

Empowerment and Concerns: A Grounded Theory Study on the Acceptance of Generative Artificial Intelligence by Primary School Teachers in Guangdong, China

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ABSTRACT

The deep integration of generative artificial intelligence (Gen AI) in educational contexts is largely contingent upon teacher acceptance. To investigate the underlying mechanisms, this study employed a grounded theory approach, conducting in-depth interviews with 21 primary school teachers in Guangdong Province, China. The findings reveal that teachers' acceptance of GenAI is not a straightforward adoption of technology but rather a prudent decision-making process characterized by an ongoing tension between "rational calculation" and "emotional experience." Specifically, influenced by the external environment, teachers meticulously weigh the "perceived advantages" and "perceived risks" of the technology, a calculus fundamentally moderated by their "role expectations." Ultimately, this internal tension manifests externally as a pattern of "low-frequency, on-demand, and selective" prudent adoption. The "Prudent Adoption Model under the Rational-Emotional Tension" constructed in this study not only uncovers that their "prudent" behavior is an assertion of professional autonomy but also provides a crucial contextualized extension to classical technology acceptance models. Furthermore, it offers profound implications for effectively supporting teachers as they navigate educational transformation in the digital-intelligent era.

Keywords: *Generative Artificial Intelligence (Generative AI), Technology acceptance, Grounded theory, Prudent adoption, Professional autonomy.*

1. INTRODUCTION

Generative Artificial Intelligence, as a disruptive technology, is permeating various sectors of society with unprecedented depth and breadth. Education, a crucial undertaking for national development and individual growth, is facing a profound reshaping of its ecosystem. Represented by large language models such as ChatGPT and DeepSeek, this technology, by virtue of its exceptional capabilities in natural language understanding, content generation, and contextual interaction, offers new possibilities for resolving the inherent tension between scale and personalization in traditional education.[1] Many scholars and policymakers regard it as a core driver for promoting the digital transformation of education and constructing a new paradigm for

smart education. They place hopes on human-machine collaboration to empower teachers, liberating them from tedious administrative tasks, thereby allowing them to focus on more creative and affective educational activities and guiding education quality to new heights.

However, historical experience demonstrates that the ultimate gateway for realizing the value of any technology in the educational field lies with teachers. Teachers act as the "gatekeepers" of educational change, and their acceptance of technology is by no means a passive "stimulus-response" mechanism, but rather a complex decision-making process integrating cognitive judgment, affective experience, and contextual considerations. Currently, a noteworthy "acceptance gap" exists between the grand narrative of external technological advocacy and the internal

perceptions of the teaching community. This gap manifests as a profound ambivalence: teachers can rationally perceive the empowering potential of generative AI—such as enhancing lesson preparation efficiency, generating contextualized teaching resources, and enabling precise attention to student differences; simultaneously, they struggle to shake off the shadows of concern it casts—including doubts about the accuracy and educational appropriateness of generated content, vigilance against the potential erosion of students' critical thinking and autonomous learning abilities, apprehensions about their professional authority being challenged by the "black box" nature of the technology, and anxiety about a digital divide exacerbated by a lack of training in the face of rapidly evolving tools. This complex psychological landscape, where "empowerment" and "apprehension" coexist, suggests that teachers' acceptance decisions are not straightforward utilitarian calculations, but likely involve a deeper, ongoing tension between rationality and emotion.

While the academic community has begun to examine teacher attitudes towards generative AI, existing research predominantly concentrates on higher education or remains at the level of describing technological application scenarios and exploring isolated influencing factors. A crucial theoretical gap persists: there is a lack of in-depth excavation and systematic theoretical construction regarding the internal psychological mechanisms of teachers, particularly primary school teachers, during their acceptance process of generative AI. The primary school stage is a critical period for the formation of students' cognitive styles, learning habits, and values, making the technological decisions of their teachers more foundational, demonstrative, and educationally sensitive. Consequently, this study poses the following questions: What core factors constitute the "rational calculus" and "emotional experience" of primary school teachers regarding generative AI? How do these two dimensions interact and create an internal tension? And how does this tension subsequently manifest as a specific pattern of behavior? Answering these questions urgently requires a theoretical model, grounded in the practical discourse of teachers, capable of unveiling the "black box" of their complex decision-making.

