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# BO‘LAJAK MAKTABGACHA TA’LIM TARBIYACHILARINING STEAM KOMPETENSIYALARINI INNOVATSION YONDASHUV VA PORTFOLIO TEXNOLOGIYASI ASOSIDA RIVOJLANTIRISH

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**Annotatsiya.** Ushbu maqolada bo‘lajak maktabgacha ta’lim tarbiyachilarining STEAM (Science, Technology, Engineering, Art, Mathematics) kompetensiyalarini TPCK (Technological Pedagogical Content Knowledge) modeli hamda e-portfolio texnologiyasi asosida rivojlantirishning nazariy va amaliy masalalari tadqiq etilgan. Tadqiqotda interaktiv texnologik vositalar va portfolio yondashuvining bo‘lajak tarbiyachilarning 4K ko‘nikmalariga (kreativlik, tanqidiy fikrlash, hamkorlik, muloqot) ta’siri tahlil qilinadi. Tajriba-sinov natijalari e-portfoliodan foydalanish talabalarda integratsiyalashgan STEAM darslarini loyihalash va autentik baholash ko‘nikmalarini statistik jihatdan ahamiyatli darajada oshirishini ko‘rsatdi.

**Kalit so‘zlar:** STEAM ta’limi, maktabgacha ta’lim, kasbiy kompetensiya, TPCK modeli, e-portfolio, autentik baholash, 4K ko‘nikmalari.

**Abstract.** This article investigates the theoretical and practical issues of developing preservice early childhood teachers’ STEAM (Science, Technology, Engineering, Art, Mathematics) competencies based on the TPCK (Technological Pedagogical Content Knowledge) model and e-portfolio technology. The study analyzes the impact of interactive technological tools and the portfolio approach on preservice teachers’ 21st-century 4C skills (creativity, critical thinking, collaboration, communication). Experimental results demonstrate that implementing e-portfolios significantly enhances preservice teachers’ ability to design integrated STEAM lessons and conduct authentic assessments.

**Keywords:** STEAM education, early childhood education, professional competency, TPCK model, e-portfolio, authentic assessment, 4C skills.

**Kirish**

Zamonaviy maktabgacha ta’lim tizimini transformatsiya qilish va ta’lim sifatini yangi bosqichga ko‘tarishda bo‘lajak tarbiyachilarning kasbiy kompetentligini oshirish eng dolzarb vazifalardan biri hisoblanadi. Bugungi kunda maktabgacha ta’lim tashkilotlarida STEAM (Science, Technology, Engineering, Art, Mathematics) yondashuvi shunchaki alohida fanlar majmui emas, balki bolalarning mantiqiy, kreativ va integratsiyalashgan fikrlash tarzini shakllantiruvchi pedagogik konsepsiya sifatida namoyon bo‘lmoqda.[6] Ilk yoshdagi bolalarda 4K ko‘nikmalarini (tanqidiy fikrlash, kreativlik, hamkorlik va muloqot) samarali shakllantirish uchun, eng avvalo, OTMlarda bo‘lajak tarbiyachilarning kasbiy tayyorgarligini innovatsion yondashuvlar asosida takomillashtirish talab etiladi [1].

Tadqiqotning nazariy-metodologik asosi sifatida TPCK (Technological Pedagogical Content Knowledge – Texnologik, pedagogik va mazmuniy bilimlar integratsiyasi) modeli (Mishra and Koehler, 2006; ElSayary et al., 2022) hamda konstruktivizm va loyihaga asoslangan ta’lim(Project-Based Learning – PBL) konsepsiyasi (French et al., 2023) xizmat qiladi. TPCK modeli pedagogning muayyan fan mazmunini zamonaviy interaktiv texnologiyalar va maqbul pedagogik metodlar vositasida integratsiyalashgan holda talabalarga yetkazish mahoratini ifodalaydi. Shu bilan birga, ta’lim jarayonida o‘qituvchilarning kasbiy o‘sishi va amaliy ko‘nikmalarini baholashda an’anaviy sinovlardan ko‘ra e-portfolio (elektron portfolio) texnologiyasi autentik baholash vositasi sifatida yuqori samaradorlik ko‘rsatmoqda [5;2].

