

Article

Research on the Transformation Limitations and Optimization Paths of AI-Assisted Teaching Plan Design for Preschool Normal Students

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Abstract: Generative artificial intelligence has now become deeply embedded in educational pedagogy, exerting multifaceted facilitative effects on curriculum resources, instructional formats, and teacher development. This study takes AI-assisted lesson plan texts produced by preschool normal university students as its research basis and compares them with curriculum cases from frontline kindergarten teachers. It finds that AI-assisted lesson plan design for preschool normal university students plays an optimizing and facilitating role in textual structures such as activity objectives, activity preparation, and activity processes, yet lacks the embodied nature of the teaching field in terms of selecting local materials, designing individualized instruction, and exercising pedagogical tact. Accordingly, optimization pathways for human-machine collaborative lesson plan design for preschool normal university students are proposed, with the aim of cultivating new normal university talent possessing both professional competence and digital literacy.

Keywords: digital-intelligent lesson plan design; preschool normal university students; general education; digital literacy

1. Introduction

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In an intelligent society, curriculum construction signifies not merely the digitization of resources but should incorporate learning, teaching, and assessment into the scope of systematic reconstruction. With regard to teacher education, AI, as an auxiliary tool for instructional design, facilitates normal university students' drafting of lesson plans, arrangement of teaching activities, and use of language, while simultaneously imposing new demands concerning curriculum, children, methods, and even judgment. In particular, lesson plan design in preschool education cannot be confined to textual composition but must be contemplated in conjunction with educational objectives, children's actual conditions, material utilization, interactional circumstances, and problems arising in the classroom. It follows that the assistance AI provides to preschool normal university students in designing lesson plans, along with its limitations, constitutes a realistic issue that teacher education must confront in the current digital-intelligent era.

2. Manifestation Characteristics of AI-Assisted Lesson Plan Design

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The competence of preschool normal university students in lesson plan design is categorized into five operable dimensions: "activity objective design, activity process organization, material and context creation, teacher-child interaction presupposition, and practical adaptation and reflective revision." Taking the small-class mathematics activity "Recognizing 1 and Many" as the common theme, 78 AI-assisted lesson plan texts listed on the course platform serve as the basic analytical materials, with a concentrated examination of the textual characteristics of preschool normal university students' use of AI in designing lesson plans with respect to objectives, processes, materials, or interaction (As shown in Table 1).

Table 1. Analytical Dimensions of AI-Assisted Lesson Plan Texts by Preschool Normal University Students

Primary Dimension	Secondary Dimension	Main Observational Content
Activity Objective Design	Objective Completeness	Whether cognitive, ability or skill, and affective objective dimensions are included
	Objective Clarity	Whether objectives are specific, observable, and aligned with small-class children's developmental level
Activity Process Organization	Segment Completeness	Whether segments including contextual introduction, observation and comparison, operational experience, game reinforcement, and life extension are included
	Progressive Relationships	Whether segments progress from perception to operation and from individual experience to life transfer
Material and Context Creation	Material Operability	Whether material quantity, safety, per-capita operational conditions, and venue arrangements are specified
	Contextual Appropriateness	Whether the context is close to children's lives and serves core mathematical experiences
Teacher-Child Interaction Presupposition	Question Executability	Whether questions are short, specific, and aligned with small-class children's expressive ability
	Response Generativity	Whether space is reserved for adjusting follow-up questions based on children's responses
Practical Adaptation and Reflective Revision	Routines and Differences	Whether class routines, children's ability differences, and teachers' organizational burden are considered
	Revision Basis	Whether revisions are made based on children's performance, micro-teaching feedback, or kindergarten conditions

2.1. Tool Usage Exhibits a Preliminary Collaborative Form of "AI Generation + Self-Revision"

Among the 78 AI-assisted lesson plan texts involved, virtually all explicitly state "self-revision, summarization, or organization after using AI," from which it can be judged that normal university students do not indiscriminately treat AI output as the final answer but have already undertaken preliminary secondary processing. Regarding tool sources, the texts mention DeepSeek 26 times, Doubao 13 times, Kimi 5 times, Quark AI 2 times, and Yuanbao 1 time, with 8 texts using "AI" as a generic designation and 29 texts not specifying the tool. Considering that individual texts simultaneously record tool names, generic

