

RESEARCH SYNTHESIS

Exploring Innovation in Classrooms in Kazakhstan

A Preliminary Synthesis of the Camtree-NIS Lesson Study Collection

Executive Summary

A series of twelve peer-reviewed reports of teacher-led research projects from the Nazarbayev Intellectual Schools (NIS) network, published by Camtree, the Cambridge Teacher Research Exchange, offers valuable insights into improving student learning through evidence-informed, collaborative inquiry. Key findings include:

Language Across the Curriculum: Embedding language development in subject teaching—especially in STEM—improves students’ writing, reasoning, and content understanding. Cross-subject collaboration (e.g. Chemistry and English) was particularly effective.

Oracy and Student Voice: Structured classroom talk built student confidence, especially among English learners. Dialogue-based activities encouraged participation, critical thinking, and deeper engagement.

Critical Thinking in STEM: Inquiry-led experiments, metacognitive strategies, and multimedia tools helped students develop analytical and reflective skills, moving beyond rote learning.

Active Learning for Engagement: Gamification, role-play, and project work increased motivation, especially in online or challenging subjects. These approaches promoted independence and collaboration.

The studies highlight the power of collaborative inquiry. Using research lesson study, teachers co-designed, tested, and refined innovations, leading to real classroom impact and professional growth. For systems aiming to foster teacher agency and learner-centred practice, the message is clear: when teachers are supported to carry out inquiry into their practice, learning improves for students, teachers, and the profession as a whole.

The reports have been published under a Creative Commons licence as a collection in the Camtree Digital library where they are available, free of charge, to a global audience. To date, this is the one of the most-read collections in the Camtree digital library, with several of the reports among the most-frequently downloaded that Camtree has published.

Introduction

In recent years, the Nazarbayev Intellectual Schools (NIS) network in Kazakhstan has been at the forefront of educational innovation, seeking to blend local and international best practices to raise standards and deepen learning. This commitment is powerfully reflected in a series of twelve teacher-led research projects, published through the Cambridge Teacher Research Exchange (Camtree), that explore the impact of classroom-based interventions across a range of disciplines and student age groups. From Chemistry labs to CLIL-infused English lessons, and from gamification to critical thinking development, these studies reveal not only the diversity of contexts and approaches within NIS schools but also the shared values that underpin them: collaboration, evidence-informed teaching, and a deep concern for learner development.

This synthesis draws together the findings and insights from these twelve inquiries, highlighting key themes, common practices, and recurring challenges. It also considers the wider implications for school leadership and education policy, particularly in systems seeking to foster teacher agency and reflective professionalism.

Language and Literacy Across the Curriculum

Language learning, especially in multilingual environments, emerged as a core concern in many of the studies. Several projects tackled the challenges students face when learning subject content through a second or third language, particularly in science disciplines where technical vocabulary and abstract reasoning are central.

At the NIS in Uralsk, Bejerano et al. explored how questioning strategies in Chemistry could be used to strengthen students' analytical writing - an essential skill for success in Cambridge International A-Level assessments. Their collaboration between Chemistry and English teachers, using CLIL principles, demonstrated how targeted questions could scaffold students' ability to plan, evaluate, and write well-structured responses.

Similarly, Yermanova et al. investigated the use of a 'flipped writing' model in English classrooms in Pavlodar and Petropavlovsk. By shifting initial input and sample analysis to homework time, students were able to use classroom lessons for supported writing practice and feedback. The study showed gains across all proficiency levels, particularly in vocabulary use, coherence, and grammar. Notably, struggling students gained the most from structured preparatory tasks and one-to-one support, though self-regulation remained a concern.

These examples point to a broader principle: that language-rich environments, whether in English or in students' native tongues, require structured support, interdisciplinary collaboration, and a strong awareness of learner needs. Both studies echo a call for schools to embed language development across the curriculum - not as an add-on, but as a fundamental aspect of deep learning.

Developing Oracy, Argumentation, and Student Voice

Alongside writing, speaking and listening skills featured prominently, particularly in lessons aimed at building confidence, critical thinking, and collaborative problem-solving. The emphasis on oracy - structured student talk - was especially clear in projects working with English as a second language (ESL) learners.

In a project by Alikulova & Abisheva, and another by Dauletlyarova et al., the focus was on using dialogue-rich tasks such as panel discussions and open-ended questioning to improve student fluency

and reasoning. Both teams reported that students became more confident in expressing ideas, especially when scaffolded with prompts or sentence stems. Even typically reserved learners began participating more actively.

This finding was echoed in Jumabayeva & Abdykadyrkyzy's work in a primary STEM classroom, where cross-curricular CLIL lessons encouraged students to ask and answer their own questions. Supported by co-teaching from EFL and Science staff, the learners developed confidence in using subject-specific language while deepening their conceptual understanding.