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Ushbu tadqiqotning maqsadi – 13.00.01 ixtisosligi bo‘yicha maktabgacha ta’lim yo‘nalishi talabalarining kasbiy kompetensiyalarini TPCK modeli va e-portfolio texnologiyasi vositasida rivojlantirishning pedagogik-metodik tizimini ishlab chiqish hamda uning amaliy samaradorligini tajribada asoslab berishdan iboratdir.

**Asosiy qism**

**Tadqiqot metodologiyasi.**

Bo‘lajak tarbiyachilarning STEAM kompetensiyalarini rivojlantirish bo‘yicha tadqiqot ishlari ElSayary et al. (2022) va French et al. (2023) tomonidan taklif etilgan explanatory sequential mixed-methods (tushuntiruvchi ketma-ket aralash metodlar) dizayni asosida tashkil etildi. Tadqiqotda N=80 nafar maktabgacha ta’lim yo‘nalishi talabalari (tajriba guruhida n=45, nazorat guruhida n=35; sifat tahlili va fokus-guruh muhokamalari uchun n=18) ishtirok etdi. Tajriba guruhida dars jarayoniga raqamli va interaktiv texnologiya vositalari (Canva, PowToon, Genially, Doodly, Google Classroom, iCloud Pages, Miro), shuningdek, Google Sites platformasi bazasidagi e-portfolio topshiriqlari integratsiya qilindi. O‘lchov vositasi sifatida ElSayary (2014) va ElSayary et al. (2022) tomonidan ishlab chiqilgan, 7 ta sub-shkala bo‘yicha 39 ta indikatorni qamrab olgan diagnostik so‘rovnoma va kriterial rubrikalardan foydalanildi (so‘rovnomaning umumiy ichki ishonchlilik koeffitsienti Cronbach’s alpha α=0.979 ga teng).

STEAM portfoliosining tarkibiy modeli. StudySmarter (2025) va French et al. (2023) ilmiy manbalari tahlili shuni ko‘rsatadiki, bo‘lajak tarbiyachining STEAM portfoliosi shunchaki hujjatlar to‘plami emas, balki uning nazariy tayyorgarligi, amaliy dars ishlanmalari va refleksiv tahlillarining boy majmuasidir. Biz ishlab chiqqan modelga ko‘ra, STEAM portfoliosi 6 ta asosiy tarkibiy qismdan iborat:

**1. Kirish va rezyume (Cover Letter and Resume):** Talabaning shaxsiy kasbiy maqsadi, pedagogik faoliyat konsepsiyasi va qisqacha ma’lumotlari.

**2. Pedagogik kredo (Teaching Philosophy):** Bo‘lajak tarbiyachining maktabgacha ta’limda STEAM va integratsiyalashgan o‘qitish bo‘yicha shaxsiy qarashlari.

**3. O‘quv-metodik ishlanmalar (Instructional Materials):** Science, Technology, Engineering, Art, Math elementlarini qamrab olgan integratsiyalashgan faoliyat ishlanmalari, loyiha xaritalari va faoliyat ssenariylari.

**4. Amaliy baholash artefaktlari (Assessment Artifacts):** Talabalar va maktabgacha ta’lim yoshidagi bolalarning amaliy faoliyat natijalari, loyiha maketlari foto/videolari, o‘quv topshiriqlari va kriterial rubrikalar.

**5. Refleksiv kundaliklar (Reflective Journals):** Talabaning har bir o‘tkazilgan STEAM faoliyatidan so‘ng o‘z faoliyatini tanqidiy tahlil qilishi (What? So what? Now what? modeli).

**6. Kasbiy rivojlanish va tavsiyanomalar (Professional Evidence):** Sertifikatlar, OTM va bog‘cha pedagoglarining taqrizlari hamda tavsiyanomalari.

**Diagnostik mezonlar va baholash rubrikasi .**

Bo‘lajak tarbiyachilarning STEAM kompetensiyalarini baholash uchun 3 ta rivojlanish darajasi (Past/Boshlang'ich, O‘rta/Amaliy, Yuqori/Innovatsion) bo‘yicha mezoniy rubrika ishlab chiqildi (1-jadval).