To address the aforementioned questions, this study employs a grounded theory approach, conducting in-depth interviews with 21 primary school teachers in Guangdong Province. It aims to systematically investigate: (1) What constitutes the

specific "perceived advantages" and "perceived risks" of generative AI among primary school teachers, and how do these form their framework of "rational calculus"? (2) What dimensions comprise their "affective experience" (e.g., role-related anxiety, professional identity), and how do these interact with and create tension against rational factors? (3) How does the rationality-affect tension collectively shape their final adoption behaviors, manifesting the typical characteristics of "prudent adoption"? By constructing a corresponding theoretical model, this research seeks to deepen the understanding of the internal logic underlying teacher technology acceptance, provide a necessary contextualized extension and supplement to classical technology acceptance models, and offer an empirical basis for developing policy systems and professional development pathways that effectively support teachers in navigating the challenges of the digital-intelligent era.

2. RESEARCH DESIGN

2.1 Research Methodology

This study employs grounded theory within the qualitative research tradition as its core methodology. Grounded theory was first introduced by Glaser and Strauss in 1967, with its fundamental purpose being to inductively construct theory from empirical data in a bottom-up manner.[2] The selection of this methodology is justified by three primary reasons. First, the central objective of this study is to explore and construct theory. Primary school teachers' acceptance of generative AI represents an emerging and complex socio-psychological process, for which no mature theoretical model currently exists to adequately explain its underlying mechanisms. The defining characteristic of grounded theory—"generating theory from data"—makes it particularly suitable for investigating this uncharted territory, thereby facilitating the construction of an acceptance model that genuinely reflects teachers' authentic perspectives.

Second, this research prioritizes a deep understanding of a complex psychological phenomenon. Teacher acceptance is not a simple binary of "yes" or "no" but is rather a dynamic process fraught with the ambivalence of "empowerment" and "apprehension." Through in-depth interviews, grounded theory is capable of capturing this complexity and revealing the underlying motivations, affective experiences, and

decision-making logics that are often elusive in quantitative studies.

Third, the research process rigorously adheres to the classic procedures of grounded theory. This involves a three-stage coding process—open coding, axial coding, and selective coding—entailing constant comparison, conceptualization, and categorization of the raw data until theoretical saturation is achieved. The ultimate goal is to develop a substantive theory that possesses explanatory power.

2.2 Data Collection

This study utilized a random sampling approach. Team members from different regions within Guangdong Province identified familiar primary school teachers to conduct one-on-one, semi-structured in-depth interviews. Based on a review of the literature and preliminary investigations, the team developed an interview protocol titled "Primary School Teachers' Attitudes Towards

Generative AI and Influencing Factors." The protocol primarily covered the following modules: (1) basic understanding and first impressions of generative AI; (2) perceived roles, potential benefits, and risks; (3) practical application experiences and specific cases; (4) difficulties and challenges encountered in use; and (5) internal and external factors influencing their acceptance. During the interviews, participants were encouraged to share specific stories and cases, with flexible follow-up questions posed based on their responses.

Ultimately, the research team completed in-depth interviews with 21 primary school teachers from Guangdong Province (see "Table 1" for details). Each interview lasted approximately 30-40 minutes. All interviews were audio-recorded with the participants' prior consent and subsequently transcribed verbatim, resulting in approximately 110,000 words of raw transcript data for subsequent analysis. All personal and institutional identifiers were anonymized to protect privacy.

Table 1. Participant characteristics (N=21)

Participant	Gender	Subject Taught	Years of Teaching	Primary School Type	Highest Degree	Age
T1	F	English	10	Rural	B.	32
T2	F	Math	1	Rural	B.	24
T3	F	English	4	Rural	B.	27
T4	F	Chinese	20	Urban	B.	40
T5	F	English	15	Urban	B.	37
T6	F	Chinese	6	Urban	M.	30
T7	M	Chinese	5	Rural	B.	28
T8	M	Chinese	8	Urban	A.	30
T9	F	Chinese	4	Rural	B.	26
T10	F	Chinese	3	Urban	B.	28
T11	M	Math	11	Rural	B.	33
T12	F	Chinese	7	Urban	B.	30
T13	M	Math	3	Urban	M.	26
T14	M	Math	6	Urban	B.	30
T15	M	Math	6	Urban	B.	31
T16	F	English	4	Urban	B.	28
T17	M	Chinese	10	Urban	B.	34
T18	F	English	6	Urban	M.	31
T19	F	Chinese	4	Urban	M.	31
T20	F	Chinese	4	Urban	B.	27
T21	M	Math	5	Rural	B.	33

