

Transformation of Lower Secondary School Teachers' Professional Roles in Generative Supported Teaching

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ABSTRACT

The rapid development of generative artificial intelligence (GenAI) is changing how teaching is designed, organized, and assessed, thereby requiring a transformation of lower secondary school teachers' professional roles. Using an integrative literature review, along with theoretical analysis, comparison, and synthesis, this article systematises changes in teachers' professional practice as GenAI is incorporated into teaching. The findings identify six major shifts: from content transmission to learning design; from information provision to knowledge verification and curation; from classroom management to the orchestration of teacher-student-AI interaction; from product grading to authentic assessment design; from compliance with professional norms to ensuring ethics and digital safety; and from periodic training to continuous professional learning. Accordingly, the article proposes six corresponding competency domains and enabling conditions at the teacher, school, and education-management levels. The findings indicate that GenAI does not diminish the teacher's position; rather, it increases the demands placed on professional judgment, agency, and pedagogical responsibility. GenAI integration should therefore follow a human-centered approach in which teachers retain final authority over instructional goals, content, processes, and quality.

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Introduction

The rapid development of Generative Artificial Intelligence (GenAI)—particularly large language models—is driving significant changes in education. These tools have the capacity to assist teachers in developing learning materials, designing activities, personalizing content, generating feedback, and analyzing learning outcomes. When employed based on clear pedagogical principles, generative AI can contribute to enhancing the quality of teaching and learning while expanding opportunities to support learners (Kasneci et al., 2023; OECD, 2026).

However, the application of generative AI also presents numerous challenges, such as misinformation, algorithmic bias, privacy violations, academic dishonesty, and the risk of technological over-reliance. For middle school students—who are at an age where they are developing self-directed learning skills, critical thinking, and a sense of responsibility—the use of AI-generated content requires teacher guidance, verification, and supervision. Consequently, generative AI does not diminish the role of teachers; rather, it places higher demands on their pedagogical judgment and professional responsibility.

In an AI-supported teaching environment, teachers shift from the primary role of knowledge transmitters to that of designers and facilitators of learning experiences; they select, verify, and refine

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AI-generated content and guide students in the responsible use of AI, while developing assessment methods that emphasize thinking processes and practical application. This transformation requires teachers to possess AI literacy—including the ability to use and evaluate AI tools and recognize ethical issues—and to maintain their agency in making pedagogical decisions. These elements constitute the core components of AI competency in education (Ng et al., 2021).

While recent studies have extensively addressed the opportunities, risks, and competencies associated with AI in education, the transformation of the professional roles of lower secondary school teachers has not yet been fully systematized. In particular, it is necessary to clarify which roles are expanding, which tasks can be supported by AI, and which professional functions must remain under the decisive control of teachers. Without appropriate guidance, the adoption of AI may be limited to the mere use of technical tools, failing to generate substantive innovation in teaching methods or the development of student competencies.

Addressing the aforementioned issue, this article focuses on clarifying the theoretical basis for the shift in the professional roles of lower secondary school teachers within the context of teaching supported by generative AI; identifying the key manifestations of this shift; and analyzing the associated opportunities, challenges, and competency requirements. Based on this analysis, the article proposes directions for professional competency development and organizational conditions to enable teachers to apply generative AI safely, responsibly, and in alignment with educational goals.

Theoretical framework and literature review

Some basic concepts

Generative Artificial Intelligence (GenAI) is a category of AI technologies capable of creating new content—such as text, images, audio, code, or simulated data—based on user prompts. In education, GenAI can assist in designing lessons, developing learning materials, suggesting learning activities, generating feedback, and tailoring content to learners' needs. However, AI-generated output may contain inaccuracies or biases, or be unsuitable for educational objectives; therefore, it requires verification and adjustment by teachers before use (Kasneji et al., 2023).

A teacher's professional role is understood as the system of functions, tasks, and responsibilities they fulfill during the processes of teaching, educating students, and engaging in professional development. In a traditional educational setting, teachers typically perform key roles such as imparting knowledge, organizing learning activities, conducting assessments, and managing the classroom. With the integration of generative AI into the teaching process, technology can support certain tasks, yet the authority to make decisions regarding objectives, content, methods, and assessment remains with the teacher.

