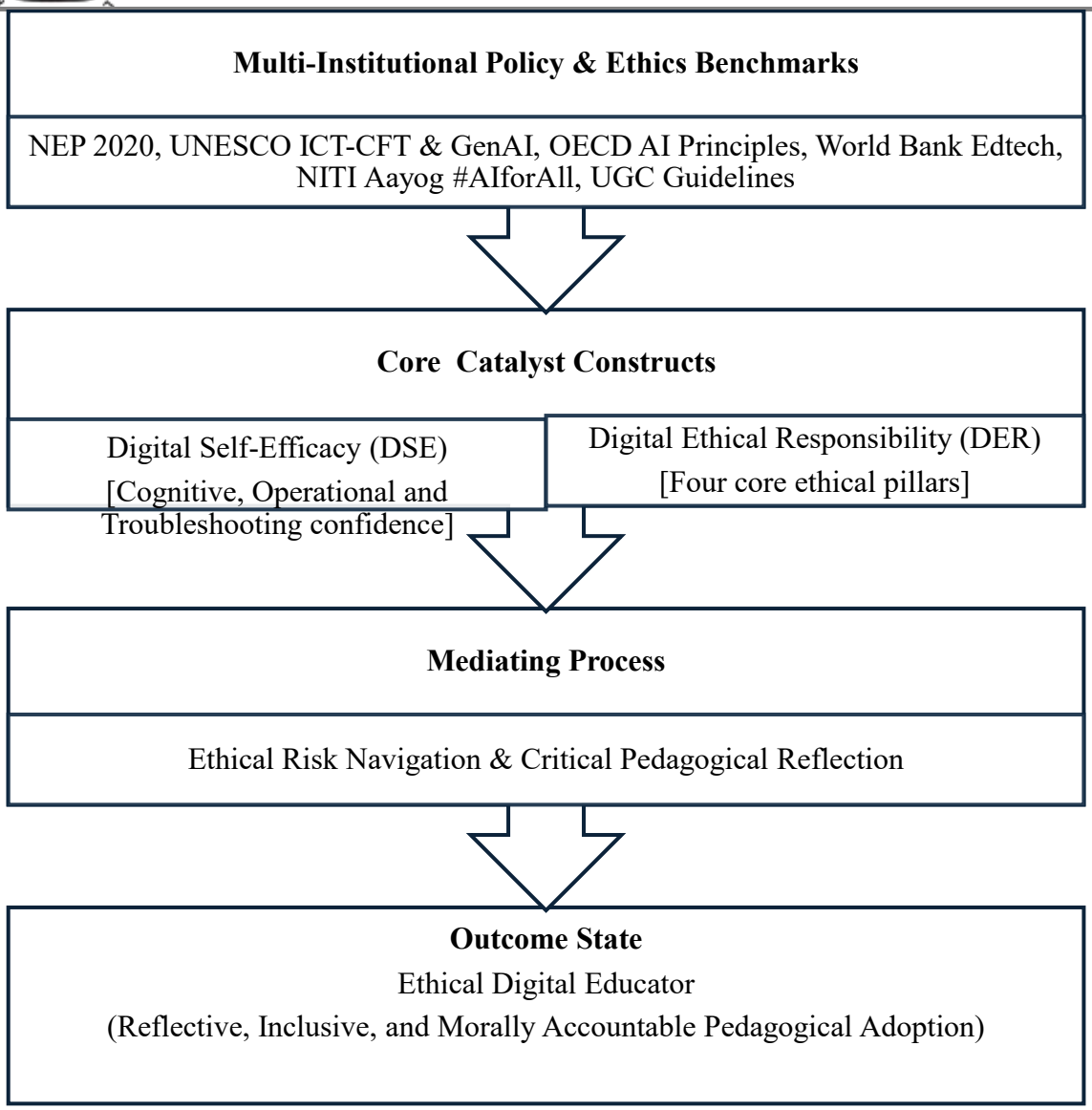

Fig 2: Multi-Institutional Policy Alignment & Conceptual Flow

4.1 Finding 1: Multi-Institutional Policy Alignment

The analysis shows that the adoption of technology in teacher training needs to match the policies set by multiple institutions:

