FILOLOGIYA VA PEDAGOGIKA

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O‘ZBEKISTON RESPUBLIKASI MAKTABGACHA VA MAKTAB TA’LIMI VAZIRLIGINING
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FILOLOGIYA VA PEDAGOGIKA

O‘ZBEKISTON RESPUBLIKASI MAKTABGACHA VA MAKTAB TA'LIMI VAZIRLIGINING ILMIY-METODIK ELEKTRON JURNALI

TAHRIR HAY'ATI:

10.00.00 – FILOLOGIYA

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O‘zbekiston Respublikasi Oliy ta'lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasi Rayosatining 2024-yil 30-noyabrdagi 364/5-qarori bilan 10.00.00 – Filologiya va 13.00.00 – Pedagogika fanlari bo‘yicha doktorlik dissertatsiyalari (PhD, DSc) asosiy ilmiy natijalarini chop etish tavsiya etilgan milliy ilmiy nashr.

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Lutfiya ERKINOVA,
Urgench State University named after Abu Rayhan Beruni

TPACK AND PBL AS MODERN AND EFFECTIVE TOOLS TO IMPLEMENT IN TEACHING

Annotation. This article analyses the role of TPACK and Project-Based Learning (PBL) in contemporary education. TPACK is interpreted as a teacher-knowledge framework that connects content, pedagogy, and technology, whereas PBL organises sustained inquiry into an authentic problem and the creation of a meaningful product. The article proposes an integration mechanism based on defining outcomes, formulating a driving question, sequencing activities, selecting technology by pedagogical function, planning evidence of learning, and reflection. Conditions for effectiveness and risks related to organisation, assessment, access, and digital equity are also discussed.

Keywords: TPACK, PBL, project-based learning, technology integration, instructional design, digital pedagogy, assessment.

Annotatsiya. Mazkur maqolada TPACK va Project-Based Learning (PBL)ning zamonaviy ta'limdagi o'rni tahlil qilinadi. TPACK mazmun, pedagogika va texnologiya bilimlarini uyg'unlashtiruvchi o'qituvchi bilim modeli, PBL esa talabaning haqiqiy muammo ustida izlanishi va mazmunli mahsulot yaratishini tashkil qiluvchi yondashuv sifatida talqin etiladi. Ularni integratsiyalash uchun natijani belgilash, yo'naltiruvchi savol yaratish, faoliyatni bosqichlash, texnologiyani pedagogik funksiya asosida tanlash, baholash dalillarini rejalashtirish va refleksiya bosqichlari taklif qilinadi. Samaradorlikning shartlari hamda yuzaga kelishi mumkin bo'lgan tashkiliy, baholash va raqamli tenglik xatarlari yoritiladi.

Kalit so'zlar: TPACK, PBL, loyiha asosida ta'lim, texnologik integratsiya, o'qitish dizayni, raqamli pedagogika, baholash.

Аннотация. В статье анализируется роль TPACK и Project-Based Learning (PBL) в современном образовании. TPACK рассматривается как модель профессионального знания учителя, объединяющая содержание, педагогику и технологию, а PBL – как подход, организующий исследование реальной проблемы и создание значимого продукта. Предложен механизм интеграции, включающий определение результатов, формулирование направляющего вопроса, поэтапное проектирование деятельности, выбор технологии по педагогической функции, планирование доказательств обучения и рефлексию. Рассматриваются условия эффективности, а также риски организации, оценивания и цифрового неравенства.

Ключевые слова: TPACK, PBL, проектное обучение, интеграция технологий, дизайн обучения, цифровая педагогика, оценивание.

Digital transformation in education requires more than adding applications or devices to existing lessons. Effective integration depends on the relationship among disciplinary content, pedagogy, technology, learners, and context. TPACK describes this professional knowledge as an interaction among technological, pedagogical, and content knowledge rather than a simple sum of separate competencies [1: 1028–1029]. Project-Based Learning (PBL), meanwhile, organises sustained inquiry around an authentic problem and a meaningful product. In genuine PBL, the project is a central means of learning disciplinary ideas, not a decorative task completed after instruction [3: 1–3].

TPACK and PBL therefore perform complementary functions: TPACK justifies the choice and purpose of technology, while PBL gives students a setting for inquiry, collaboration, decision making, and communication. This article proposes a compact mechanism for integrating them. Technology must strengthen a defined learning outcome, and the project must make students' knowledge and reasoning visible.

Tpack and pbl as complementary frameworks

TPACK combines Content Knowledge, Pedagogical Knowledge, and Technological Knowledge with their intersections, culminating in Technological Pedagogical Content Knowledge. Its main contribution is to challenge technology-first planning. A videoconferencing platform, an artificial-intelligence assistant, or a collaborative board is not inherently effective; its value depends on the knowledge students construct, the activity they perform, and the feedback they receive. Technocentric planning begins with a tool and only later searches for a curriculum use, often ignoring differences among subjects [2: 2–4]. A sounder sequence is to define content-based activities first and then select digital or non-digital tools that strengthen them [2: 11–13].

PBL is characterised by centrality, a driving question, constructive investigation, student autonomy, and realism [3: 3]. Students formulate questions, evaluate sources, distribute roles, create a draft or prototype, present it to an audience, and revise it through feedback. These processes can support communication, critical thinking, problem solving, creativity, time management, and digital literacy [4: 39–41]. The teacher's role does not disappear; it changes from delivering answers to designing the environment, scaffolding inquiry, monitoring quality, and providing timely formative feedback.

Claims about effectiveness nevertheless require careful evidence. Reviews note positive PBL outcomes but also methodological limitations, including quasi-experimental designs that restrict strong causal conclusions [5: 267]. Higher-education studies distinguish cognitive, affective, behavioural, and artifact-performance outcomes, which cannot be captured by a single questionnaire or test [6: 2–5]. PBL should therefore be implemented as an aligned system of goals, activities, evidence, assessment, and reflection rather than promoted only as an engaging method.

