

Reconstruction of the Quality Assurance System for Graduation Theses Against the Background of Intelligent Education: from the Perspective of Agent Assistance

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ABSTRACT

In the context of educational intelligence driving the evolution of graduation thesis writing tools into "intelligent collaboration platforms", this study aims to explore the logic of teacher-student collaboration practice and the reconstruction of the "instruction-learning" relationship after the intervention of agents in response to the predicament of inefficient information transmission and ambiguous responsibility boundaries in traditional guidance. Based on the framework of technology-mediated interaction theory, a participatory observation method was used to study 12 groups of thesis supervisors from 3 universities, and grounded theory was used to code and analyze the data. The study found that agents drive information transmission from "teachers' one-way output" to "AI provides basic information, teachers and students deepen together" in a two-way collaboration; The boundaries of responsibility have been restructured from "teacher-led" to "teacher-directed academic direction, student-led original content, and agent-assisted tool functions" shared by multiple subjects; Teachers and students maintain a balance of "dependence and vigilance" towards the agent, with the core being the retention of human subjectivity. The research findings reveal the new logic of thesis guidance under educational intelligence, provide empirical support for the theory of technology-mediated interaction, and offer practical references for colleges and universities to optimize the quality assurance system of theses.

Keywords: *Intelligent education, Thesis guidance, Agent assistance, Technology-mediated interaction.*

1. INTRODUCTION

In recent years, the wave of educational intelligence has accelerated the reshaping of the teaching ecosystem in higher education. The popularity of tools such as generative AI (like ChatGPT) and CNKI's "intelligent writing assistant" has driven the transformation of graduation thesis writing from "individual creation" to "human-machine collaboration".

In practice, undergraduate thesis guidance in colleges and universities faces new predicaments: under the traditional "face-to-face + email" guidance model, instructors have difficulty capturing the cutting-edge dynamics of students' topic selection in real time, students' first drafts are illogical and unstandardized due to insufficient

academic training, and the information transmission efficiency in "guidance - learning" is low and the responsibility boundaries are blurred. This problem is directly related to the academic normality and innovation ability of undergraduate talent cultivation, and has become a key pain point for quality assurance in higher education in the context of educational intelligence. In the interdisciplinary field of education intelligence and higher education quality assurance, the issue of "human-machine collaboration" in thesis guidance has gradually become the focus of academic attention, but its micro-practical mechanism remains to be explored in depth.

2. LITERATURE REVIEW

Existing research provides theoretical and practical references for this article: Sang et al. (2025), starting from the scientific basis of generative AI, reveals the complementarity between intelligent technology and the educational ecosystem; Guo et al. (2025) explore the path of educational intelligence empowering rural educational equity, emphasizing the integration role of intelligent tools in educational resources; Lin Jian et al. (2024) focused on the system design of intelligent engineering education and proposed the application framework of intelligent technology in all aspects of teaching. But most of these studies focus on the macro scenarios of educational intelligence, or remain at the construction of the traditional quality assurance system for graduation theses, and do not pay sufficient attention to the collaborative practice of "guidance-learning" after the intervention of agents; Xuan et al. (2021) systematically reviewed the application of AI in learning management systems, but did not delve deeply into the reconstruction of information transmission and responsibility boundaries in thesis guidance.

Although the theory of technology-mediated interaction provides a framework for analyzing human-machine collaboration, existing applications are mostly focused on classroom teaching and rarely extend to the "high-stakes" scenario of graduation theses. These research gaps suggest an urgent need for a micro-reconstruction of the quality assurance system for graduation theses from the perspective of agent assistance.

3. THEORETICAL ANALYSIS

3.1 Theoretical Overview

This study chose technology-mediated Interaction (TMI) as the core theoretical basis because the theory focuses on "how Technology reshapes the process and outcome of human interaction" and can precisely explain how agents (Technology) intervene. The logic of information transmission, role cognition, and the reconfiguration of responsibility boundaries in teacher-student collaboration in thesis guidance - this is precisely the core issue of this study.