1- NEP 2020 Mandates: These include Paragraphs 15.1-15.5, which aim to reform teacher training into professional programs based on values: Paragraphs 23.1-23.3, which require the use of technology in a way that respects human values, Paragraph 11.8, which requires courses on value-based and ethical education through a credit system, and paragraphs 24.1-24.4, which ensure equal access to digital resources and protect data privacy (National Education Policy, 2020).
2- UNESCO Guidelines: These include the UNESCO ICT Competency Framework for Teachers (UNESCO, 2018) and the Guidance for Generative AI in Education and Research (UNESCO, 2023).
3- OECD Benchmarks: These align with the OECD Recommendation on Artificial Intelligence (OECD, 2019) and OECD Learning compass 2030 (OECD, 2019).
4- World Bank Directives: These include the principles from Reimagining Human Connections (World Bank, 2020; World Bank, 2021). These emphasize protecting student privacy and reducing the gap in digital access.

5- NITI Aayog Principles: These reflect India's national strategies for AI, such as #AIforAll and Responsible AI for All. These prioritize fairness, privacy and transparency in algorithms (NITI Aayog, 2021).
6- UGC Ethics Standards: These include (UGC, 2018) and the Vigilance Advisory Circular on AI-detection and linguistic analysis tools (UGC, 2023). These set the standard for academic integrity and ethical leadership in higher education programs.

4.2 Finding 2: Operationalization of Digital Self-Efficacy (DSE)

The conceptual analysis shows that digital readiness in teacher education cannot be limited to basic computer skills. Digital Self-Efficacy (DSE) refers to an educators' belief in their ability to carry out more complex digital tasks, adjust to new tools, and solve technical problems on their own during teaching (Bandura A. , 1977; Compeau & Higgins, 1995).

DSE includes three main areas:

1- Technological Adaptability: The confidence to independently explore, learn and use new digital platforms and generative AI tools without constant help from technical support (Eastin & LaRose, 2000; UNESCO, 2023).
2- Troubleshooting Resilience: The ability to stay calm and address unexpected technical issues, such as hardware, software, or connectivity problems, during live session (Torkzadeh & Koufteros, 1994).
3- Pedagogical Innovation: The confidence to change traditional, teacher-led instruction into interactive, technology-based learning environments for students (Compeau & Higgins, 1995; OECD, 2019).

4.3 Finding 3: Operationalization of Digital Ethical Responsibility (DER) & Its Four Pillars

Digital Ethical Responsibility (DER) refers to an educator's active moral commitment, awareness, and behavior to manage ethical challenges, protect student dignity, and ensure fairness in digital learning environments (Floridi, 2019; Selwyn, 2019).

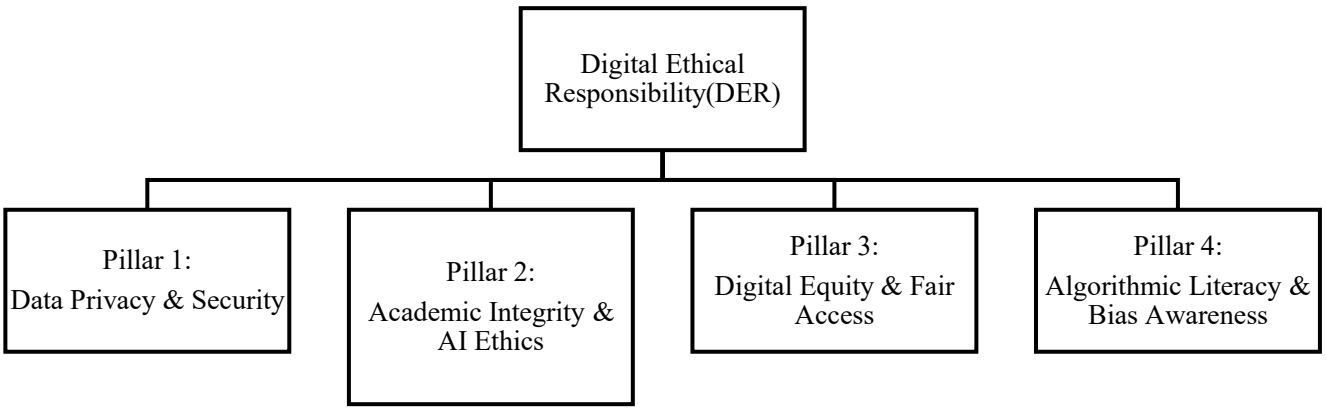

Fig 3: DER Four Pillars

1. Pillar 1: Data Privacy and Security Navigation: Protecting student data, evaluating software privacy policies, respecting digital consent, preventing commercial surveillance, and safeguarding educational records (OECD, 2019; Regan & Jesse, 2019; World Bank, 2020).

