

Assessing the tpack implementation of selected private elementary schools in beijing, china towards a teaching enhancement program in arts education

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How to cite this paper: Gao, X. L., & Ramos, K. A. N. (2025). Assessing the tpack implementation of selected private elementary schools in beijing, china towards a teaching enhancement program in arts education. *International Journal of Educational Development*, 1(3), 12-19. ISSN Print: 3104-4263; ISSN Online: 3104-4271. <https://doi.org/10.63313/IJED.9023>
Published: 2025-10-20

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Abstract

This study assessed TPACK (Technological Pedagogical Content Knowledge) implementation in visual arts education at five private elementary schools in Beijing, aiming to identify status, challenges, and develop a teaching enhancement program. It adopts a convergent parallel mixed-methods design, involving 30 art teachers and 90 Grade 6 students via surveys, and 15 teachers and 10 students via semi-structured interviews.

Results show teachers' self-assessed TPACK across six dimensions (TK, CK, PK, PCK, TCK, TPK) is moderate, with TK highest and PCK lowest. Students rate teachers' PCK highest but TCK and TPK lowest, indicating insufficient alignment of technology with teaching goals.

Key challenges include outdated/insufficient equipment, software incompatibility, curriculum-tradition conflicts, student distraction, and over-reliance on digital effects. Influencing factors cover teachers' tech proficiency, curriculum standards, and goal-oriented tech selection.

A TPACK-based enhancement program is proposed, including hardware updates, digital resource development, teacher training, and optimized teaching strategies. It balances tech innovation with traditional art foundations, providing a practical path for sustainable TPACK integration in Beijing's private elementary art education.

Keywords

Arts Education; Private Elementary Schools; Beijing; Teaching Enhancement Program

1. Introduction

In the rapidly transforming landscape of 21st-century education, the purposeful integration of technology into teaching and learning has moved beyond the status of a

pedagogical innovation to become a global educational imperative. Within this discourse, the Technological Pedagogical Content Knowledge (TPACK) framework, first formulated by Mishra and Koehler, has established itself as a robust theoretical and practical model for explaining how teachers can effectively synthesize technological tools, pedagogical strategies, and subject-specific expertise in their instructional practice. Recent theoretical refinements and empirical applications have further strengthened its position as a central construct in educational technology research, demonstrating its relevance across an expanding range of disciplines and educational contexts (Koehler et al., 2021; Chai et al., 2021; Ghavifekr et al., 2022).

However, the distribution of TPACK-related research remains uneven. While its adoption in science, technology, engineering, and mathematics (STEM) education has been widely documented and methodologically diversified (Zhang et al., 2022; Wang & Li, 2023), its integration in the domain of arts education — and particularly in visual arts at the elementary school level — remains underexplored. In China, the strategic importance of arts education has been explicitly reaffirmed in recent policy directives, most prominently in the Ministry of Education's 2021 document *Opinions on Comprehensively Strengthening and Improving Aesthetic Education in Schools in the New Era*. This policy calls for a systemic reform of aesthetic education, emphasizing technology integration as a means to foster creativity, critical thinking, and cultural awareness among students. Yet, despite its ambitious vision, the reform process faces persistent challenges: inadequate technological competencies among teachers, limited availability of pedagogically relevant digital resources, and inconsistencies in implementation practices — challenges that are particularly acute in elementary visual arts education.

Empirical evidence further underscores this gap. Existing research on TPACK in the arts tends to focus on secondary or higher education, with a notable concentration on music or media studies (Chen et al., 2021), leaving the specific pedagogical needs and classroom realities of elementary visual arts teachers largely unaddressed. This omission is especially pronounced within China's private school sector, which, although often characterized by greater curricular flexibility and receptivity to innovation, simultaneously faces disparities in teacher preparation, digital infrastructure, and policy-aligned curriculum development (Liu & Zhao, 2022).