Consequently, the transformation of the teacher's professional role in instruction supported by generative AI can be understood as a process of adjusting, expanding, and restructuring professional functions to effectively orchestrate the interaction among teachers, students, and technology. This transformation does not entail replacing teachers with AI; rather, it represents a shift from being primarily a provider of knowledge to becoming a designer of learning experiences, a verifier of information, a guide in AI usage, a guardian of ethics, and a decision-maker accountable for pedagogical choices.

Theoretical basis for the shift in teachers' roles

First, the shift in teachers' roles can be explained through the Technological Pedagogical Content Knowledge (TPACK) framework. According to Mishra and Koehler (2006), effective technology integration requires teachers to combine three domains of knowledge: content knowledge, pedagogical knowledge, and technological knowledge. Teachers must not only know how to use tools but also determine which technologies are appropriate for the specific content, student audience, and teaching methods.

In the context of AI, the TPACK framework has been expanded to emphasize AI interaction competencies and ethical responsibility. Celik (2023) proposed the Intelligent-TPACK model, wherein a teacher's AI integration competence encompasses an understanding of AI technology, pedagogical values, the relationship between AI and subject matter, and the ability to evaluate ethical issues. This approach demonstrates that tool proficiency alone is insufficient to ensure teaching effectiveness; teachers must also recognize AI's limitations, verify content reliability, and take responsibility for their technology choices.

Secondly, AI competency theory provides a basis for defining new requirements for teachers. Ng et al. (2021) posit that AI competency comprises four fundamental dimensions: recognizing and understanding AI; using and applying AI; evaluating and creating with AI; and being aware of ethical issues related to AI. For lower secondary school teachers, AI competency not only supports professional practice but also enables them to guide students in identifying misleading content, protecting personal data, and using AI responsibly.

Third, the perspective of professional agency affirms the central role of teachers within a technology-driven environment. While AI can offer suggestions, generate content, or assist with data analysis, it cannot independently determine educational goals, students' psychological characteristics, or the social values that need to be cultivated. Consequently, teachers must maintain their autonomy and exercise judgment when selecting, adapting, or rejecting AI-generated proposals. The relationship between teachers and AI should therefore be grounded in the principle that AI supports professional practice, while teachers retain decision-making authority and ultimate responsibility.

Based on the above premises, the shift in the professional role of lower secondary school teachers can be identified across six dimensions: (1) from a transmitter of knowledge to a designer and organizer of learning experiences; (2) from a provider of information to a selector, validator, and adapter of content; (3) from a grader to a designer of process-based and authentic assessments; (4) from a classroom manager to a facilitator of student-AI interactions; (5) from an implementer of professional standards to a guardian of ethics and digital safety; and (6) from periodic training to continuous professional learning.

Literature Review

Research on AI in education has developed along three primary lines of inquiry. The first focuses on analyzing the opportunities and challenges AI presents for teaching and learning activities. A review by Celik et al. (2022) indicates that AI can assist teachers with lesson planning, identifying learning needs, providing feedback, implementing pedagogical interventions, and conducting assessments. However, the use of AI also raises concerns regarding accuracy, transparency, algorithmic bias, and the reliability of the results.

Regarding generative AI, Kasneci et al. (2023) highlight its potential to create learning materials, facilitate personalization, and provide rapid feedback, while also warning of risks such as misinformation, bias, academic dishonesty, and learner dependency. These findings underscore the need for teachers to verify content and structure learning activities so that students utilize AI as a tool to support—rather than replace—critical thinking.

The second perspective focuses on the competencies required of teachers. Research on AI literacy and Intelligent-TPACK emphasizes the integration of technological understanding, pedagogical knowledge, content knowledge, and ethical awareness (Celik, 2023; Ng et al., 2021). Under this approach, teachers need to be able to select appropriate tools, craft effective prompts, evaluate output quality, and refine AI-generated content to align with lesson objectives. Furthermore, teachers must be capable of guiding students to recognize the limitations of technology and adhere to principles regarding privacy, copyright, and academic integrity.

A third perspective examines shifts in professional practice and roles. AI can assist with repetitive tasks such as generating questions, suggesting learning materials, or drafting initial feedback. This enables teachers to dedicate more time to interaction, guidance, personalized support, and fostering student development. However, the effectiveness of this transformation depends on teacher competence, technological infrastructure, school policies, and data protection mechanisms.

