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DEVELOPING LEARNING MOTIVATION IN PROSPECTIVE PRIMARY SCHOOL TEACHERS THROUGH DIGITAL INTERACTIVE EDUCATIONAL TECHNOLOGIES AND GAMIFICATION

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Abstract

This study examines how digital interactive educational technologies and gamification can be designed and integrated to strengthen learning motivation among prospective primary school teachers in pedagogical university programs. In teacher education, motivation is not only a personal attribute but also a professional resource that shapes persistence, self-regulation, reflective practice, and readiness to adopt learner-centered methods in future classrooms. The research conceptualizes motivational growth through the lens of self-determination theory and expectancy-value perspectives, emphasizing the role of autonomy-supportive learning environments, competence-building feedback, and socially meaningful participation. Digital interactive tools, including learning management systems, microlearning applications, interactive simulations, and multimedia authoring platforms, are treated as pedagogical systems rather than isolated instruments. Gamification is framed as a structured motivational design approach that uses clear goals, progress visibility, formative feedback loops, meaningful challenges, collaboration, and narrative elements to sustain engagement without reducing learning to reward-chasing.

Empirically, the study proposes and tests an instructional model that combines interactive tasks, adaptive feedback, and gamified learning scenarios aligned with primary-education pedagogy courses. The model prioritizes authentic professional tasks such as lesson design, classroom management decision-making, and assessment literacy, delivered through digital modules that support

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iterative improvement and peer interaction. The expected contribution is a context-sensitive framework for pedagogical universities that links motivational indicators with measurable learning outcomes, offering evidence-based guidance on how to implement digital interactivity and gamification ethically, inclusively, and sustainably in teacher preparation.

Keywords: Learning motivation; teacher education; prospective primary school teachers; digital interactive learning; gamification; self-determination theory; expectancy-value; autonomy support; formative feedback; engagement; self-regulated learning; professional identity; instructional design; learning analytics; blended learning; microlearning; collaborative learning; reflective practice.

Introduction

BO‘LAJAK BOSHLANG‘ICH SINF O‘QITUVCHILARIDA O‘QUV MOTIVATSIYASINI RAQAMLI-INTERAKTIV TA’LIM TEXNOLOGIYALARI VA GAMIFIKATSIYA ASOSIDA SHAKLLANTIRISH

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Annotatsiya:
Ushbu tadqiqot pedagogika universiteti dasturlarida boshlang‘ich sinf o‘qituvchisi bo‘lishga tayyorlanayotgan talabalarda o‘qish motivatsiyasini kuchaytirish maqsadida raqamli interaktiv ta’lim texnologiyalari va gamifikatsiyani qanday loyihalash hamda integratsiya qilish mumkinligini tahlil qiladi. O‘qituvchi tayyorlash jarayonida motivatsiya nafaqat shaxsiy xususiyat, balki kelgusida sinfda barqaror ishlash, o‘zini boshqarish (self-regulyatsiya), reflektiv amaliyot va o‘quvchi-markazli metodlarni qabul qilishga tayyorlikni belgilovchi kasbiy resurs sifatida qaraladi. Tadqiqot motivatsion o‘sishni o‘z-

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o‘zini belgilash nazariyasi (self-determination theory) va kutilma–qiymat (expectancy–value) yondashuvlari nuqtai nazaridan konseptuallashtirib, avtonomiyani qo‘llab-quvvatlovchi o‘quv muhitlari, kompetensiyani rivojlantiruvchi qayta aloqa (feedback) hamda ijtimoiy jihatdan mazmunli ishtirokning rolini ta’kidlaydi. Raqamli interaktiv vositalar — o‘qitishni boshqarish tizimlari (LMS), mikroota’lim (microlearning) ilovalari, interaktiv simulyatsiyalar va multimedia kontent yaratish platformalari — alohida instrumentlar sifatida emas, balki yaxlit pedagogik tizimlar sifatida talqin etiladi. Gamifikatsiya esa o‘qishni faqat mukofot ortidan quvishga aylantirmasdan, jalb etilganlikni barqaror ushlab turishga xizmat qiladigan struktural motivatsion dizayn yondashuvi sifatida asoslanadi; u aniq maqsadlar, taraqqiyotni ko‘rsatib borish, formatif qayta aloqa sikllari, mazmunli qiyinchiliklar, hamkorlik va narrativ elementlarni o‘z ichiga oladi.