2. Pillar 2: Academic Integrity and AI Ethics: Establishing transparent guidelines for generative AI Usage, teaching responsible digital scholarship, preventing plagiarism, and modeling proper attribution in higher education (Holmes et al., 2019; UGC, 2023; UNESCO, 2023).
3. Pillar 3: Digital Equity and Universal Fair Access: Designing inclusive learning experiences, leveraging Open Educational Resources (OER), and ensuring mandatory digital tasks do not disadvantage socio-economically underprivileged students (Education , 2020; UNESCO, 2018; World Bank, 2020).
4. Pillar 4: Algorithmic Literacy and Automated Bias Awareness: Critical understanding that educational algorithms and automated scoring platforms can reflect cultural, linguistic and gender biases, requiring active human teacher oversight (Nobel, 2018; OECD, 2019; NITI Aayog, 2021).

4.4 Finding 4: Proposed Measurable Indicators for DSE and DER

To make this conceptual model ready for empirical testing, measurable dimensions and survey indicator items have been developed. These indicators are designed for use with a 5-point Likert scale (ranging from 1=Strongly Disagree to 5=Strongly Agree) and are specifically tailored for pre-service teacher cohorts, such as Master of Education (M.Ed.) students.

Table 3: Measurable Dimensions and Proposed Survey Indicators for DSE and DER

Construct	Dimension	Item Code	Proposed Survey Item Indicator	Theoretical Reference
Digital Self-Efficacy (DSE)	Technological Adaptability	DSE_TA1	I feel confident in my ability to learn and use new educational software and AI tools without needing technical support.	Compeau & Higgins (1995); Eastin & LaRose (2000)
		DSE_TA2	I can independently adapt emerging digital platforms to match my specific subject curriculum.	Bandura (1986); OECD (2019a)
	Troubleshooting Resilience	DSE_TR1	When technical problems occur during teaching, I stay calm and solve the issue step-by-step.	Torkzadeh & Koufteros (1994)
		DSE_TR2	I can quickly arrange alternative teaching activities whenever internet or school computers fail.	Ertmer & Ottenbreit-Leftwich (2010)
	Pedagogical Innovation	DSE_PI1	I feel confident designing interactive, student-centered digital activities rather than just using slides.	Koehler & Mishra (2009); UNESCO (2018)

		DSE_PI2	I can create digital assessments that challenge students to think critically instead of just memorizing facts.	UNESCO (2023)
Digital Ethical Responsibility (DER)	Pillar 1: Data Privacy & Security	DER_DP1	Before asking students to use a digital app, I check its privacy terms to ensure their personal data is safe.	Regan & Jesse (2019); World Bank (2021)
		DER_DP2	I actively guide students on how to protect their personal privacy and digital footprints online.	NEP 2020 (Para 24.4); OECD (2019b)
	Pillar 2: Academic Integrity & AI Ethics	DER_AI1	I give clear guidelines to students about what is acceptable and what is unfair when using generative AI tools.	UGC (2023); UNESCO (2023)
		DER_AI2	I teach students how to cite digital sources correctly, prevent plagiarism, and verify information found online.	UGC (2018); Holmes et al. (2019)
	Pillar 3: Digital Equity & Fair Access	DER_EQ1	I ensure my digital assignments have low-bandwidth or offline options so that disadvantaged students are not left behind.	NEP 2020 (Para 24.1); World Bank (2020)
		DER_EQ2	I deliberately use Open Educational Resources (OER) to help reduce textbook and material costs for students.	UNESCO (2018); NEP 2020 (Para 11.8)