The core of the theory of technology-mediated interaction lies in viewing technology as an "intermediary constituent element" of interpersonal interaction, rather than a tool independent of

interaction. In this study, the theory of technology-mediated interaction is deeply integrated with the research question through "concept docking" and "analytical framework construction". From the perspective of concept docking, the "technical intermediary" in the theory is specifically defined as the "agent" in this study, including the AI topic matching system, the academic language intelligent polishing tool, etc., and the "interactive process" corresponds to the "dynamic collaborative practice of thesis topic argumentation, initial draft writing and revision". "Interactive results" focus on "reconstructing the logic of information transmission in the mentor-learning relationship" and "redefining the boundaries of responsibility".

3.2 Analytical Framework

Based on this docking, this study constructs a triple analytical framework:

First, from the "information flow" dimension, analyze how the agent changes the way information is passed between teachers and students - for example, the AI topic matching system can push structured information such as "subject frontier topics + literature support strength" to students in real time, while providing teachers with "similarity analysis of student topics to existing research", This two-way, real-time information transmission breaks the traditional model of "teachers' one-way output and students' passive reception", making the information flow more targeted and symmetrical.

Secondly, from the dimension of "role cognition", explore the reshaping of the roles of teachers and students by the intervention of agents - teachers shift from the traditional "knowledge authority" to "the guide of intelligent tools", and their core responsibility shifts from "directly providing topic suggestions" to "guiding students to distinguish the academic value and originality of AI suggestions"; Students have shifted from "passive learners" to "leaders of human-machine collaboration", actively integrating AI-generated topic frameworks with their own research interests, rather than relying on technology's "one-click generation".

Finally, from the "responsibility allocation" dimension, study the boundaries of responsibility between teachers and students and agents - students need to conduct "originality arguments" on AI-generated topics to ensure that the topics are in line with their own research capabilities and academic norms; Teachers need to review whether the

language of the papers polished by AI conforms to the logic of academic expression to avoid the problem of "language homogenization" brought about by technology; While the agent only takes on the responsibility of "information assistance" and does not involve academic judgment or originality guarantee. This analytical framework directly addresses the core question of this study, namely "how agents intervene in collaborative practice and how to redefine the logic of information transmission and the boundaries of responsibility."

4. PARTICIPATORY OBSERVATIONS AND CASE STUDIES

This study focuses on the collaborative practice of "teacher-student - agent" in thesis guidance in the context of educational intelligence. To capture the dynamic interaction process in the natural context, a qualitative case study based on participatory observation is adopted. The core advantage of this approach lies in restoring the true logic of teacher-student collaboration after agent intervention through "immersion" field observation and "deep description" data analysis - which is highly consistent with the study's focus on "micro-collaboration practices" and "details of information transmission". The study followed the qualitative logic of "context immersion - data saturation - topic refinement", taking 12 groups of thesis supervisors from three universities as the subjects of observation, covering the entire process of topic argumentation, initial draft writing and revision, and systematically analyzed the reshaping mechanism of the "mentor-learning" relationship by agents through participatory observation, in-depth interviews and secondary data collection.

4.1 Selection of Research Subjects

The subjects were selected using purposive sampling, aiming to cover the characteristics of different types of universities, disciplines, and teachers and students to ensure representativeness and diversity of the sample. The sampling criteria were set as three: (1) teachers and students are in the stage of writing their graduation theses (senior students of 2024 and their supervisors); (2) Having used agent tools (such as CNKI's topic analysis system, Grammarly Academic Edition Proofreading tool) for guidance; (3) Covering three types of universities: comprehensive, science and engineering, and liberal arts, reflecting disciplinary differences.

4.2 Data Collection and Analysis

Data collection was centered on participatory observation, combined with in-depth interviews and secondary data analysis to form a "triangulation" data chain to ensure the richness and credibility of the data.