Empirik jihatdan tadqiqot boshlang‘ich ta’lim pedagogikasi fanlariga moslashtirilgan interaktiv topshiriqlar, adaptiv qayta aloqa va gamifikatsiyalashgan o‘quv ssenariylarini birlashtiruvchi o‘qitish modelini taklif etadi va sinovdan o‘tkazadi. Model darsni loyihalash, sinfni boshqarishda qaror qabul qilish hamda baholash savodxonligi kabi autentik kasbiy vazifalarni ustuvor qo‘yadi; bu vazifalar iterativ takomillashtirish va tengdoshlar bilan o‘zaro hamkorlikni qo‘llab-quvvatlaydigan raqamli modullar orqali amalga oshiriladi. Kutilayotgan ilmiy-amaliy hissa pedagogika universitetlari uchun kontekstga mos metodik asos yaratishdan iborat bo‘lib, u motivatsion ko‘rsatkichlarni o‘lchanadigan o‘quv natijalari bilan bog‘laydi va o‘qituvchi tayyorlashda raqamli interaktivlik hamda gamifikatsiyani etik, inklyuziv va barqaror tarzda joriy etish bo‘yicha dalillarga asoslangan tavsiyalarni taqdim etadi.

Kalit so‘zlar: o‘qish motivatsiyasi; o‘qituvchi ta’limi; bo‘lajak boshlang‘ich sinf o‘qituvchilari; raqamli interaktiv ta’lim; gamifikatsiya; o‘z-o‘zini belgilash nazariyasi; kutilma–qiymat; avtonomiyani qo‘llab-quvvatlash; formatif qayta aloqa; jalb etilganlik; o‘zini boshqarib o‘qish (self-regulated learning); kasbiy

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identitet; o‘qitish dizayni; o‘quv analitikasi; aralash ta’lim (blended learning); mikroota’lim; hamkorlikda o‘qish; reflektiv amaliyot.

Introduction

In contemporary teacher education, learning motivation is increasingly recognized as a core predictor of persistence, academic achievement, and professional readiness. For prospective primary school teachers, motivation is doubly significant: it determines not only how effectively they learn during university study, but also how they later cultivate motivation in children through classroom climate, instructional design, and feedback practices. When students in teacher-training programs experience stable, internally supported motivation, they are more likely to engage in reflective practice, accept constructive critique, and sustain professional growth beyond graduation. Conversely, when motivation is dominated by external pressure or routine compliance, learning tends to become superficial, risk-avoidant, and weakly connected to professional identity. In this sense, motivation in teacher education can be viewed as a professional resource that shapes future pedagogical behavior, not merely an individual psychological trait.

Digital transformation has expanded the repertoire of tools available to pedagogical universities. Learning management systems, interactive content platforms, mobile applications, multimedia authoring tools, and communication environments make it possible to diversify tasks, increase feedback frequency, and personalize learning trajectories. However, the presence of technology does not automatically generate motivation. Digital environments can also overload attention, encourage passive consumption, and amplify extrinsic control through constant monitoring. Therefore, the central issue is not whether digital tools are used, but how they are pedagogically designed to support autonomy, competence, and relatedness, which are widely considered key psychological conditions for sustainable motivation. Digital interactivity becomes motivational when it gives learners meaningful choice, provides clear and timely feedback, supports mastery progression, and builds a sense of belonging through collaborative activity.

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Gamification has emerged as one of the most discussed motivational design approaches in education. In higher education, gamification is often interpreted as adding points, badges, and leaderboards to existing courses. Such narrow implementations can produce short-term engagement but may also trigger competition anxiety, reduce intrinsic interest, or foster reward dependency. For teacher education, a more rigorous interpretation is needed: gamification should be treated as a structured system of motivational affordances that organizes learning into goals, challenges, progress cues, feedback loops, and social interaction while preserving academic meaning. When aligned with professional tasks, gamification can help students persist through complex learning sequences such as lesson planning, assessment design, microteaching, and classroom problem solving. Importantly, prospective teachers also gain meta-pedagogical insight by experiencing gamified learning from the learner's perspective, which can later inform their own classroom practices.