Collectively, these studies highlight the power of purposeful talk in the classroom - not just as a precursor to writing, but as a powerful learning mode in its own right. They make a strong case for schools to invest in oracy frameworks and professional development to help teachers plan and facilitate structured, inclusive discussion.

Critical Thinking and Metacognition in STEM Subjects

A consistent theme across several studies was the ambition to develop higher-order thinking in students, especially in Science, Technology, Engineering and Mathematics (STEM) contexts. Rather than focusing solely on content acquisition, these projects aimed to foster skills such as analysis, reasoning, and problem-solving.

Balabayeva & Van Der Merwe, teaching Biology in Kyzylorda, explored how laboratory experiments could develop critical thinking in Grade 9 students. Through careful scaffolding of experimental design and conclusion-writing, they tracked improvements in students' analytical abilities across multiple lessons. Importantly, they found that the foundational skills built during these lessons were transferable to higher-level courses.

Meanwhile, Kelimberdiyeva et al. applied a metacognitive approach to listening comprehension, helping students in English classes to plan, monitor, and evaluate their listening strategies. This research demonstrated that even so-called passive skills can be made active and reflective, improving not only test outcomes but also learner independence.

In Chemistry, Meshchanova & Ilyubaeva tested the impact of video-based instructions for laboratory experiments, as an alternative to traditional printed guides. The use of visual materials, showing real-time equipment handling and experimental stages, significantly improved the accuracy and confidence of students - especially those with lower analytical ability. They also noted a rise in argumentation skills as students were better able to describe, explain, and reflect on their observations.

These projects illustrate a shared pedagogical shift: from rote recall to deeper engagement with ideas. They show how experimental work, when thoughtfully designed, can cultivate not only content knowledge but also cognitive skills vital for lifelong learning.

Motivation and Engagement Through Active Learning

Another cluster of studies addressed the perennial challenge of student engagement, particularly in subjects or formats where learners may feel disconnected or under-confident. These inquiries trialled a range of active learning strategies to boost motivation and make lessons more interactive and responsive.

Ramazanov & Ramazanov's project in Computer Science applied gamification techniques - avatars, level-based tasks, and structured challenges - to enhance participation and critical thinking. The results were compelling: increased task completion rates, improved collaboration, and more independent reasoning, especially during coding tasks.

In a different context, Alikulova & Saparbayeva focused on online English lessons, using project work and role-play to build students' confidence and oral fluency. Their work showed that even in virtual spaces, well-structured tasks can support peer-to-peer dialogue and language development.

Together, these studies demonstrate that engagement is not merely a matter of entertainment or novelty. When students see themselves reflected in the learning process - as creators, collaborators, or problem-solvers - they are more likely to take ownership of their progress.

Lesson Study as a Professional Learning Model

Perhaps the most unifying feature across all twelve studies is the use of lesson study as a vehicle for teacher learning and innovation. In each case, educators worked in small teams to design, observe, and refine lessons, using real-time evidence from their classrooms to adjust and improve their approaches.

This collaborative, inquiry-driven model created space for rich professional dialogue and mutual learning. Teachers reported that planning with colleagues across subjects helped to break down silos and deepen understanding. In many cases, external facilitators - such as those from the Centre for Pedagogical Excellence - played a vital role in supporting the process and helping teams move from intuition to evidence.

Yet challenges remain. Several teams noted the difficulty of scheduling joint planning time, particularly across campuses or schools. Others reflected on the need for more training in data analysis or the principles of educational research. Nonetheless, the benefits of lesson study - shared ownership, reflective practice, and tangible classroom impact - were widely affirmed.

Challenges and Barriers Identified

Across the twelve studies, several recurring challenges emerged. One was students' varied language proficiency, which affected their ability to engage with subject content, particularly in English-medium STEM subjects. Teachers addressed this through scaffolding and language integration, but the issue remains significant.

A second barrier was student self-regulation, particularly in flipped or independent learning contexts. While many students appreciated the autonomy, others struggled with time management or motivation - suggesting a need for more support in developing metacognitive and organisational skills.

A third issue was time pressure. Teachers were often constrained by limited lesson time or packed curricula, making it hard to fully implement or iterate their innovations. Aligning assessment practices with more exploratory, student-centred methods was also a concern.

Despite these constraints, teachers overwhelmingly found the lesson study process energising and generative, providing a platform to test ideas and learn from one another in a meaningful way.

Implications for Education Leadership and Policy

Taken together, these twelve studies offer valuable insights not just for classroom practitioners, but for school leaders and policymakers seeking to create conditions for effective, inclusive, and future-ready education.