An integrated design mechanism

The first step is to define the intended learning outcome and formulate an authentic driving question that makes it necessary. In an English language course, for example, the question "How can our university improve its information service for international students?" connects language use with audience analysis, intercultural communication, research, and digital product design. Teachers then specify what students should know and what evidence will demonstrate that knowledge. A video, podcast, website, or infographic is only the visible artifact; disciplinary accuracy, source quality, argument structure, and communicative appropriateness must be observable within it.

The second step is to design a manageable pedagogical sequence. Inquiry, planning, prototyping, revision, presentation, and reflection are assigned clear interim products, deadlines, individual and collective responsibilities, and feedback. Combining content-based activities into a coherent unit keeps technology subordinate to learning goals [2: 20–22]. Scaffolding may include models, guiding

questions, curated sources, short explanations, checkpoints, and peer review; it should enable student autonomy rather than replace it.

The third step is criterion-based technology selection. Each tool should improve a specific pedagogical function such as access to information, collaboration, modelling, multimodal expression, feedback, monitoring, or dissemination. Google Docs can support collaborative revision, Padlet can organise sources, Canva can support audience-oriented visual communication, and videoconferencing can connect learners with an external expert. If a tool adds no educational value, choosing not to use it is also a valid TPACK decision. Teachers should additionally plan an accessible, low-bandwidth or non-digital alternative.

The fourth step is to plan assessment and reflection from the beginning. An analytic rubric should combine disciplinary accuracy, evidence, collaboration, technological appropriateness, product quality, presentation, and individual contribution. Formative evidence may include a concept map, project plan, annotated bibliography, draft, or prototype; summative assessment addresses both the final product and the reasoning behind it. Tests, observations, rubrics, reflections, and artifacts should be triangulated because each reveals a different dimension of learning [6: 3–6]. Reflection then informs changes to the next project's scope, timeline, grouping, guidance, tools, and assessment.

Practical application, conditions, and risks

A practical English-language project may be titled "Local Stories for a Global Audience." Students create a digital story about a local cultural site. Content goals include description, interviewing, source verification, and audience-appropriate language; activities include inquiry, model analysis, peer feedback, and revision. Audio, mapping, captions, and visual editing are used only when they support those goals. Assessment addresses language accuracy, cultural responsibility, source quality, coherence, purposeful technology use, and individual contribution. Generative AI may support ideas or initial language feedback, but students must verify information, cite sources, and disclose substantial AI assistance.

Implementation also requires teacher learning and institutional support. A 2024 study involving 245 teachers highlights the importance of TPACK-related self-efficacy, disciplinary preparation, pedagogical education, professional development, and supportive school culture for technology-supported PBL [7: 2–3]. One-off platform training is therefore insufficient: teachers need opportunities to design a project, enact it, analyse evidence, receive collegial feedback, and redesign the unit. Project-based instruction need not reject short explanations, structured exercises, models, or demonstrations; these methods are appropriate when they support rather than displace inquiry and product creation [8: 301–302].

Three conditions are essential. First, outcomes, activities, tools, and assessment must be aligned so that an attractive product cannot conceal inaccurate content. Second, students need scaffolding for questioning, source evaluation, planning, teamwork, and evidence-based decisions; teacher guidance, productive group processes, balanced instruction and inquiry, and aligned assessment are recognised success factors [5: 275–276]. Third, equitable access requires accessible or offline options, fair roles, technical support, and clear rules for privacy, copyright, academic integrity, and AI use. Project scope must fit available time and curriculum constraints [3: 26–27]. Effectiveness should be demonstrated through intended learning outcomes, not only satisfaction or claims that a technology worked.

TPACK and PBL are complementary tools: TPACK balances content, pedagogy, and technology, while PBL makes that balance visible through authentic inquiry and product creation. Integration begins with clear outcomes, a meaningful question, staged activities, purposeful technology, and assessment of process and product. With appropriate scaffolding, equitable access, responsible AI use, and reflection, TPACK–PBL can develop disciplinary knowledge, critical thinking, communication, collaboration, and digital literacy.

References

1. Mishra P., Koehler M.J. Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge // Teachers College Record, 2006. Vol. 108, №6. – P. 1017–1054.
2. Harris J.B., Mishra P., Koehler M.J. Teachers' Technological Pedagogical Content Knowledge: Curriculum-based Technology Integration Reframed // Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, 2007), 2007. – P. 1–26.
3. Thomas J.W. A Review of Research on Project-Based Learning. – San Rafael, CA: The Autodesk Foundation, 2000.
4. Bell S. Project-Based Learning for the 21st Century: Skills for the Future // The Clearing House, 2010. Vol. 83, №2. – P. 39–43.
5. Kokotsaki D., Menzies V., Wiggins A. Project-based learning: A review of the literature // Improving Schools, 2016. Vol. 19, № 3. – P. 267–277.
6. Guo P., Saab N., Post L.S., Admiraal W. A review of project-based learning in higher education: Student outcomes and measures // International Journal of Educational Research, 2020. Vol. 102. Art. 101586.
7. Mansour N., Said Z., Abu-Tineh A. Factors impacting science and mathematics teachers' competencies and self-efficacy in TPACK for PBL and STEM // Eurasia Journal of Mathematics, Science and Technology Education, 2024. Vol. 20, №5. Art. em2442.
8. Erkinova L.Q. Loyiha metodi an'anaviy usullarga to'ldiruvchi sifatida // Ijtimoiy-gumanitar fanlarning dolzarb muammolari, 2024, № 4(S/4). – B. 299–304.