**1-jadval. Bo‘lajak tarbiyachilarning STEAM portfoliosini baholash rubrikasi**

| **Baholash mezonlari** | **Past daraja (Boshlang'ich, 1-1.5 b.)** | **O‘rta daraja (Amaliy, 2-3 b.)** | **Yuqori daraja (Innovatsion, 4-5 b.)** |
|---|---|---|---|
| 1. STEAM elementlarini | Fanlarni alohida tushunadi, dars | 2-3 ta STEAM elementini o‘zaro | Barcha 5 ta STEAM elementini |

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|---|---|---|---|
| integratsiyalash | konspektida ularni birlashtirishda qiynaladi. | bog'lab, sodda integratsiyalashgan dars tuzadi. | uyg'unlashtirib, innovatsion dars ishlanmalari va loyiha xaritalari yaratadi. |
| 2. Interaktiv va raqamli vositalar | Raqamli vositalarni qo‘llashda ikkalanadi, faqat an'anaviy shakllar bilan cheklanadi. | E-portfolio platformalarida ishlay oladi, darsda multimediya vositalaridan foydalanadi. | Interaktiv ilovalardan (Genially, Canva, PowToon) erkin foydalanadi, e-portfolioda boy artefaktlar beradi. |
| 3. Pedagogik refleksiya va 4K | Refleksiya shakliy va umumiy; 4K ko‘nikmalari past darajada namoyon bo‘ladi. | Har bir mashg'ulotdan so‘ng o‘z faoliyatini tahlil qiladi, erishilgan natijalarni aks ettiradi. | Chuqur tanqidiy va refleksiv tahlil yuritadi, TPCK va 4K ko‘nikmalarining yuqori darajasini ko‘rsatadi. |

**Tadqiqot natijalari va muhokama**.

Tajriba-sinov ishlari yakunida olingan ma’lumotlarni ElSayary et al. (2022) uslubiyoti bo‘yicha bir omilli ko‘p o‘lchovli dispersion tahlil (MANOVA) orqali qayta ishlash shuni ko‘rsatdiki, interaktiv texnologiya va e-portfolio qo‘llanilgan tajriba guruhida barcha 6 ta kasbiy kompetensiya bo‘yicha statistik jihatdan ahamiyatli ijobiy siljish yuz berdi.

Tajriba guruhi talabalarining post-test natijalari bo‘yicha o‘rta qiymatlar quyidagicha shakllandi: Tanqidiy fikrlash (Critical thinking) M=3.92 (SD=0.73), Hamkorlik (Collaboration) M=4.07 (SD=0.82), Muloqot (Communication) M=4.11 (SD=0.73), Kreativlik va innovatsiya (Creativity and Innovation) M=4.06 (SD=0.93), O‘z-o‘zini yo‘naltirish (Self-direction) M=4.03 (SD=0.94), Fanlararo bog'lanish (Connection) M=4.13 (SD=0.81) hamda Interaktiv texnologiya qo‘llash (Interactive technology) M=4.27 (SD=0.82). Handal et al. (2013) shkalasiga ko‘ra, ushbu ko‘rsatkichlar talabalarda STEAM kompetensiyalari Yuqori darajada rivojlanganligini tasdiqlaydi (ElSayary et al., 2022).

**Xulosa**

Olib borilgan ilmiy-amaliy tadqiqot natijalari bo‘lajak maktabgacha ta’lim tarbiyachilarining kasbiy kompetensiyalarini rivojlantirishda TPCK modeli va e-portfolio texnologiyasini integratsiyalash yuqori pedagogik samaradorlikka ega ekanligini ko‘rsatdi. STEAM portfoliosi shunchaki baholash vositasi emas, balki talabalarning nazariy bilimlari, kreativ faoliyat ishlanmalari va refleksiv tahlillarini tizimlashtiruvchi dinamik rivojlanish muhiti hisoblanadi.

Tadqiqot xulosalariga tayanib quyidagi amaliy tavsiyalar ilgari suriladi:

1. OTMlarda maktabgacha ta’lim yo‘nalishi bakalavriat va magistratura bosqichlari o‘quv rejalariga “STEAM ta’limida e-portfolio va interaktiv texnologiyalar” maxsus modulini kiritish;

2. Bo‘lajak tarbiyachilarning pedagogik amaliyot jarayonida loyihaga asoslangan ta’lim(PBL) va e-portfolio vositasida autentik baholash amaliyotini keng yo‘lga qo‘yish;

3. Maktabgacha ta’lim tashkilotlari va OTMlar o‘rtasidagi ta’lim klasteri hamkorligida talabalarning amaliy STEAM portfoliosi taqdimotlarini doimiy ravishda o‘tkazib borish.

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