3. DATA ANALYSIS

Following each formal interview, the researchers organized the collected data within 24 hours, ultimately accumulating over 110,000 words of interview transcripts. The interview audio was

transcribed verbatim, and irrelevant content was removed from the text. The data was then organized, analyzed, and coded with the assistance of NVivo 11.0 software.

3.1 Open Coding

Open coding involves breaking down the obtained raw data and, through constant comparison, identifying similarities and differences within the materials to assign labels to the phenomena reflected by the data, gradually conceptualizing them. During open coding, researchers must strive to "bracket" their personal "biases" and the study's "preconceptions," discovering and extracting as many concepts as possible from the data. The more meticulous this operation is, the better, continuing until the codes reach a state of saturation[3] (Chen Xiangming,

2000, p. 332). For instance, the statement "It can tutor according to each student's situation" was coded as "Personalized instructional support," while "Before using it, there was simply no one to teach us, we didn't know how to use it" was coded as "Technical operational barrier." Through continuous comparison, merging, and refinement, this study ultimately distilled [number] initial concepts from the raw statements. To clearly present this process, "Table 2" showcases a selection of representative, high-frequency core initial concepts, their corresponding raw statement excerpts, and their sources.

Table 2. Representative examples of open coding

No.	Subcategory	Examples of Included Initial Concepts
1	Teaching Efficacy	Improving teaching efficiency, Reducing workload, Resolving teaching challenges
2	Student Development	Stimulating student interest, Personalized instructional support, Fostering autonomous learning
3	Resource Innovation	Enriching teaching resources, Innovating teaching models
4	Ethical Risks in Teaching	Questions about content accuracy, Weakening of critical thinking, Risks in value orientation
5	Student Management Risks	Student over-reliance, Challenges in school-home supervision
6	Technology Usage Risks	Privacy and security concerns, Technical reliability issues
7	Usage Level	No attempt, Low-frequency on-demand use, Active exploration
8	Application Scenarios	Aiding lesson preparation & resource generation, Creating classroom scenarios, Visualizing teaching aids, Homework (essay) grading & feedback
9	External Support	Policy support and impetus, School-provided training, Resource provision
10	Internal Drivers	Teaching needs driving adoption, Colleague recommendation effect, Personal innovation awareness
11	Social Discourse	Influence of positive discourse, Influence of negative discourse
12	School Climate	Organizational culture pressure, Level of parental recognition
13	Role Anxiety	Assistant, Replacement, Sense of irreplaceability
14	External Pressure	Competition rules, Feeling coerced by technology, Technical proficiency assessments

3.2 Axial Coding

The primary task of axial coding is to discover and establish the underlying logical connections among the initial concepts derived from open coding. This involves clustering conceptually related and contextually similar initial concepts to form main categories and subcategories at a higher

level of abstraction.[4] Through continuous comparison and analysis of the 137 initial concepts, this study ultimately distilled six core main categories: perceived utility, perceived risk, adoption behavior, facilitating conditions, subjective norms, and affective experience. Each main category and its corresponding subcategories are presented in "Table 3".

Table 3. Results of axial coding

Main Category	Subcategory	Representative Dimensions
Perceived Utility	Teaching Efficacy	The positive perception that generative AI can improve teaching efficiency, optimize instructional effectiveness, and enhance the level of personalization.
	Student Development	Recognition of the value of generative AI in promoting the holistic development of students' comprehensive qualities and key competencies.
	Resource Innovation	The perception that generative AI introduces innovation and convenience to the creation, forms, and accessibility of teaching resources.
Perceived Risk	Ethical Risks in Instruction	Concerns regarding potential ethical issues arising from the use of generative AI, such as educational equity, academic integrity, and data privacy.
	Student Management Risks	Apprehensions that over-reliance on the technology could weaken student autonomy and lead to management challenges such as the erosion of teacher-student or parent-child relationships.
	Technology Usage Risks	Concerns about potential application barriers stemming from the inherent reliability and suitability of generative AI technology itself, coupled with insufficient digital literacy among teachers and students.
Adoption Behavior	Usage Level	The breadth, depth, and frequency of teachers' application of generative AI in their educational and instructional work.
	Application Scenarios	The specific contexts in which generative AI is utilized across various stages of the teaching process, such as lesson preparation, instruction, assessment, and