designations, or revision items, the statistics here are processed only on the basis of explicitly stated facts and do not constitute absolutely mutually exclusive categorical analysis. This indicates that digital-intelligent lesson plan design does not equate to using AI to replace normal university students in composing lesson plans; rather, according to unified task requirements, normal university students use AI to produce drafts, formulate structures, and adjust language, and then engage in reflective deletion, revision, or reorganization of the obtained content. The problem encountered is that although many texts currently bear "self-revision" markers, the revised portions mostly involve only material compression, organization, or substitution, and substantive professional analysis concerning children's behavior, kindergarten realities, or teaching effectiveness is difficult to identify. Although AI has potential in text generation, resource integration, and feedback support, teacher intervention remains necessary in complex teaching activity design, authentic learning-condition judgment, and deep inquiry support.

2.2. Objectives and Process Structures Are Relatively Complete, but Descriptions of Preparation Materials and Implementation Conditions Are Insufficient

From the perspective of structural elements, 75 texts contain activity objectives, accounting for 96.2%; 71 contain activity processes, accounting for 91.0%; 49 explicitly state cognitive objectives, 49 state ability or skill objectives, and 48 state affective objectives. AIGC has reinforced normal university students' use of three-dimensional objectives and standardized formats, making the texts appear more complete and more conformant to conventional lesson plan writing requirements. The 21 texts listed are essentially explicit descriptions of activities or teaching materials (accounting for 26.9%). It can therefore be judged that AI-assisted texts can mostly provide a written structure of the "objective-process" type, yet often fail to incorporate material quantities, safety factors, children's actual manipulatives, venue, and teacher preparation into considerations of classroom reality. According to small-class standards, children's grasp of "1" and "many" largely depends on physically taking, distributing, gathering, and comparing objects; without materials, the success of the activity is difficult to guarantee.

2.3. Activity Methods Are Diverse, but Homogenization and Idealization Readily Emerge

Regarding instructional design elements, all 78 texts address the part-whole relationship that "many can be divided into one by one, and one by one combined make many"; 77 contain physical object or material operations, 76 contain contextual introduction, 74 contain observation and comparison, 68 contain life extension, 67 contain game reinforcement, and 35 contain multi-sensory participation. It is evident that under a unified theme and with AI tool assistance, normal university students can rapidly generate a basic pathway conforming to the characteristics of small-class mathematics activities, namely "contextual introduction—observation and comparison—operational experience—game reinforcement—life transfer." Currently, many texts construct plots in similar ways, basically employing rabbits, bears, forests, candy, carrots, and apples as materials; the activities used are relatively diverse, yet the underlying logic is mostly of a homogeneous type. Individual texts mention multiple games, outdoor searching, musical movement, or family projects, but fail to incorporate the 20-minute small-class instructional time, children's attention span, and material organization into holistic consideration. AI has considerable command of activity extension but does not necessarily know the time, space, and order-related difficulties encountered in real classes. From a disciplinary perspective, generative artificial intelligence empowering teaching cannot remain at the level of general technical functions but must return to the essence of specific disciplines, learning processes, and differences in teaching scenarios; "understanding by design" in instructional design likewise emphasizes organizing learning experiences through the correspondence among objectives, assessment, and activities.

3. Transformation Limits of AI-Assisted Lesson Plan Design

At this point, the frontline teacher's lesson case "Baby Rabbit Visits" composed without AI means is introduced as a realistic reference, thereby analyzing the

transformation constraints that AI-assisted lesson plans may encounter when moving from textual status into actual teaching.

3.1. AI-Assisted Texts Exhibit Marked Normativity, While Actual Lesson Cases Possess Greater Practical Adaptability

A comparison between AI-assisted texts and the kindergarten curriculum case "Baby Rabbit Visits" reveals that AI-assisted design is highly useful for normal university students in rapidly completing lesson plans; its objectives are habitually stated separately as cognitive, ability, or affective, and the teaching process generally unfolds through introduction, inquiry, operation, game, and extension, with language relatively close to course assignment standards, serving as a good learning scaffold for those lacking experience. However, in the kindergarten curriculum case, when teachers actually engage in design, they naturally consider questions such as whether newly enrolled children can adapt, whether they can clearly hear instructions, whether each child receives materials, how materials are managed, whether operations exceed children's capabilities, and whether a given step conforms to daily routines. Therefore, standardized texts are the foundation of activity success; there is no need to pursue excessive refinement, but emphasis should be placed on the feasibility of the activity plan.