Private elementary schools in Beijing present a particularly illustrative case of this paradox. On one hand, they possess the autonomy to experiment with advanced pedagogical models and integrate emergent educational technologies into their curricula. On the other hand, their potential is frequently constrained by insufficient professional development opportunities, fragmented access to appropriate technological tools, and the absence of coherent frameworks for integrating technology into arts education. Notably, the perspectives of art teachers working in these environments — regarding both the perceived benefits and the practical constraints of implementing TPACK — remain scarcely examined in the literature. Similarly, the

voices of students, who are the direct beneficiaries of such pedagogical innovations, are seldom incorporated into empirical analyses of technology-enhanced visual arts learning, thereby leaving a critical dimension of the discourse insufficiently addressed.

A further limitation in existing scholarship lies in its frequent theoretical or descriptive orientation, which tends to abstract away from the situated complexities of classroom practice. Barriers such as insufficient planning time, lack of digital tools tailored for visual arts instruction, and limited opportunities for professional collaboration among teachers significantly impede the adoption of TPACK in real-world contexts (Alayyar et al., 2022; Lin & Chen, 2023). The scarcity of grounded, context-sensitive empirical studies prevents a nuanced understanding of how national policy ambitions intersect with institutional structures, teacher agency, and the material conditions of teaching in the arts.

Against this backdrop, the present study is situated at the intersection of educational technology, visual arts pedagogy, and policy reform. By concentrating on the under-researched context of private elementary schools in Beijing, it responds to both theoretical and practical gaps in the literature. It seeks to contribute to the scholarly discourse by generating empirical insights into how technology can be systematically and meaningfully integrated into arts education in ways that align with China's modernization goals under the 14th Five-Year Plan. Ultimately, the study aspires to inform policymakers, school leaders, and practitioners about strategies for cultivating a digitally fluent and artistically enriched learning environment that meets the demands of 21st-century learners.

2. Scope and Delimitation

This study was delimited to five purposefully selected private elementary schools in Beijing, China. The selection was guided by three primary criteria: (1) the schools' expressed willingness to participate in the research; (2) their demonstrable integration of technology into classroom instruction; and (3) their representativeness of contemporary urban private school contexts in Beijing. These criteria ensured that the research setting aligned with the study's focus on the intersection of technology integration and visual arts pedagogy in the elementary education sector.

The study's participants consisted of thirty (30) visual arts teachers and ninety (90) Grade 6 students, all of whom completed a structured survey questionnaire designed to assess the implementation of the Technological Pedagogical and Content Knowledge (TPACK) framework in visual arts education. To complement the quantitative data, fifteen (15) visual arts teachers and ten (10) Grade 6 students participated in in-depth semi-structured interviews. The qualitative component was aimed at eliciting rich, nuanced insights into participants' experiences, perceptions, and challenges related to technology-enhanced visual arts teaching and learning.

The research was conducted over a continuous three-month period and followed a

sequential mixed-methods design. The process comprised four interrelated phases: (1) the preparation and development of research instruments, including validation by content experts; (2) quantitative data collection via surveys, followed by qualitative data collection through interviews; (3) systematic data analysis employing both statistical and thematic techniques; and (4) the design and preliminary validation of an enhanced visual arts teaching program grounded in the TPACK framework. The three-month time frame was deemed sufficient to allow for meaningful engagement with participants, comprehensive data collection, and robust analysis.

This study was bounded by several delimitation. The scope is limited to private elementary schools in Beijing and does not extend to public schools or institutions in other regions. It focuses exclusively on visual arts education at the elementary level and excludes other art disciplines such as music, dance, or performance arts. Furthermore, the research instruments—particularly the questionnaires and interview protocols—were specifically designed to capture the unique pedagogical and technological dimensions of visual arts instruction. As such, their applicability to other disciplines or educational contexts may be limited.

While the findings cannot be generalized to all schools in China, the research offers significant empirical contributions to the limited body of scholarly literature on the integration of the TPACK framework in elementary-level visual arts education. It provides evidence-based insights into pedagogical strategies that address the evolving demands of 21st-century learning environments and may inform policy formulation, teacher professional development, and curriculum design in comparable educational contexts.