Facilitating Conditions	External Support	classroom management. Institutional and environmental support provided by schools or higher authorities, including hardware facilities, platform tools, training, and incentives.
	Internal Drivers	Intrinsic motivations within teachers themselves, such as needs for professional development, awareness of innovation, and a spirit of exploration.
Subjective Norms	Social Discourse	The intangible influence on teachers stemming from public discussions, expectations, and prevailing orientations regarding AI in education.
	School Climate	The prevailing attitudes, values, and group pressures concerning the use of generative AI among school leadership and colleagues.
Affective Experience	Role Anxiety	The confusion and sense of insecurity teachers experience regarding their professional role and value in the face of the impact of generative AI.
	External Pressure	The sense of urgency and burden resulting from external factors such as assessment requirements, peer competition, and parental expectations.

3.3 Selective Coding

The aim of selective coding is to systematically analyze and select, from all the identified main categories, a core category of a high level of abstraction that can connect all other main categories and form a cohesive theoretical storyline capable of explaining the majority of the studied phenomena.[5] Through continuous comparison of the six main categories—Perceived Utility, Perceived Risk, Adoption Behavior, Facilitating Conditions, Subjective Norms, and Affective Experience—this study identified "Prudent Adoption under the Rational-Emotional Tension" as the core category that effectively subsumes the others and clearly reveals the underlying psychological mechanism of primary school teachers' acceptance of generative AI.

3.3.1 Elaboration of the Core Category

The core category, "Prudent Adoption under the Rational-Emotional Tension," signifies that primary school teachers' acceptance of generative AI is not a simple, linear decision-making process. Rather, it constitutes a cautious and conditional adoption, consistently unfolding within a tension between rational calculus (the weighing of utility against risk) and affective experience (feelings regarding role identity and external pressures). "Rational Calculus" manifests in teachers' repeated weighing

of the perceived utility—the "benefits" of teaching efficacy enhancement and student development—against the perceived risks—the "costs" of ethical and student management concerns. This forms the rational foundation of their decision. "Affective Experience" manifests as deep-seated anxiety about potential role replacement, encapsulated within "Role Anxiety," and the pressures arising from "Subjective Norms," such as social discourse and school climate. This constitutes the emotional and contextual background of the decision. "Prudent Adoption" is the outcome of the aforementioned tension, directly externalized as specific and complex "Adoption Behaviors," such as "low-frequency, on-demand, and selective use," as opposed to wholesale acceptance or rejection. Meanwhile, "Facilitating Conditions," such as training and resources, act as key external variables that can mitigate this tension and promote adoption.

3.3.2 Presentation of the Theoretical Model

Centering on this core category, the following theoretical storyline can be delineated, forming the "Model of Teachers' Prudent Adoption of Generative AI under Rational-Emotional Tension" constructed in this study. The intrinsic logical relationships within this model are depicted in "Figure 1".