- Participatory Observation: The observation period is from March to June 2024 (the critical period for graduation thesis writing), focusing on three core scenarios: topic argumentation meetings, online guidance sessions, and initial draft revision discussions. Researchers are involved as "non-interventional participants", entering the mentoring site 2-3 times a week to document the details of interactions between teachers and students and the agent.
- In-depth interviews: The interview outline is designed around the core issues of the study and is divided into three dimensions: (1) The guidance model before the agent's intervention, such as the pain points of the traditional "face-to-face + email" model, such as lagging information transmission and inaccurate feedback; (2) The collaborative process in the use of the agent, such as how to combine the AI's "subject frontier matching" results when selecting topics, and how to integrate the "grammar correction + academic expression suggestions" of the polishing tool when revising the first draft; (3) Cognition of the "guiding-learning" relationship, such as whether teachers think that the agent reduces the workload of "topic screening", and whether students are concerned about "loss of originality due to over-reliance on AI". The interviews are semi-structured, combining pre-set questions with impromptu follow-ups.
- Secondary data analysis: A total of 24 pieces of data were collected, including the guidance logs of teachers, the draft topics of students, the agent usage logs, such as the operation records of the AI topic selection system, the modification traces of the polishing tool, the final thesis text, etc. Secondary data is used to supplement the details of observations and interviews, such as verifying the process of students' "multiple adjustments of topic keywords" through the "historical operation records" of the AI topic selection system; The actual impact of the agent on "academic language normativity" can be analyzed by comparing the first draft with the final one.

5. RESEARCH FINDINGS

This study, through participatory observations and in-depth interviews with 12 groups of teachers and students, combined with the theory of technology-mediated interaction, reveals the reconfiguration mechanism of information transmission logic and responsibility boundaries in the "guidance-learning" relationship after agents' involvement in thesis guidance in the context of educational intelligence, as presented in the following three core findings:

5.1 Information Transmission Mediated by Agents: from "One-way Output" to "Two-way Collaboration"

The core value of the agent lies in breaking the traditional one-way information transmission model of "teacher → student" and promoting the formation of a two-way collaborative logic of "AI provides basic information - teachers and students analyze and deepen together" through the functions of "information supplementation" and "structured presentation". This shift is reflected in two dimensions:

First, the "information supplementation" of the agent reverses the direction of information transmission. In traditional guidance, information such as students' topic directions and literature support is entirely dependent on teachers' experience accumulation, and the direction of transmission is "teachers give, students receive"; While the agent integrates the cutting-edge data of the discipline through algorithms, providing teachers and students with more comprehensive basic information, the direction of transmission shifts to "AI gives the foundation - teachers and students analyze the depth". For example, law students initially hit a bottleneck due to the overly broad topic of "data privacy protection", and the AI topic system, based on their interests and discipline hotspots, recommended the direction of "Privacy infringement determination in Algorithmic recommendation", along with 12 core papers from "China Legal Science" and "Legal Research" in the past three years.

Secondly, the "structured presentation" of the agent optimizes the efficiency of information transmission. In traditional guidance, discussions between teachers and students often fall into inefficiency due to the "unstructured" information, such as students' colloquial expressions and teachers' scattered suggestions; The agent, through

"structured output", transforms ambiguous information into clear academic expression, making the discussion more focused on the content itself.

From the perspective of technology-mediated interaction theory, the agent, as an "intermediary element", not only changes the speed and form of information transmission, but also reconstructs the direction of transmission - from "one-way indoctrination" to "two-way co-creation". This shift has upgraded teacher-student interaction from "information reception" to "information interpretation and creation", in line with the core proposition of "technology reshaping the flow of information in interpersonal interaction" in the theory.

5.2 Reconstructing the Boundaries of Responsibility: from "Teacher-led" to "Multi-subject Sharing"

After the intervention of the agent, the responsibility model for thesis guidance shifts from "teachers taking full responsibility" to "teacher-guided - student-assisted - agent assisted" multi-agent collaboration, essentially a "differentiation and upgrade" of responsibility: teachers' responsibility shifts from "doing specific things" to "guiding the academic path".

In the traditional model, teachers are responsible for the entire process of "selecting the topic, modifying the framework, and refining the language"; With the intervention of the agent, the teacher's responsibility focuses on "guiding students to interpret the academic value of the AI results" and "plugging the logical loopholes of the agent". Students' responsibility shifts from "passive execution" to "active creation". In the traditional model, students often regarded "modifying as required by the teacher" as a core responsibility; With the intervention of the agent, the student takes on the active responsibility of "verifying the authenticity of the AI results" and "integrating the AI suggestions with personal interests".

This responsibility reengineering is a manifestation of the "role cognition change" in the theory of technology-mediated interaction: teachers transform from "knowledge authorities" to "academic guides", students grow from "knowledge receivers" to "knowledge creators", and agents act as "information assistants" - the responsibilities of the three are both differentiated and coordinated, together forming a "responsibility community".