A robust theoretical foundation is essential for evaluating motivational change. Self-determination theory highlights the importance of autonomy-supportive instruction, competence experiences, and social relatedness in developing internalized motivation. Expectancy-value approaches complement this by explaining how learners' beliefs about success, perceived task value, and perceived costs influence engagement and achievement. In digital interactive contexts, these constructs can be operationalized through design choices: adaptive scaffolding may strengthen expectancy of success; authentic professional tasks may increase utility and attainment value; carefully balanced challenge and time demands may reduce perceived cost. Additionally, self-regulated learning frameworks are relevant because digital environments require learners to plan, monitor, and evaluate their own work more actively than traditional lecture-based formats. Thus, motivation and self-regulation interact: motivated students regulate more effectively, while well-designed regulation supports can protect motivation during difficulty.

Within pedagogical universities, primary-education students often face a motivational paradox. They may enter the program with strong moral commitment to teaching but experience a decline in academic motivation when

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coursework feels theoretical, repetitive, or disconnected from classroom realities. This gap suggests the need for learning designs that increase authenticity, visibility of progress, and constructive peer interaction. Digital interactive technologies can provide simulation-based cases of classroom events, interactive lesson-design studios, and collaborative feedback channels, all of which can strengthen professional relevance. Gamification can further structure these experiences into coherent learning journeys with incremental mastery and reflection checkpoints.

The present study addresses this need by developing and evaluating an instructional model for enhancing learning motivation among prospective primary school teachers through digital interactive educational technologies and gamification. The model integrates interactive tasks, formative feedback, and gamified learning scenarios aligned with core pedagogical competencies. The research focuses on how motivational indicators change under this model and how these changes relate to learning outcomes such as task performance, persistence, and reflective quality. By providing a context-sensitive framework for pedagogical universities, the study aims to contribute practical guidance for designing motivationally robust digital learning experiences in teacher preparation.

Methods

The study applied a mixed-methods design combining quasi-experimental comparison with qualitative inquiry to evaluate an instructional model aimed at strengthening learning motivation among prospective primary school teachers through digital interactive educational technologies and gamification. The research was implemented in a pedagogical university context within regular coursework to ensure ecological validity. The intervention was embedded in a core pedagogy module focused on lesson planning, formative assessment, classroom management scenarios, and reflective practice. The central methodological principle was to treat technology and gamification as an integrated instructional system rather than add-on activities, ensuring alignment between learning outcomes, digital tasks, and motivational supports.

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Participants were prospective primary school teachers enrolled in undergraduate or master's-level teacher education pathways. Two groups were formed: an intervention group that studied using the developed digital-interactive and gamified model, and a comparison group that studied the same academic content through a conventional blended format with standard digital materials but without structured gamification and without the full set of interactive task designs. Group equivalence was supported through baseline measures of motivation and prior academic achievement, and both groups were taught by instructors following a shared syllabus to control for content variation. Participation in data collection was voluntary and guided by ethical principles, including confidentiality and the right to withdraw without penalty.

The instructional model included three design components. The first component was digital interactivity organized around authentic professional tasks. Students completed interactive cases that simulated primary classroom situations, constructed lesson plans using digital templates with embedded prompts, and produced microteaching artifacts such as short instructional videos or interactive worksheets. Interactivity was ensured through branching scenarios, iterative drafts, peer-review exchanges, and instructor feedback cycles. The second component was gamification as motivational architecture. The course was structured as a sequence of "missions" corresponding to professional competencies, each containing clear goals, criteria, and progressive challenge levels. Progress visibility was provided through a non-competitive progression map, while feedback loops were strengthened through immediate automated checks for task completeness and rubric-based formative comments from peers and instructors. Badges and points were used cautiously as informational signals of mastery rather than as high-stakes rewards, and leaderboards were avoided to reduce performance anxiety and to support inclusive participation. The third component was reflection and self-regulation support. Students used short reflective prompts after each mission to evaluate their learning strategies, identify difficulties, and plan improvements. This component aimed to reinforce autonomy and internalization, connecting course activity with emerging professional identity.