- First, they demonstrate the value of investing in teacher-led inquiry. When teachers are empowered to investigate and improve their practice collaboratively, the resulting innovations are more likely to be sustained, relevant, and impactful.
- Second, the studies make a compelling case for integrating language and literacy support across all subjects. Especially in multilingual settings, language should be seen as a shared responsibility, not the sole domain of the language department.
- Third, there is strong evidence here for the power of structured student talk - not just as a communication tool, but as a vehicle for thinking and learning. Schools would do well to adopt oracy frameworks and train teachers in facilitating purposeful dialogue.
- Finally, these projects underline the importance of flexible curriculum and assessment policies that allow space for innovation. Where high-stakes tests dominate, the kinds of deep learning and formative feedback showcased in these reports are often marginalised.

Conclusion

The Camtree-NIS reports reveal a community of educators engaged in thoughtful, rigorous, and often courageous experimentation. These are not isolated success stories, but part of a growing movement towards a more collaborative, reflective, and learner-centred vision of schooling. Whether through flipped learning, gamification, practical science, or CLIL, the thread that connects these studies is a belief in the power of teaching to transform - and the value of inquiry as a path to better practice.

As systems around the world look to balance rigour with relevance, and innovation with equity, the work of these teachers offers both inspiration and a model. Their message is clear: when teachers lead, learning improves - not only for students, but for the profession as a whole.

About Camtree

Camtree: the Cambridge Teacher Research Exchange is a global platform for close-to-practice research in education. Based at Hughes Hall, University of Cambridge, Camtree draws on high-quality research from around the world to support educators to reflect on their practice and carry out inquiries to improve learning in their own classrooms and organisations. The outcomes of these inquiries, once peer reviewed, can be published within the Camtree digital library under a Creative Commons Licence (CC-BY 4.0). You can find out more about Camtree and its digital library at <https://www.camtree.org>

The Teacher Research Reports

The following reports contributed to this synthesis and all are available to download in the Camtree Digital Library at <https://library.camtree.org>.

- Alikulova, X., & Abisheva, K. (2024). *Developing students' argumentative skills in ESL lessons*. <https://hdl.handle.net/20.500.14069/680>
- Alikulova, X., & Saparbayeva, Z. (2024). *Developing students' communication in the context of online ESL lessons*. <https://hdl.handle.net/20.500.14069/679>
- Baitokayeva, L. (2024). *How to develop grade 7 learners' research skills by using a story-based learning approach in english lessons?* <https://hdl.handle.net/20.500.14069/742>
- Balabayeva, S. S., & Van Der Merwe, D. (2025). *Development of critical thinking competencies in grade 9 biology students through effective use of laboratory experiments to positively affect skill levels*. <https://hdl.handle.net/20.500.14069/895>
- Bejerano, M. J., Kimatova, G., & Sergaliyeva, A. (2025). *Improving students' analytical writing skills through effective questioning strategies in chemistry lessons*. <https://hdl.handle.net/20.500.14069/900>
- Dauletiyarova, A. B., Rashitova, M. B., Serikbayeva, Zh. K., & Zhbir, O. V. (2025). *Improving students' speaking skills in English classes by using open questions and interactive speaking methods*. <https://hdl.handle.net/20.500.14069/884>
- Jumabayeva, T., & Abdykadyrkyzy, A. (2025). *Strengthening scientific understanding through targeted english lessons*. <https://hdl.handle.net/20.500.14069/847>
- Kelimerdiyeva, A., Paviz, K., Yermaganbetova, N., Mauytova, Z., Kurbangaliyev, M., & Nabiyeva, A. (2025). *Exploring the impact of metacognitive strategies on intermediate learners' listening comprehension skills*. <https://hdl.handle.net/20.500.14069/845>
- Meshchanova, A., & Ilyubaeva, G. (2025). *Improving the quality of laboratory work in chemistry by replacing printed instructions with video instructions*. <https://hdl.handle.net/20.500.14069/888>
- Ramazanov, R., & Ramazanov, R. (2025). *Gamification in high school computer science: Enhancing engagement and critical thinking through lesson study*. <https://hdl.handle.net/20.500.14069/899>
- Shakhmetova, Z., & Nusipzhanova, G. (2024). *Development of academic English language skills among 11th grade students in written biology assignments through the use of the CLIL methodology: A research lesson study*. <https://hdl.handle.net/20.500.14069/684>
- Yermanova, B., Gurinova, A., Golovintseva, V., Kiiko, Y., Rakhmail, E., & Melnikova, Y. (2025). *How to develop grade 9 and 10 students' writing skills by using the flipped writing method in english lessons*. <https://hdl.handle.net/20.500.14069/844>