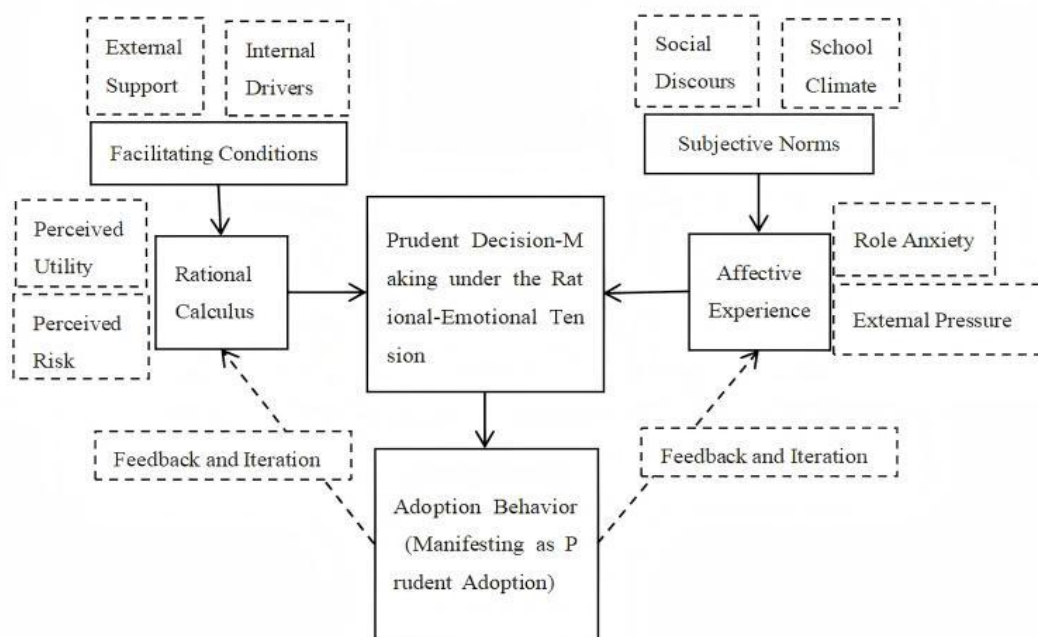


Figure 1 The model of Teachers' Prudent adoption of Generative AI under the Rational-Emotional Tension.

As illustrated by the storyline in Figure 1, when primary school teachers decide whether and how to adopt generative AI, the core of their decision-making exists in a state of persistent "tension." On one hand, grounded in rational calculus, they meticulously weigh the "utility" of the technology—such as enhanced teaching efficiency and stimulated student interest—against its associated "risks"—such as content inaccuracy and the potential passivity in student thinking. On the other hand, they are significantly influenced by affective experiences, grappling with anxieties about the technology's impact on their professional role while also feeling pressure from social discourse and school expectations. This rationality-affect tension leads to a generally prudent stance among teachers; they neither embrace the technology indiscriminately nor reject it outright. Instead, they engage in conditional and selective experimentation and application within specific teaching contexts. The outcomes of these applications, in turn, serve as new experiences that feed back into and influence their subsequent rounds of rational calculus and affective experience, thereby forming a dynamic, cyclical decision-making process.

4. THEORETICAL DISCUSSION AND PRACTICAL IMPLICATIONS

4.1 Theoretical Discussion

The "Prudent Acceptance Model under the Rational-Emotional Tension" constructed in this study offers a profound elucidation of the complex psychological mechanisms underlying primary school teachers' acceptance of generative AI. This model not only engages in a dialogue with classical technology acceptance theories but also accentuates the unique aspects of teacher acceptance within the educational context.

4.1.1 Extension and Contextual Deepening of the Technology Acceptance Model (TAM)

The classic Technology Acceptance Model (TAM) posits that perceived usefulness and perceived ease of use are the key antecedents predicting users' behavioral intentions to adopt a technology.[6] This study provides further confirmation within the teacher population regarding the core driving role of "perceived advantages" (i.e., perceived usefulness). Teachers indeed value the powerful potential of generative AI in enhancing lesson preparation efficiency, enriching teaching resources, and enabling personalized instruction. However, a more

significant finding of this research is that the classic model exhibits notable contextual limitations when explaining the technology acceptance behaviors of teachers as a distinct professional group.

The decision-making logic of teachers far surpasses a simplistic utilitarian calculus of "if it's useful, use it." Within the complex field of education, which has human development as its ultimate goal, the consequences of technological application involve students' cognitive growth, value formation, and the quality of teacher-student interactions, thereby amplifying the risk dimension exponentially. Consequently, "perceived risk" is not a secondary or derivative factor, but constitutes a core dimension of decision-making that parallels, and in certain contexts even outweighs, "perceived advantages." As exemplified by Teacher T4's concern that "it will make students lazy and stop them from thinking for themselves," and Teacher T12's explicit statement that "generated content may contain errors or inaccurate information," teachers' considerations of risks related to content accuracy, student intellectual passivity, and value orientation often carry greater weight than the tool's interface friendliness or operational simplicity (i.e., perceived ease of use). This heightened sensitivity to "risk" stems from the inherent ethical responsibility and educational mission of the teaching profession.