Overall, research has clarified the potential, risks, and necessary competencies associated with teachers' use of AI. However, three gaps remain. First, many studies address teachers in general or focus on higher education, leaving the specific professional characteristics of lower secondary school teachers insufficiently analyzed. Second, while most works examine AI acceptance, attitudes, or usage skills, they have not systematized the transition between professional roles. Third, the relationship between these new teacher roles and the psychological traits, self-directed learning competencies, and information verification abilities of lower secondary students has not received adequate attention.

These gaps necessitate the development of a dedicated analytical framework regarding the evolving professional roles of lower secondary school teachers, clarifying the content of each role, the required competencies, and the conditions ensuring the safe, responsible, and educationally aligned application of generative AI

Research Methodology

This article employs a theoretical research approach based on an integrative review. Literature was gathered from Scopus, Web of Science, ERIC, ScienceDirect, and Google Scholar using keywords related to generative AI, professional roles, AI competencies, and K-12 teachers. Studies were selected based on their relevance to the topic, academic credibility, and completeness of publication details, with priority given to research possessing a DOI.

The materials were analyzed, compared, and synthesized based on several categories: the support capabilities of generative AI, shifts in teachers' tasks, competency requirements, and ethical issues. Based on this analysis, the article outlines the aspects of the professional role transformation for lower secondary school teachers in teaching environments supported by generative AI.

Research Results

Based on an analysis and synthesis of studies regarding TPACK, AI competence, AI ethics, and the application of AI in teachers' professional practice, this article establishes a transformation framework comprising six role categories. This framework represents the study's theoretical synthesis, reflecting a shift in the focus of professional activities without implying that AI will entirely replace teachers' traditional roles.

Framework for the professional role transformation of lower secondary school teachers

STT	Traditional role	Roles in teaching with generative AI	Key manifestations
1	Delivering content and developing learning materials	Designing and personalizing learning activities	Defining objectives, designing tasks, differentiating learning materials, and selecting the level of AI involvement.
2	Provide information	Knowledge verification and curation	Verify the accuracy, origin, bias, and suitability of the content.

STT	Traditional role	Roles in teaching with generative AI	Key manifestations
3	Classroom management	Facilitating teacher-student-AI interaction	Establish rules for AI usage, maintain dialogue, and support students.
4	Rate the product	Authentic assessment design	Evaluating the process, requiring explanations, reflecting, and disclosing the extent of AI support.
5	Setting a moral example	Ensuring ethics and digital security	Data protection, respect for copyright, transparency, and accountability.
6	Periodic professional development	Continuous professional learning	Updating tools, conducting controlled trials, and adjusting teaching activities.

The six role groups are mutually complementary. Among them, the role of learning design occupies a central position; knowledge verification, interaction facilitation, assessment, and ethical assurance constitute the conditions for implementation; and continuous professional learning serves as the foundation for sustaining the entire transformation process.

The teacher as a learning designer

Generative AI can assist teachers in brainstorming ideas, designing scenarios, creating learning materials, differentiating tasks, and proposing feedback. However, the educational value lies not in the content generated by AI, but in how teachers select and organize that content into appropriate learning activities. A review by Celik et al. (2022) indicates that AI can support teachers in lesson planning, implementation, and assessment, yet its effectiveness depends on the teacher's pedagogical intervention.

Therefore, lower secondary school teachers need to clearly define objectives, expected learning outcomes, and the permissible extent of AI involvement before utilizing these tools. AI-generated content must be evaluated for accuracy, difficulty level, language quality, and alignment with both the curriculum and students' cognitive characteristics. Teachers should also design tasks that require students to analyze, select, explain, or create based on AI suggestions, rather than simply copying ready-made outputs. Consequently, the teacher's role shifts from directly creating all learning materials to designing, selecting, refining, and personalizing the learning environment.

Teachers as Verifiers and Curators of Knowledge

Generative AI can produce coherent responses, but they are not always accurate or supported by verifiable sources. The output may also contain fabricated information or biases or be unsuitable for the cultural context and educational objectives. Kasneci et al. (2023) emphasize that the use of large language models in education must be accompanied by fact-checking, critical thinking, and human oversight.