3. Research Design

This study employed a convergent parallel mixed-methods research design, a methodological approach in which quantitative and qualitative data were collected and analyzed independently yet simultaneously, with subsequent integration occurring during the interpretation phase. This design was purposefully selected because the research problem—examining the implementation of the Technological Pedagogical Content Knowledge (TPACK) framework in visual arts education—requires both empirical breadth and contextual depth. The quantitative component offers statistically grounded evidence of prevalence and general patterns of practice, while the qualitative component illuminates the contextual and experiential dimensions underlying these practices. Aligned with the study's objectives, this integrated approach prevents numerical findings from being interpreted in isolation, instead situating them alongside participants' narratives. Such triangulation enhances methodological rigor and generates interpretations that are both empirically robust and pedagogically meaningful. In the context of educational research, this design is particularly advantageous for addressing questions that demand the synthesis of measurable indicators with rich, situationally grounded insights.

The research process was structured in three distinct stages. First, the quantitative phase consisted of administering structured survey questionnaires to all Grade 6 visual arts teachers and Grade 6 students in five purposefully selected private elementary schools in Beijing. Grade 6 students were selected as respondents because, at this stage of cognitive development, they possess sufficient metacognitive maturity to reflect meaningfully on their learning experiences and to provide informed evaluations of technology integration in visual arts instruction. The teacher survey gathered self-reported measures of TPACK proficiency, the frequency and modes of technology integration, as well as perceived challenges in delivering technology-enhanced art lessons.

Second, the qualitative phase involved conducting semi-structured interviews with the same participant groups—Grade 6 visual arts teachers and a purposively sampled subset of Grade 6 students from the survey cohort. Interviews with teachers explored their instructional strategies in relation to TPACK, the barriers and enabling factors they encounter when integrating technology into arts education, and their perceived professional development needs. Student interviews investigated learning experiences, personal preferences, and attitudes toward technology-enriched art classes, thereby providing a learner-centered perspective on classroom practices.

Finally, the integration phase adhered to the principles of the convergent parallel design. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data underwent thematic analysis to identify recurring patterns and interpretive categories. The results from both strands were compared and merged only after the independent analyses were completed. This comparative process enabled the identification of convergences (areas of alignment between datasets), divergences (contradictory or differing findings), and complementarities (instances where each data source addressed distinct dimensions of the Research Questionss). By following this structured, sequential workflow, the study ensured methodological transparency, maintained high standards of validity, and produced a comprehensive account of how technological, pedagogical, and content knowledge intersect in authentic visual arts classroom contexts.

4. Results and discussion

Research Questionss 1

The implementation level of TPACK application among art teachers in Beijing, China.

Table 1. Technological Knowledge (Teacher Perspectives)

Statements	Mean	SD	Verbal Interpretation
I am comfortable using digital tools for creating art.	4.03	1.03	ME
I can troubleshoot common technology problems during class.	3.97	0.999	ME
I know how to use digital platforms for art assignments.	3.97	0.890	ME

I frequently explore new technology tools for learning or teaching art.	3.73	1.04	ME
I am confident using drawing or design apps.	4.07	0.980	ME
Overall	3.96		ME

Legend: 4.21-5.00 Great Extent; 3.41-4.20 Moderate Extent; 2.61-3.40 Some Extent; 1.81-2.60 Little Extent; 1.00-1.80 No Extent; WM-Weighted Mean; SD-Standard Deviation; VI-Verbal Interpretation

Table 1 shows the participants' assessment of their digital competence in art-related tasks. The overall mean score of 3.96 indicates that the respondents perceive themselves to a moderate extent (ME) capable of using digital tools for art creation, troubleshooting, and exploring technology in teaching and learning contexts.

Among the items, the highest rating was on "I am confident using drawing or design apps" ($M = 4.07$, $SD = 0.980$), which suggests that participants are relatively more assured in using digital applications for creative expression. This was followed by "I am comfortable using digital tools for creating art" ($M = 4.03$, $SD = 1.03$), reflecting a moderate extent of ease in incorporating technology into the artistic process.