Therefore, this study advocates for a contextualized revision of the classic TAM in educational technology acceptance research: elevating "perceived risk" to a core variable of equal standing with "perceived usefulness." A technology acceptance model more applicable to the educational context should conceptualize acceptance as a prudent decision-making process wherein teachers repeatedly weigh the "empowering potential" of a technology against its "potential harms." This revision not only deepens our understanding of teacher technology acceptance but also signals to technology developers and promoters that mitigating teachers' risk perceptions is as crucial as demonstrating the technology's usefulness. Only when a technology is perceived as both a "reliable" and "beneficial" tool can it truly become integrated into the core aspects of education.

4.1.2 Revealing the Foundational Moderating Role of "Role Expectation"

Moving beyond a purely utilitarian assessment of the technology's functionality, a finding of

greater theoretical significance in this study is the revelation of the fundamental moderating role played by "Role Expectation" in the teacher acceptance process. "Role Expectation" refers to teachers' deep-seated beliefs and positioning regarding the question, "What role should generative AI play in education?" The study reveals that the expectation of AI as an "assistant rather than a replacement" constitutes a consensual baseline for the vast majority of teachers in understanding the human-technology relationship. This baseline also serves as the logical starting point for the core category of "Prudent Adoption under the Rational-Emotional Tension."

This finding elevates the discussion from the "tool-function" level to the "technology-professional identity" relationship level. The acceptance of a new technology by teachers is not merely a technical judgment but, more profoundly, a process of identity verification. When teachers perceive generative AI as a challenge or threat to their professional authority, pedagogical wisdom, or even their existential professional value (i.e., role conflict), the adoption process becomes fraught with internal tension and resistance, regardless of its high functional utility. Conversely, when teachers can clearly position generative AI as a "super assistant" or "intelligent learning partner" that enhances their professional capabilities (i.e., role complementarity), their willingness to explore the technology increases significantly, and they become more inclined to discover its empowering potential. The perspective shared by Teacher T2—"Once a clear distinction is made, the integration of AI becomes a powerful enhancement"—exemplifies teachers' active management of role boundaries to achieve effective human-AI collaboration.

This resonates profoundly with academic discourse on how technology reshapes professional practice. The relationship between teachers and generative AI is, at its core, a new challenge confronting professionalism in the digital-intelligent era. The essence of teacher professionalism is precisely demonstrated in their capacity to leverage their irreplaceable pedagogical tact, emotional care, and value guidance to orchestrate, critique, and integrate technological tools, rather than being displaced by them. Consequently, the process of teachers accepting generative AI is, in substance, a reconstruction and reaffirmation of professional identity. It is a process through which they renegotiate the fundamental questions of "what constitutes a teacher" and "what

the teacher's role should be" within this new technological context. Promoting the application of generative AI must not overlook this deep-seated psychological mechanism; any strategy likely to induce teacher role apprehension is destined to be ineffective. Future support measures must, therefore, be committed to reinforcing the "assistive" positioning of generative AI, aiding teachers in consolidating and enhancing their professional identity within the emerging paradigm. This constitutes the psychological cornerstone for the successful integration of technology into education.

4.1.3 "Prudent Acceptance" as the Rational Embodiment of Teacher Professional Autonomy

The "low-frequency, on-demand, and selective" pattern of "prudent acceptance" ultimately observed among primary school teachers is by no means a simple form of hesitation or lag. Rather, it represents a dynamic equilibrium achieved within the framework of rational calculus and affective appraisal, serving as a profound manifestation of teacher professional autonomy amidst the wave of technological change. This behavioral pattern underscores the "gatekeeper" role that teachers collectively enact, navigating between external technological hype and the internal imperatives of educational principles.