In this role, teachers perform three fundamental tasks: reviewing content before use, selecting reliable sources for cross-referencing, and guiding students in evaluating AI-generated results. Teachers must help students distinguish between answers that merely appear plausible and verified knowledge, while encouraging them to cross-reference multiple sources, trace original documents, and verify authors, publication dates, and contexts. Furthermore, teachers bear professional responsibility for the learning materials introduced in the classroom, even when those materials are generated by AI.

The teacher as a facilitator of interaction

While AI can provide rapid feedback and personalized support, it cannot replace the teacher-student relationship, empathy, and the ability to recognize students' psychosocial needs. Particularly at the lower secondary level, teachers also bear the responsibility of fostering learning motivation, shaping behavior, instilling values, and maintaining a safe classroom environment.

Therefore, teachers need to structure interactions based on the principle that the human element plays the decisive role. AI serves as a tool for prompting, practice, and providing initial feedback, while teachers are responsible for explaining, adjusting, and addressing issues that lie beyond the tool's capabilities. During group activities, teachers should create opportunities for students to discuss and critically evaluate AI-generated results and collaboratively formulate answers. Thus, the presence of AI does not diminish teacher-student interaction; instead, it necessitates a more purposeful and human-centric approach to facilitating that interaction.

The teacher as a designer of authentic assessments

AI's ability to generate text and complete tasks makes it difficult for assessments focused solely on the final product to accurately reflect student competence. Moorhouse et al. (2023) argue that the prevalence of generative AI necessitates adjustments to assessment practices, alongside a clear definition of the methods and limits regarding AI usage for specific tasks.

In this context, assessment needs to shift its focus toward the learning process and accountability. Teachers can incorporate observations, dialogue, oral presentations, learning portfolios, and products linked to real-world scenarios. Students should be required to explain their working methods, identify where AI provided assistance, evaluate the quality of the output, and present their own personal adjustments. Being transparent about the extent of AI usage helps distinguish between legitimate support and academic dishonesty, while simultaneously fostering self-assessment skills and a sense of academic responsibility.

Giáo viên với vai trò người bảo đảm đạo đức và an toàn số

Research on AI ethics in K-12 education indicates that privacy, data security, fairness, and algorithmic bias are issues requiring special attention (Gouseti et al., 2025). Since lower secondary school students lack the full capacity to recognize technology-related risks, teachers must set an example while also guiding and supervising AI usage.

Teachers need to guide students to avoid entering personal information or sensitive data into AI tools, to respect copyright, to disclose AI-assisted content, to check for biases, and to refrain from using AI to insult, impersonate, or harm others. Furthermore, teachers must help students understand that the user bears responsibility for the final output and cannot shift that responsibility onto the tool. Consequently, AI ethics should be integrated into teaching and learning activities rather than merely presented as a separate technical rule.

Teachers as continuous professional learners

Generative AI evolves rapidly, meaning that knowledge of a specific tool can quickly become obsolete. Consequently, a teacher's professional competence is demonstrated not only by their

ability to use the tool but also by their capacity for self-directed learning, experimentation, evaluation, and adaptation of its use. The Intelligent-TPACK model emphasizes the integration of technological, content, pedagogical, and ethical knowledge as teachers incorporate AI into their instruction (Celik, 2023).

Teachers need to regularly update their tools, experiment within controlled parameters, observe the impact on learning activities, and share experiences within their professional groups. Professional development should also focus on the ability to select appropriate technologies, recognize situations where AI should not be used, and maintain autonomy in pedagogical decision-making. Thus, continuous professional learning not only helps teachers adapt to technology but also reinforces their professional identity and responsibility within the digital educational landscape.

Synthesizing the six aspects above reveals that generative AI does not eliminate the role of lower secondary school teachers; instead, it shifts the professional focus from tasks involving information delivery and reproduction to roles centered on design, evaluation, coordination, and accountability. A teacher's core value lies in their ability to exercise pedagogical judgment, maintain human connections, and ensure that the use of AI fosters the holistic development of students.

Opportunities and challenges regarding the shift in the professional role of lower secondary school teachers

Generative AI both expands the scope of tasks teachers can perform and increases their professional responsibilities. Technology's impact depends not only on the tools' capabilities but also on teacher competence, student characteristics, and school management conditions.