	Pillar 4: Algorithmic Literacy & Bias	DER_AL1	I critically evaluate automated scoring tools and online test platforms to make sure they are not biased against any group.	Noble (2018); NITI Aayog (2021)
		DER_AL2	I ensure that automated AI suggestions never replace my personal teacher judgment when assessing student progress.	Floridi (2019); Selwyn (2019)

4.5 Finding 5: The DSE-DER Synergy Matrix

A crucial insight is that DSE and DER should work together to support each other. The 2x2 synergy matrix identifies four different results related to educator profiles:

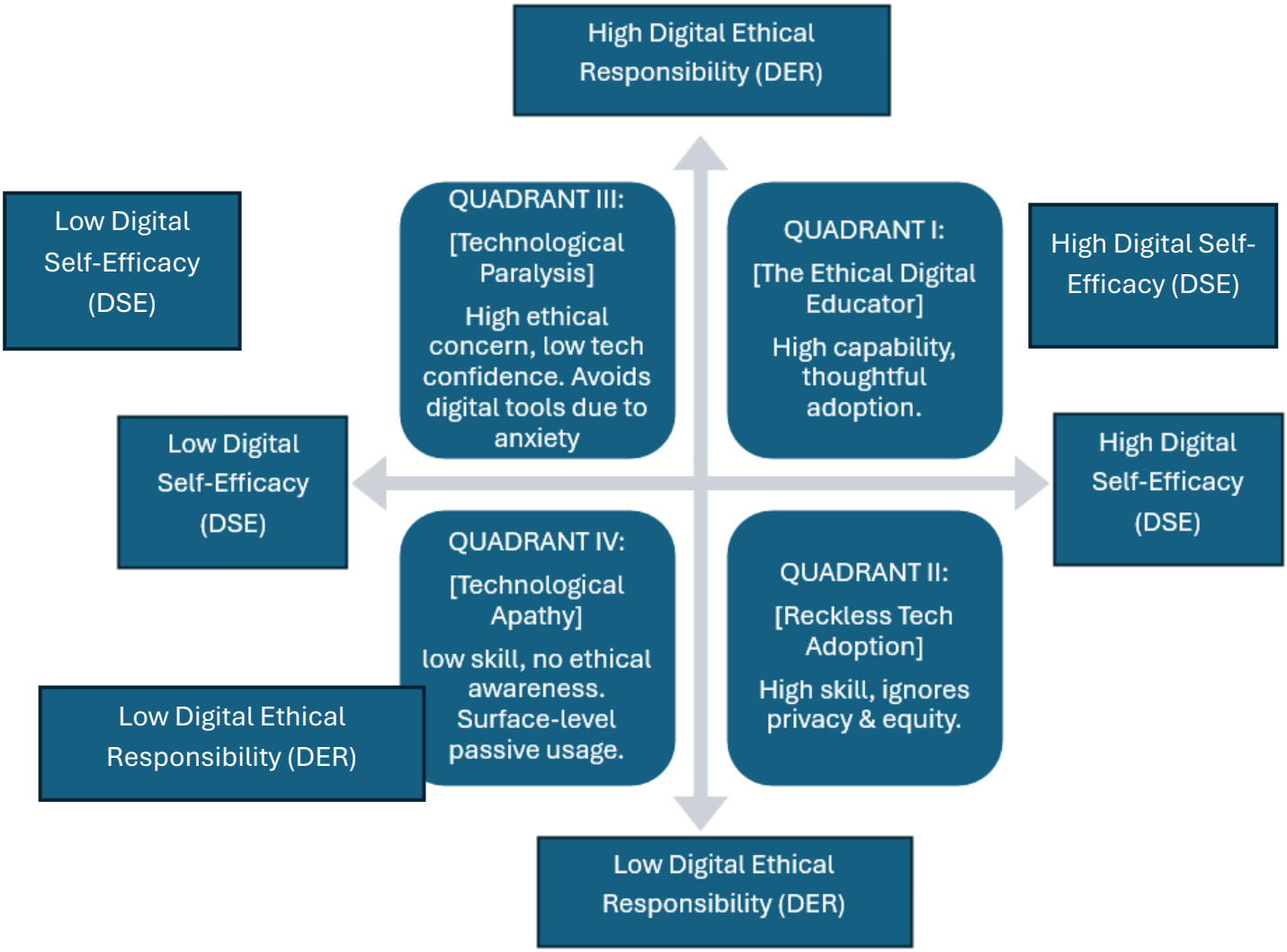

Fig 4: DSE-DER Synergy Matrix

1- Technological Apathy (Low DSE/Low DER): This refers to a passive and shallow use of technology, where individuals lack both technical expertise and an understanding of the ethical implications (Selwyn, 2016).
2- Reckless Tech Adoption (High DSE/Low DER): This involves quickly embracing new AI and digital tools without thoroughly considering issues such as privacy concerns, algorithmic bias, and unequal access to technology (Regan & Jesse, 2019).
3- Technological Paralysis (Low DSE/High DER): Educators may have a strong awareness of the risks associated with technology but lack the technical skills needed to use digital tools effectively, leading them to avoid using them altogether (Ertmer & Ottenbreit-Leftwich, 2010; Howard, 2013).
4- The Ethical Digital Educator (High DSE/High DER): This is the ideal state outlined by the NEP 2020. Educators in this category are confident in their technical abilities and have a strong sense of ethical responsibility, allowing them to assess digital tools, safeguarding student rights, ensure fairness, and provide meaningful and transformative teaching (Floridi, 2020).

4.6 Finding 6: Formal Theoretical Propositions

Based on the conceptual framework presented, the paper presents three propositions that can be tested empirically:

Proposition 1 (Direct Influence): Digital Self-Efficacy (DSE) has a positive direct effect on an educator's ability to implement Digital Ethical Responsibility (DER). Having confidence in digital skills reduces technical frustration and creates the mental space needed for teachers to assess ethical issues, privacy rules, and student accessibility during teaching (Bandura A. , 1977; Compeau & Higgins, 1995).

Proposition 2 (Mediation Role): Digital Ethical Responsibility (DER) plays a key mediating role connecting factors that encourage technology use, such as perceived usefulness with meaningful pedagogical adoption. This ensures that technology is chosen and utilized based on its ethical and educational value, rather than just how quickly it can be used (Floridi, 2019; Selwyn, 2019).