Firstly, "prudent acceptance" reflects teachers' rational positioning of technology as a tool. Teachers are not rejecting technology itself, but rather resisting being defined by it. As Teacher T2 stated in the interview, "If we have a need, we will use it, but it depends on the lesson content; the frequency of use isn't very high yet." This indicates that teachers view generative AI as a "toolkit on standby" rather than a "standard procedure," strictly subordinating its use to specific instructional objectives and content needs. This strategy of "on-demand use" demonstrates that teachers, as the subjects of instructional design, possess a clear awareness of the context-specific nature of technology application. Mature teachers keenly recognize that content and strategies generated by AI cannot be applied directly; they must be filtered, processed, and transformed through their professional expertise to fit the specific learning context and classroom dynamics. This process is precisely the "pedagogicalization" of external technology, constituting the core expression of their professional judgment.

Secondly, "selectivity" highlights teachers' adherence to the core values of education. Primary school teachers do not accept all applications of generative AI indiscriminately but exercise distinct value-based filtering. They are generally receptive to its assistance in areas such as resource generation and reducing administrative tasks—as exemplified by Teacher T6's mention of quickly generating reading materials. However, they maintain heightened vigilance regarding its direct intervention into students' core cognitive processes, such as essay conception or exploring mathematical problem-solving strategies. This caution aligns with Teacher T12's concern that "if students become overly reliant on AI, they might develop habits of not thinking or inquiring." Underpinning this selectivity is teachers' steadfast commitment to the fundamental mission of education: fostering student cognitive development. They instinctively resist any technological application that might supplant students' firsthand experiences and independent thinking, thereby delineating a clear boundary between instrumental rationality and educational values.

Consequently, the seemingly "slow and fragmented" adoption of generative AI in current primary school teaching practice should not be hastily attributed to teacher conservatism or technical barriers. Rather, it represents a proactive strategy employed by the teaching community to navigate the uncertainties of external technology with prudent rationality. Through their professional judgment, teachers are actively setting the pace and delineating the boundaries for technological integration, engaging in a large-scale, spontaneous "classroom experiment" to explore the optimal path for technology-enhanced instruction while safeguarding educational quality. This very behavioral pattern is a vivid demonstration of teacher professional autonomy in the digital-intelligent era—they are not passive recipients of technology, but active decision-makers and reflective practitioners in its integration. Understanding and respecting this "prudent acceptance" is the prerequisite for effectively implementing educational technology.

4.2 Practical Implications

Based on the "Prudent Adoption under the Rational-Emotional Tension" model, this study contends that the key to promoting the beneficial application of generative AI in education lies in constructing a systematic support framework

capable of effectively bolstering teachers' rational judgment, alleviating their emotional anxieties, and empowering their professional autonomy. Accordingly, the following specific recommendations are proposed:

4.2.1 Policy-Making and School Management: Fostering a Prudent yet Open Institutional Environment

Policies and school management should avoid pursuing a "one-size-fits-all" adoption rate. Instead, they can focus on three areas to provide a "safety net" and "scaffolding" for teachers' prudent exploration. First, it is to provide "safe and controllable" official platforms and resource banks. Educational authorities and schools should prioritize the introduction and development of generative AI educational tools that have undergone content review and guarantee data security, coupled with providing repositories of excellent teaching cases validated by frontline practice. This equips teachers with pre-screened tools and "scaffolding," which can significantly lower technical barriers and content risks, thereby supporting their "selective use" behavioral pattern.

Second, it is to establish evaluation mechanisms that encourage exploration and tolerate trial and error. Move away from assessment methods that simplistically quantify the use of generative AI, and instead, incentivize teachers to maintain reflective journals and share innovative teaching cases. Foster an organizational culture that "values participation and prizes reflection," explicitly permitting teachers to experiment—and even fail—within a controlled scope. This approach alleviates the performance pressure stemming from the fear of improper application, thereby transforming external "subjective norms" from a negative stressor into a positive motivator.

Third, it is to integrate "digital ethics" education as a core component of information literacy for both teachers and students. At the policy level, efforts should be made to promote the development of a code of conduct for the use of generative AI in schools and to implement digital ethics education for teachers and students. This not only guides students to use technology responsibly at the source, reducing the "supervisory burden" on teachers, but also elevates technology integration to the level of holistic education, aligning it with the fundamental mission of teaching.

4.2.2 Teacher Development and Training Systems: Shifting from Technical Drill to Professional Empowerment

Current training often overemphasizes tool functionality, which is insufficient for addressing the complex decision-making teachers face. Support for teacher development should consider a shift in three key areas.