Opportunities for teachers' professional activities

Generative AI can assist with routine tasks such as suggesting lesson ideas, generating questions, adapting instructional materials, and providing initial feedback. This frees up time for teachers to observe, advise, and offer personalized support. AI systems also enhance the ability to differentiate tasks based on students' proficiency levels, learning paces, and individual needs. However, effectiveness is only realized when teachers evaluate the output and transform AI-generated suggestions into activities aligned with instructional goals. A review by Celik et al. (2022) indicates that while AI can support teachers in planning, implementation, and assessment, it does not eliminate the need for pedagogical intervention.

AI also facilitates innovation in learning materials, teaching methods, and assessment. Teachers can utilize AI tools to construct scenarios, generate data for analysis, or simulate diverse perspectives to foster critical thinking. Furthermore, AI supports self-directed learning, professional reflection, and the sharing of expertise. These opportunities enable teachers to shift their focus from content creation and repetitive tasks toward designing learning experiences, facilitating interactions, and supporting student development.

Challenges facing teachers

The first challenge concerns the accuracy and reliability of the output. AI can generate unsubstantiated information, cite non-existent sources, or reproduce biases present in training data (Kasneci et al., 2023). A further challenge is the competency gap: knowing how to operate the tool does not equate to the ability to integrate AI in a pedagogically valuable way. Teachers must also define objectives, verify content, identify risks, and tailor results to the specific characteristics of their learners.

Over-reliance on AI-generated lesson plans, learning materials, or assessment suggestions can undermine creativity and professional autonomy. Furthermore, uploading student work or data to AI platforms raises concerns regarding privacy, copyright, bias, and accountability—issues that are particularly significant in K-12 education (Gouseti et al., 2025). AI's ability to generate finished products also means that assessing only the final output may fail to accurately reflect student competence. Assessments should incorporate evidence of the learning process, oral examinations, and in-person presentations, while also requiring transparency regarding AI usage (Kofinas et al., 2025).

Conditions ensuring role transition

This transition requires teachers to receive training in AI, instructional design, assessment, and digital ethics. Schools need to clearly define permitted tools, restricted data types, requirements for disclosing the extent of AI assistance, and the responsibilities of all parties involved; simultaneously, they should establish professional learning communities where teachers can experiment in a controlled manner, share experiences, and evaluate impacts before widespread implementation. The focus is not on maximizing AI usage, but rather on selecting the right tools for the right tasks and educational objectives.

Requirements for the professional development of lower secondary school teachers

Based on six role shifts, the article identifies six core competency groups. These groups integrate technological understanding with subject-matter knowledge, pedagogical competence, critical thinking, and ethical responsibility; therefore, they need to be developed as an integrated whole rather than as isolated, instrumental skills.

AI Literacy

Teachers need to understand the general principles, capabilities, and limitations of generative AI; distinguish AI from search engines; and recognize the roles of data, prompts, outputs, bias, and the phenomenon of generating unfounded information. This competency enables teachers to determine which tasks can be assigned to AI tools and which must be performed by humans. According to Ng et al. (2021), AI literacy serves as the foundation for the ability to utilize and evaluate AI, as well as to address ethical issues associated with the technology.

Competence in AI-supported instructional design

Teachers need to select AI tools based on learning objectives, subject content, and student characteristics; they must also be able to craft prompts, refine learning materials, differentiate tasks, organize activities, and determine the extent of AI involvement. Furthermore, teachers must anticipate potential risks and prepare contingency plans for instances where the tool generates unsuitable results. This represents an integration of technological, content, pedagogical, and ethical knowledge within the Intelligent-TPACK framework (Celik, 2023).

Capacity to verify and evaluate content

Teachers must assess the accuracy, provenance, currency, potential bias, and suitability of the output regarding the curriculum, age group, and cultural context. Cross-referencing with textbooks, scientific literature, and authoritative sources not only ensures the quality of learning materials but also provides a basis for guiding students to distinguish between a plausible-sounding answer and verified knowledge (Kasneci et al., 2023).

Capacity to organize assessment in the context of AI

Teachers need to design context-embedded tasks, combine product and process assessments, and utilize oral questioning, observation, presentations, and learning portfolios.