Proposition 3(Moderating Synergy): Digital Ethical Responsibility (DER) moderates the relationship between Digital Self-Efficacy (DSE) and meaningful pedagogical adoption, such that the positive impact of DSE is significantly stronger when DER is high compared to when DER is low. Having technical skills alone can lead to reckless adoption, but when combined with high ethical awareness, it leads to student-focused, responsible teaching (Holmes et al., 2019).

DISCUSSION

5.1 Theoretical Contribution: Overcoming the Utilitarian Bias

For many years, research on how people accept and use technology has mainly focused on utilitarian models like TAM, UTAUT, UTAUT-2 and UTAUT-3. These models assess technology adoption based on factors such as performance expectancy, ease of use, enjoyment and personal innovation (Davis F. D., 1989; Venkatesh et al., 2003; Venkatesh et al., 2012; Farooq, et al., 2017). Although these models help to explain why people use corporate software or consumer apps, they do not address the moral and human aspects of teaching.

This paper introduces Digital Ethical Responsibility (DER) along with Digital Self-Efficacy (DSE) to broaden the understanding of technology adoption. It redefines what it means for technology to be successfully adopted, moving beyond just how fast a task is done or how much a system is used. Instead, it emphasizes morally responsible, inclusive and reflective teaching practices.

5.2 Multi-Institutional Policy Harmonization

The model presented here brings together national policies with global standards to create a unified approach.

- NEP 2020: This document covers several important areas. It includes Paragraphs 15.1-15.5, which focus on improving teacher training. It also includes paragraphs 23.1-23.3, which deal with using educational technology based on values; Paragraph 11.8, which addresses courses that include credit-based values and ethics; and Paragraphs 24.1-24.4, which emphasize digital equity and safety (National Education Policy, 2020).
- UGC & NITI Aayog Directives: These include UGC regulations on academic integrity (UGC, 2018, 2023) and NITI Aayog's #AIforAll Principles (NITI Aayog, 2021). These directives require higher education institutions to ensure academic honesty and fairness in algorithms.
- Global Frameworks: The model aligns Indian higher education with the UNESCO ICT-CFT (UNESCO, 2018), UNESCO GenAI Guidance (UNESCO, 2023), OECD AI principles (OECD, 2019), and the World Bank's Data Privacy directives (World Bank, 2021).