3.2. AI Should Focus on Activity Richness, but Dilution of Core Experiences Must Be Avoided

AI-assisted lesson plan design liberates normal university students from the difficulty of "not knowing how to design." For the small-class teaching activity "Recognizing 1 and Many," recognizing quantity should not be taken as the criterion for children's core experience; rather, children should be guided to understand the relationship between "one" and "many" through repetitive, concrete, and speakable actions. "Baby Rabbit Visits" repeatedly expresses the same quantity using chairs, towels, cookies, and hearts, simple in form and progressive in concept. In contrast, some AI texts incorporate counting, classification, even bodily movements or family matters into objectives; without teachers' judgment, the thematic focus is easily lost.

3.3. AI Provides Question Templates, but Authentic Interaction Requires Child-Response Generation

AI texts can presuppose relatively complete and layered questions, yet they do not necessarily align with small-class children's immediate expressive level. Frontline teachers' traditional lesson plan questions are often shorter, more direct, and closer to the actions children are currently performing, and thus more likely to elicit responses. It follows that teacher-child interaction is not accomplished on paper but generated among children's actions, teachers' questions, children's responses, and teachers' follow-up questions. When using AI, normal university students need to rewrite AI-generated long questions and abstract questions into short sentences grounded in actions and physical objects, and presuppose multiple follow-up approaches for various child responses. The key to artificial intelligence empowering classroom transformation lies not in adding tools but in reconstructing the classroom's learning space, pedagogical relationships, and human-machine collaboration configurations.

3.4. What Normal University Students Learn Should Shift from "Being Able to Write" to "Being Able to Revise, Apply, and Reflect"

If considered only at the textual level, AI itself is an excellent means for enabling normal university students to rapidly obtain complete and linguistically appropriate lesson plans. What teacher education pursues is the cultivation of teachers who understand children and can design experiences. Therefore, analysis of the impact of digital-intelligent lesson plan design on learning performance has three levels: the foundational level, namely using AI to construct a basic draft; the developmental level, namely the ability to verify AI's deficiencies and exercise judgment regarding child appropriateness; and the professional level, namely reflecting on and revising lesson plans based on children's actual behavior. At present, most students have already shown a "revision" tendency, but whether their revisions involve experiences, resources, or

interaction still requires teacher guidance. This also indicates that normal university students' AI usage competence is not a singular technical operational ability but is jointly related to teaching beliefs, pedagogical knowledge, instructional design, classroom management, evaluative feedback, and ethical judgment.

4. Optimization Pathways for AI-Assisted Lesson Plan Design

4.1. University Courses Should Shift from "Permitting AI Use" as a Starting Point to "Training in AI Evaluation"

Lesson plan courses in university preschool education programs should neither categorically reject nor indiscriminately affirm AI; rather, AI should be incorporated as training content in lesson plan design courses. Relevant instructors should require students to submit together the AI original version, the revised content, and revision explanations, with emphasis on analyzing whether students can identify and correct issues such as overly broad teaching objectives, excessive segments, difficult-to-obtain materials, age-inappropriate questions, operations that cannot ensure full participation, and lack of safety or routine arrangements. Only thus can AI use be elevated from an assignment technique to a component of professional learning. For more complex instructional design tasks, teacher-intelligent agent collaborative support models can also be drawn upon, incorporating knowledge bases, role division, plan integration, and iterative optimization into the lesson plan co-revision project.

4.2. Normal University Students Should Adopt the Five-Step Method of "Generation – Diagnosis – Adaptation – Verification – Reflection"

In the generation stage, normal university students may preserve the AI initial text and clearly account for the prompts used, the number of generations, and tool selection, enabling instructors to analyze whether they already understand the task itself. In the diagnosis stage, in conjunction with the "Guidelines for the Learning and Development of Children Aged 3-6," children's developmental characteristics, and the actual activity needs of kindergartens, specific questions should be posed regarding each item of AI content, such as whether objectives are too broad, whether segments are too dense, whether materials are readily available, whether questions conform to language habits, whether everyone is allowed hands-on participation, and whether there is time to complete the activity. In the adaptation stage, excessive pursuit of linguistic polishing should be avoided; instead, abstract objectives should be transformed into visible behaviors, complex questions simplified into short phrases grounded in objects and actions, and excessive steps condensed into coherent operations related to core experiences, while implementation approaches for grouping, distributing and collecting materials, individual guidance, or routine reminders are provided. In the verification stage, micro-teaching, peer review, practicum observation, or teacher commentary may be used to examine whether the lesson plan is feasible, recording both difficulties children may encounter and teachers' corresponding strategies. In the reflection stage, second-round revision reflections should be written based on classroom outcomes, indicating which content came from AI and which was retained, discarded, or transformed through professional judgment. Thereby, AI can transition from mere text generation to professional learning contexts, promoting normal university students' development of child-oriented lesson plan competence through the logic of comparison, revision, and verification.