The first is to offer "Critical Integration" workshops to empower teachers in risk assessment and management. Training content must move beyond "how to use" and prioritize "when to use," "where to use cautiously," and "how to critique, verify, and correct" AI-generated content. For instance, workshops could involve teachers in collaboratively analyzing the strengths and weaknesses of AI-generated lesson plans and essay examples, and developing subject-specific Checklists for Ethical Use and Quality Review of Generative AI. This translates abstract "risk perception" into actionable professional practice, thereby enhancing teachers' confidence and sense of control in critiquing, verifying, and pedagogically orchestrating technology.

The second is to focus on "Human-AI Collaboration" in instructional design to reinforce teacher role identity. Training should deliberately demonstrate how generative AI can augment, rather than replace, the teacher's professional role. Through case-based learning, it should highlight the teacher's irreplaceable role in setting learning objectives, stimulating students' higher-order thinking, and providing emotional support, positioning AI as a powerful assistant for processing information, providing resources, and handling repetitive tasks. This helps resolve "role anxiety," repositioning teachers from being "challenged by technology" to becoming "orchestrators and leaders of technological resources."

The third is to build "Communities of Practice" to form peer support networks. Encourage the establishment of cross-school or regional teacher communities of practice focused on generative AI, facilitating regular sharing of both successful experiences and "lessons learned from pitfalls." This trusted peer-to-peer exchange is the optimal way to mitigate the pressure of "subjective norms" and acquire authentic, effective practical strategies, ensuring teachers feel they are not navigating this exploration alone.

4.2.3 *Technology Development and Industry: Promoting Educational-Essence-Oriented Innovation*

The form of technology directly influences its acceptance. Technical research and development in industry should fully understand and respond to the authentic logic of educational contexts. In shifting from a "function-oriented" to an "education-oriented" approach, three key considerations are essential.

Firstly, it is to develop "teacher-led" rather than "replacement" tools. Product design must emphasize teacher control and final decision-making authority. For instance, tools should provide multiple options for teachers to choose from, rather than outputting a single result; they should clearly display the generative logic and sources of content to facilitate teacher review and modification; and they should be designed as "lesson preparation assistants" or "classroom collaborators," not as "automated teaching machines." This aligns, at the technological source, with teachers' role expectation of AI as an "assistant."

Secondly, it is to deeply integrate pedagogical knowledge to enhance contextual appropriateness. The "usefulness" of technology is grounded in a profound understanding of educational principles. Developers should collaborate closely with frontline teachers and educational experts to embed Pedagogical Content Knowledge (PCK) into the models. This ensures generated content better meets the teaching needs of specific grade levels and lesson types, thereby fundamentally improving its accuracy and pedagogical value and alleviating teachers' "utility concerns."

Thirdly, it is to increase technological transparency and explainability. To address teacher skepticism about the "black box," products should strive to incorporate simple explanatory functions, such as annotating the key information sources or indicating the uncertainty level of generated content. Establishing smooth feedback and error-correction channels allows teachers to participate in refining the technology, thereby building trust in it.

5. CONCLUSION

This grounded theory study reveals that primary school teachers' acceptance of generative AI is not a simple adoption process, but a prudent decision-making dynamic characterized by tension between

rational calculation and emotional experience. Teachers recognize generative AI's potential in enhancing instruction, enriching resources, and supporting student development, yet remain cautious about ethical risks, cognitive dependency, and professional role challenges. Moderated by "role expectations," this tension results in a "low-frequency, on-demand, selective" adoption pattern, reflecting teachers' assertion of professional autonomy.

The proposed "Prudent Adoption Model under Rational-Emotional Tension" extends the classic Technology Acceptance Model by positioning "perceived risk" as a core variable alongside "perceived utility," while highlighting teachers' identity negotiation in technological integration. Promoting generative AI's educational integration requires respecting teachers' professional judgment, addressing role anxiety, and strengthening systemic support.

Moving forward, policy, training, and technology development should align to foster an open yet cautious educational ecosystem—where generative AI serves as a trustworthy assistant to teachers, not a replacement, enabling thoughtful and sustainable integration in the digital transformation of education.

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