5.3 Curricular Operationalization for M.Ed. & Teacher Education

Transforming this conceptual model into advanced teacher education programs, such as Master of Education Curricula, needs changes across three main areas (National Council for Teacher Education, 2021).

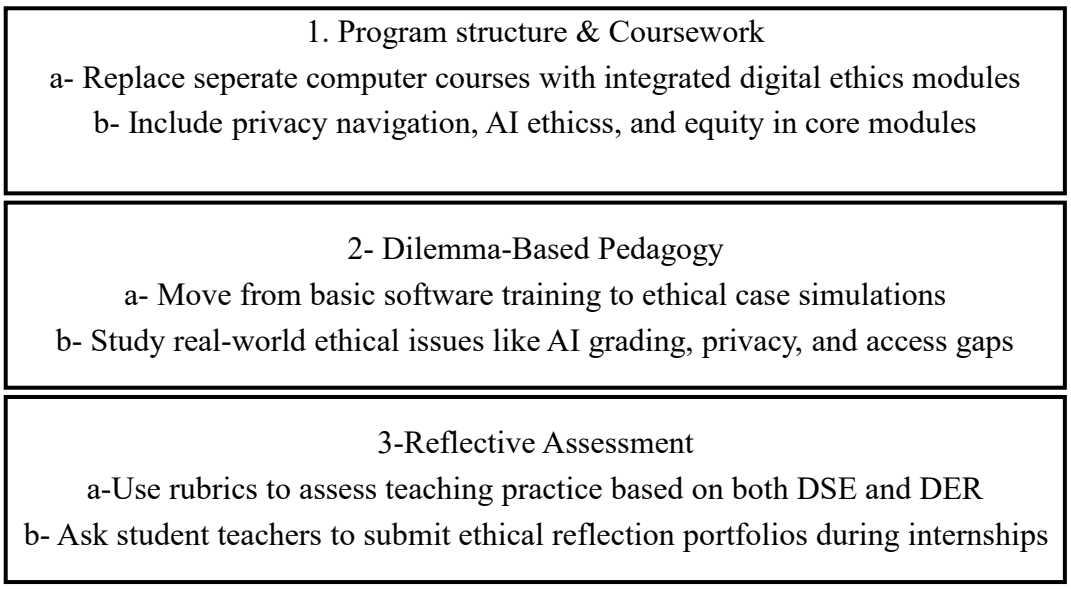

Fig 5: Proposed Curricular structure for M.Ed. & Teacher Education

- Coursework Restructuring: Replacing basic software training with integrated modules on digital surveillance, data privacy, open educational resources (OER) and AI ethics (Holmes, Bialik, & Fadel, 2019; UNESCO, 2023).
- Dilemma-Based Pedagogy: Using case-based simulations where teacher candidates examine real-world situations involving automated grading bias, plagiarism detection ethics, and digital access disparities (Buckingham, 2015; Nobel, 2018).
- Reflective Assessment Rubrics: Evaluating student teachers during field placements based on their ability to protect student data privacy, maintain academic integrity, ensue digital equity, and show resilience in troubleshooting (National Council for Teacher Education, 2021).

Implications, Limitations, & Future Empirical Roadmap

5.4 Policy and Institutional Recommendations

For regulatory bodies like the National Council for Teacher Education (NCTE) and the University Grants Commission (UGC) as well as universities implementing the National Education Policy 2020 (National Education Policy, 2020).

- Professional standards integration: it is essential to formally include Digital Ethical Responsibility (DER) metrics within the National Professional Standards for Teachers (NPST) (National Council for Teacher Education, 2021).
- Institutional Ethics Oversight: Higher education institutions should create edtech ethics oversight committees that follow the guidelines set by the UGC (2018) and the principles outlined by NITI Aayog (NITI Aayog, 2021). These committees should review data privacy and algorithmic transparency before the institution adopts any software.

5.5 Limitations of the Conceptual Design

As this is a theoretical study, it does not include primary empirical data, such as field data, sample statistics, or quantitative hypothesis testing. The model, propositions and construct dimensions are developed through an integrative synthesis and policy analysis.