4.3. Kindergarten Practice Should Make Frontline Lesson Cases the Feedback Object for AI Texts

"Baby Rabbit Visits" is a kindergarten reference case corresponding to AI instructional design. For normal university students, activities in AI can be compared item by item with the studied lesson case to verify whether the context is coherent, whether materials unfold progressively, whether every child can participate hands-on, whether relevant mathematical experiences are brought in from life, and whether teachers can make appropriate revisions based on children's feedback. Kindergarten educators should

use "AI lesson plan co-revision" to assist normal university students in transforming standardized texts into educational behavior plans suitable for their own class and feasible in practice.

4.4. The Evaluation Methods Employed Should Be Based on Practice-Oriented Scales

Evaluation of lesson plans should develop from single textual analysis into three categories: textual quality, practical adaptation, and reflective revision. The text itself should possess strengths in objectives, organization, and language; practical adaptation should consider materials, time, children's conditions, and handling of individual differences; reflection and revision should indicate whether students can rewrite lesson plans based on micro-teaching or classroom observation outcomes. If digital-intelligent lesson plan design proceeds along this line of thinking, learning outcomes will not be equated with "whether AI writes beautifully." The effectiveness of artificial intelligence education is influenced by multiple factors including organizational support, classroom culture, teachers' perceived competence, perceived value, activity content, and instructional design; therefore, evaluation should also attend to the joint role of technological cognition and teaching practice (As shown in Table 2).

Table 2. Evaluation Framework for Human-Machine Collaborative Lesson Plan Design by Preschool Normal University Students

Evaluation Module	Core Indicator	Evaluation Focus
Text Quality	Objectives, Structure, Language	Conformity to standardization and completeness, alignment with the activity theme and the age characteristics of young children
Practical Adaptation	Materials, Time, Safety, Routine	Feasibility of implementation in a real small-class kindergarten setting
Child Adaptation	Experience, Individual Differences, Expression Level	Proximity to children's existing experience, and the ability to support the participation of children with different competencies
Interactive Generation	Questioning, Responding, Follow-up Inquiries	Reservation of sufficient space for children to provide responses and further promote the process
Reflection and Revision	Revision Description, Practical Basis	Capability to revise AI-generated texts based on trial teaching, observation or teacher feedback

5. Conclusion

AI should be regarded as a "draft generator" and "idea expander" for preschool normal students' lesson plans, rather than an automatic solution that replaces teachers' professional judgment. To endow digital intelligent lesson plan design with practical value, it is necessary to integrate the actual conditions of children into the process, give full play to the leading role of teachers, take AI as an auxiliary means, and gradually achieve the goal of professional development based on classroom situations and reflective practices.

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References

1. B. Liu, X. Nie, S. Wang, et al., "Generative Artificial Intelligence and the Reshaping of Future Education Forms: Technical Framework, Capability Characteristics and Application Trends," *e-Education Research*, vol. 45, no. 1, pp. 13–20, 2024.
2. Y. Xie, C. Li, C. Li, et al., "Digital Courses in Universities in the Intelligent Era: Connotation, Form and Construction," *e-Education Research*, vol. 45, no. 11, pp. 5–12, 2024.
3. M. Chen and J. Xu, "The Role Upgrading and Capability Reshaping of Teachers in the Digital Intelligence Era: From 'Knowledge Transmitter' to 'Wisdom Guide'," *e-Education Research*, vol. 47, no. 5, pp. 30–37, 2026.
4. J. Zhang and Y. Zhang, "Constancy and Change: The Underlying Logic of Teachers' Competence Development and Its Direction in the Era of Artificial Intelligence," *Education Journal of Renmin University of China*, no. 3, pp. 5–18, 2026.
5. R. Huang, D. Liu, A. Tlili, et al., "Human-Machine Collaborative Teaching: Path Design Based on Scenarios of Virtual Avatars, Digital Twins and Educational Robots," *Open Education Research*, vol. 29, no. 6, pp. 4–14, 2023.

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