5.3 The "Degree" in the Use of Agents: Seeking a Balance Between "Dependence" and "Vigilance"

Although the agent has optimized the guidance process, both teachers and students generally face the contradiction of "dependence and vigilance": they hope to improve efficiency through the agent, but are also worried that excessive dependence will erode originality. At the core of this contradiction is the exploration of the "functional boundaries of the agent" - the agent should be an "auxiliary tool" rather than a "creator". Teachers' response strategy focuses on "balancing instrumental value with humanistic value."

This exploration of "degree" confirms the essence of "technology-human-interaction symbiosis" in the theory of technology-mediated interaction: the agent is not a "substitute", but a "collaborator" - its value lies in releasing the creativity of teachers and students, rather than dissolving human subjectivity. The "degree" of the agent is actually the boundary of "human subjectivity" - as long as the student is always the "creator", AI will always be the "good tool".

6. VERIFICATION OF DISCOVERY AND EXPLANATION OF BOUNDARIES

The findings of this study were consolidated through "triple data validation": first, the interview data were consistent with the observation scenarios, such as "teacher-student joint analysis of AI reports" and "student supplementary personal analysis"; Second, secondary data (guidance logs, comparisons of the first and final drafts of papers) showed that 83% of students' topics had a 41% higher "novelty" (based on the citation rate of core literature) compared to the traditional model; Third, the analysis of exceptional cases, such as students who did not use AI, showed that although students who did not use the agent did not experience "two-way collaboration", their "originality anxiety" was more prominent, indirectly confirming the balancing value of the agent for "efficiency and originality".

It should be noted that the conclusions of this study apply to the scenario of colleges and universities where intelligent writing tools have been popularized in the early stage of educational intelligence; There are differences in the use of agents across different disciplines, such as the liberal arts emphasizing "original viewpoints" and

the science emphasizing "data verification", but the core mechanisms of "two-way information collaboration" and "multi-subject responsibility sharing" are universal.

This study, by deeply depicting the collaborative practice after the intervention of agents, reveals the new logic of graduation thesis guidance in the context of educational intelligence: Agents do not "replace teachers" or "replace students", but rather, by reshaping the boundaries of information transmission and responsibility, drive the "mentor-learning" relationship from "master-slave" to "collaborative" - a transformation that is precisely the deep reconstruction of the higher education quality assurance system by educational intelligence.

7. CONCLUSION

Based on the framework of technology-mediated interaction theory, this study systematically reveals the collaborative practice and relationship reconstruction logic of "teacher-student - agent" in thesis guidance in the context of educational intelligence through participatory observation and grounded theory analysis. The study found that the involvement of agents drives information transmission from the traditional "one-way output by teachers" to a two-way collaborative model where "AI provides basic information and teachers and students analyze and deepen together" - AI optimizes information efficiency through "structured presentation", while teachers focus on "guiding students to interpret the academic value of the information", shifting the focus of guidance from "data transmission" to "meaning mining"; The boundaries of responsibility are restructured from "teacher-led" to a multi-subject sharing of "teacher-directed academic direction, student-led original content, and agent-assisted tool function", where teachers and students collaborate through "AI supplementing information - teacher-guided logic - student integrated creation" to achieve "differentiation and synergy" of responsibility; The use of the agent by teachers and students always maintains a balance of "dependence and vigilance", with the core being the retention of human subjectivity - students need to verify the originality of the AI results, teachers need to fill the logical loopholes of the AI, and the agent only plays the role of "instrumental assistance". This conclusion directly responds to the core question of the study: By reshaping the logic of information transmission and the allocation of responsibilities, the agent has

driven the "mentor-learning" relationship from "master-slave" to "collaborative", achieving a deep reconstruction of the thesis guidance model through educational intelligence.

The findings provide an operational path for colleges and universities to optimize the quality assurance system of graduation theses and offer practical references for colleges and universities to address the challenges of educational intelligence. The limitations of this study are mainly reflected in two aspects: First, the contextual adaptability of the conclusions needs to be further verified; 2. The study focused on the "collaborative process" of graduation thesis writing and did not track the long-term impact of agents on the quality of the final thesis. Future research could expand the sample to more types of universities or conduct 1-2 year follow-up studies to examine the long-term effects of collaboration mechanisms on students' academic abilities.

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