5.6 Roadmap for Future Empirical Validation

To transition this theoretical model into verified practice, a staged empirical validation plan is outlined across three clear phases:

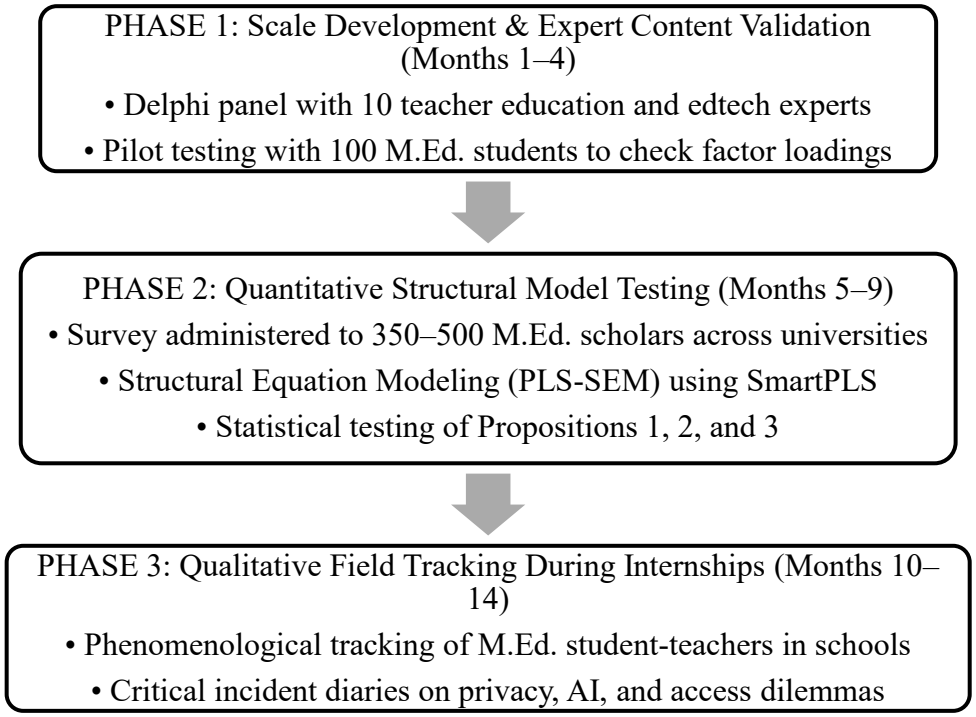

Fig 6: Staged Empirical Validation Roadmap for the DSE-DER Framework

- Phase 1 (Scale Refinement & Expert Validation): The 14 proposed survey indicators (Table 3) will be reviewed by a panel of 10 experts in teacher education and educational technology to ensure content validity. A pilot study with 100 M.Ed. students will be conducted to verify scale reliability (Cronbach's alpha $\geq$ 0.80) and factor structure using Exploratory Factor Analysis (EFA).
- Phase 2 (Quantitative Hypothesis Testing via PLS-SEM): The finalized survey will be administered to a large sample of 350 to 500 Master of Education (M.Ed.) scholars across central and state universities. Partial Least Squares Structural Modeling (PLS-SEM) using SmartPLS will be used to test the measurement model (convergent and discriminant validity) and statistically evaluate the structural paths for Propositions 1,2, and 3.
- Phase 3 (Qualitative Field Tracking During Internships): Qualitative researchers will use phenomenological approaches to examine how prospective teachers experience and resolve real ethical

dilemmas such as student data privacy, generative AI misuse, and internet connectivity barriers during their field internships in schools.

CONCLUSION

As higher education in India and globally increasingly incorporates artificial intelligence, learning analytics, and digital platforms under the NEP 2020, models of technology adoption must move beyond focusing only on operational utility, task efficiency, and system performance. This conceptual paper, grounded in national policy mandates and international ethical standards, presents a framework that integrates Digital Self-Efficacy (DSE) and Digital Ethical Responsibility (DER) into technological acceptance theory.

By positioning digital ethical responsibility as an active driver rather than a secondary consideration, this model develops a human-centered approach for teacher preparation. Equipping future educators with both technical confidence and a sense of moral responsibility ensure that the integration of technology in Indian higher education remains inclusive, equitable, and committed to the overall development of all learners.

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