The statements "I can troubleshoot common technology problems during class" ($M = 3.97$, $SD = 0.999$) and "I know how to use digital platforms for art assignments" ($M = 3.97$, $SD = 0.890$) both received similar ratings, signifying that participants moderately recognize their competence in addressing technical issues and using platforms effectively. On the other hand, "I frequently explore new technology tools for learning or teaching art" ($M = 3.73$, $SD = 1.04$) obtained the lowest mean score, indicating that while participants possess functional skills, they are less proactive in seeking out new and emerging technological tools.

Overall, the results imply that participants have a moderate level of confidence and competence in digital art applications, but there is potential for enhancement, particularly in fostering innovation and consistent exploration of new technologies in art education.

Fitriyah et al. (2024) found that in their mixed-methods assessment of primary school teachers' TPACK competencies, scores were highest in content knowledge (CK) and pedagogical knowledge (PK), while technological integration lagged behind. Compared to their findings, the technological knowledge scores reported in this study appear relatively strong, which may reflect both the technological emphasis within art education in Beijing and the specific training received by teachers in this field.

Moreover, the findings echo those of Jing & Omar (2024), who observed that Chinese pre-service art teachers excelled in TCK and TPK domains but continued to face challenges in broader, integrative applications of TPACK. This suggests that while individual technical proficiency is well-developed among Chinese art teachers, further development may be required to strengthen their ability to integrate this knowledge with pedagogy and content systematically.

In conclusion, the results in Table 1 indicate that the participating art teachers exhibited a high degree of self-efficacy and confidence in applying technological

knowledge, aligning with global trends that emphasize the increasing importance of digital fluency in arts education. These findings further underscore the potential for this group to serve as frontrunners in the continued integration of technology into pedagogical practice.

5. Conclusion

Based on the research analysis content and findings, the following summary is presented in the order of the Research Questions:

1. Research Question 1: The implementation level of TPACK application among art teachers in Beijing

The research findings indicate that art teachers in Beijing demonstrate a good level of mastery across all dimensions of TPACK and are able to integrate technology, pedagogy, and subject matter to some extent in their classroom practice. Teachers excel in technical knowledge and integration skills, but there is room for improvement in their subject matter knowledge, particularly in simplifying complex art concepts and effectively connecting them to students' prior knowledge.

2. Research Question 2: Students' views and attitudes towards the application of TPACK

The research findings indicate that students generally recognize the ability of teachers to apply TPACK in art classrooms, especially in terms of combining subject content and teaching methods to conduct lively classroom activities. However, students also note that although technology is used in the classroom, its integration with teaching objectives and methods has not been fully utilized.

3. Research Question 3: Challenges currently faced in implementing TPACK in the classroom

The research findings indicate that in the classroom, teachers not only face objective limitations such as outdated equipment, insufficient quantities, and rapid technological updates, but also must address new issues such as conflicts between curriculum standards and administrative requirements, as well as classroom management and academic integrity. These challenges collectively result in difficulties in implementing TPACK in practice, revealing constraints from multiple dimensions including institutional, resource, and teaching strategy factors.

4. Research Question 4: Factors influencing the implementation of TPACK in art education

The research findings indicate that the factors influencing the effective implementation of TPACK mainly include teachers' technical proficiency, curriculum standards, teaching strategy selection, and tool selection principles.

Teachers' personal experience and professional development level determine whether technology can be effectively applied; curriculum standards and textbook frameworks influence the balance between traditional and digital art teaching; and in classroom teaching, strategies such as gamification, project-based learning, and

interdisciplinary approaches can promote the organic integration of technology and teaching. These factors indicate that the implementation of TPACK depends not only on technology itself but also on teachers' teaching philosophy and curriculum positioning.

5. Research Questionss 5: Teaching Improvement Plan

The research findings indicate that promoting the deep integration of TPACK in art classrooms requires a systematic improvement plan. By updating equipment, developing digital and traditional integrated course resources, strengthening teachers' professional development and classroom management skills, and reasonably planning teaching time and strategies, it is possible to achieve a balanced development of technology and art education. This plan provides a clear path for the sustainable implementation of TPACK, emphasizing the importance of maintaining artistic foundations and cultural connotations while fully leveraging the advantages of technology in innovative and interdisciplinary teaching.

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