Students are required to explain their working methods, disclose the extent of AI assistance, and reflect on the quality of the output. Assessment criteria must distinguish between legitimate assistance and academic dishonesty, thereby ensuring that results reflect the learner's genuine contribution (Moorhouse et al., 2023).

Ethical, safety, and data protection competencies

Teachers must select tools appropriate for the students' age; avoid uploading students' personal data or sensitive information to unverified platforms; and provide guidance on respecting copyright, ensuring transparency regarding AI usage, and identifying content that is fake, discriminatory, or harmful. Users bear responsibility for the final output and must not shift that responsibility to the tool (Gouseti et al., 2025).

Reflective capacity and continuous professional development

Teachers need to update their knowledge, conduct controlled experiments, gather evidence on impact, and adjust their use of AI. Professional reflection also encompasses the ability to identify situations where technology should not be used, share experiences within professional communities, and maintain autonomy in decision-making. UNESCO (2024) emphasizes that AI capacity building must be human-centric and ensure teacher accountability for pedagogical decisions.

Discussion

Research findings indicate that generative AI transforms professional practices but does not replace pedagogical responsibilities. While technology can generate content and offer suggestions, it cannot independently define educational goals, identify students' psychosocial needs, or assume accountability for decisions affecting learners. Therefore, the principle of human decision-making must be upheld in the design, organization, and assessment of instruction; this aligns with UNESCO's (2024) human-centric approach.

Technological competence cannot be separated from subject-matter knowledge and pedagogical competence. An AI product that is visually appealing may still lack educational value if it is not aligned with specific learning objectives, content, and learner contexts. This finding reinforces the Intelligent-TPACK model: effective AI integration is a combination of technology, content, pedagogy, and ethics, rather than merely the ability to operate tools (Celik, 2023).

Professional autonomy thus becomes a prerequisite for ensuring quality. Teachers must be capable of selecting, adjusting, or rejecting AI-generated suggestions and bear ultimate responsibility for learning materials, instructional methods, and assessment. However, this shift in roles cannot rely solely on individual effort. Without data protection standards, professional support mechanisms, and appropriate infrastructure, teachers risk having to experiment on their own and shoulder the associated risks. Capacity building must go hand in hand with policy innovation, subject-specific professional development, and effective school management.

Thus, AI does not diminish the teacher's role but rather renders it more complex, shifting the focus from mere knowledge delivery to designing, validating, coordinating, and evaluating learning, as well as fostering digital ethics and upholding professional accountability. This transformation reaffirms the teacher's central position while placing higher demands on pedagogical judgment, autonomy, and professional responsibility.

Conclusions and recommendations

Conclusions

The study identifies six shifts in the professional roles of lower secondary school teachers when integrating generative AI into instruction: learning design; knowledge verification and curation; orchestration of teacher-student-AI interactions; design of authentic assessments; assurance of

ethics and digital safety; and continuous professional learning. While AI offers opportunities to reduce routine workloads, support differentiated instruction, innovate learning materials, and foster professional development, it simultaneously presents challenges regarding reliability, the competency gap, privacy, academic integrity, and professional agency.

To fulfill these new roles, teachers require six corresponding sets of competencies: AI literacy, instructional design, content verification, assessment organization, ethics and data assurance, and professional reflection. The study's core finding is that AI generates educational value only when placed under the professional oversight of teachers and within a responsible governance framework.

Recommendations

For teachers, AI should be utilized with clear instructional objectives, with its scope of support verified and transparent; decision-making regarding content, methodology, or assessment must not be entirely delegated to the tool. Schools need to establish regulations governing AI usage, data protection, and academic integrity; organize subject-specific training; foster professional learning communities; and evaluate both effectiveness and risks prior to widespread implementation. Regulatory bodies must develop an AI competency framework for K-12 teachers tailored to the Vietnamese context, refine ethical and legal guidelines, and ensure equitable access to technology across educational institutions.

Limitations and directions for future research

As this study was conducted from a theoretical perspective, the proposed framework of roles and competencies has not yet been validated using empirical data from Vietnamese lower secondary schools; furthermore, the study did not clarify differences regarding subjects, locations, or facilities. Future research should survey and interview teachers, students, and administrators; compare different subjects and school types; develop a scale to measure role transformation; and pilot an AI competency training program to validate and refine the proposed framework.

Conflict of Interest

The authors declare no conflict of interest.

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