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Digital tools were selected according to accessibility and pedagogical fit, including a learning management system for content delivery and tracking, interactive content software for quizzes and simulations, and collaborative platforms for peer feedback and group work. Learning analytics were used in a limited, educationally oriented way, focusing on student engagement indicators such as task completion rates, time-on-task ranges, revision frequency, and feedback participation. These indicators were not used for punitive monitoring; instead, they informed supportive instructor interventions and self-regulation guidance.

Motivation was measured using an adapted instrument grounded in self-determination theory and expectancy-value perspectives. The survey captured dimensions such as intrinsic interest, identified regulation, perceived competence, autonomy experience, task value, and perceived learning costs. The instrument was administered at pre-test and post-test, and internal consistency was checked using reliability analysis. In addition, behavioral indicators of motivated learning were collected from the digital environment, including persistence in completing optional enrichment tasks, frequency of revisions, and responsiveness to feedback. To deepen interpretation, qualitative data were gathered through short reflective journals and semi-structured focus group interviews with a subset of participants from the intervention group. These materials explored how students perceived the gamified structure, which design elements supported or hindered motivation, and how digital interactivity influenced their sense of professional readiness.

Data analysis proceeded in three stages. First, descriptive statistics summarized motivational profiles and learning outcomes. Second, inferential analysis compared pre-post changes between groups, using appropriate tests for mean differences and effect size estimation. Relationships between motivational variables and performance indicators were examined through correlational analysis. Third, qualitative thematic analysis was conducted to identify recurring patterns in learners' experiences, focusing on autonomy, competence, relatedness, perceived value, and perceived costs. Integration of quantitative and qualitative results was used to triangulate findings and to explain not only

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whether motivation changed, but which design mechanisms plausibly contributed to that change in the pedagogical university context.

Results

The findings indicated that the digital-interactive and gamified instructional model was associated with a measurable strengthening of learning motivation among prospective primary school teachers, along with improvements in several learning-performance indicators. At baseline, the intervention and comparison groups demonstrated broadly similar motivational profiles, characterized by moderate intrinsic interest in pedagogical coursework, relatively high professional intent, and uneven self-regulation behaviors. After the instructional period, the intervention group showed a clearer shift toward more internalized forms of motivation, while the comparison group exhibited smaller, less consistent changes.

On self-report measures, the intervention group demonstrated increases in intrinsic interest and identified regulation, suggesting that students not only found learning activities more engaging, but also perceived them as more personally meaningful for their future profession. Gains were also observed in perceived competence and clarity of success expectations, which is consistent with the model's emphasis on progressive challenges, transparent criteria, and frequent formative feedback. In contrast, extrinsic pressure-related indicators did not increase, implying that the gamified structure did not intensify controlling motivation when implemented without competitive ranking. Measures of perceived task value increased as students increasingly connected course assignments to authentic primary-school teaching tasks, especially lesson planning under constraints, responding to classroom behavior scenarios, and designing formative assessments. Perceived learning costs, particularly time-related stress and uncertainty about how to improve, decreased modestly in the intervention group, while remaining more stable in the comparison group.

Behavioral data from the digital environment converged with the survey trends. The intervention group demonstrated higher task completion rates across the mission sequence, with fewer late submissions and lower dropout from multi-

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step assignments that required revision. Revision frequency increased, indicating that students were more willing to rework drafts after receiving feedback, rather than submitting minimally acceptable products. Engagement with peer feedback also rose: students in the intervention group provided more rubric-aligned comments and were more likely to incorporate peer suggestions in subsequent versions of their work. A notable pattern was the growth of "feedback responsiveness," operationalized as the proportion of assignments revised after formative comments. This indicator was consistently higher under the gamified model, suggesting that progress visibility and structured feedback loops supported persistence during difficulty.

Performance outcomes showed parallel improvements. In rubric-based assessment of professional tasks, the intervention group achieved stronger results on lesson-design coherence, alignment between objectives and assessment, differentiation strategies for diverse learners, and the use of formative assessment techniques. The quality of reflective writing improved in depth and specificity, with more frequent references to concrete classroom situations and clearer articulation of what should be changed in future practice. Microteaching artifacts produced in the intervention condition demonstrated more purposeful structure and greater attention to learner engagement, which may reflect increased motivation to invest effort in authentic tasks. While both groups improved over time as a normal effect of instruction, the intervention group's improvement was more pronounced in the competency areas that were directly reinforced through interactive cases and mission-based progression.

Qualitative evidence explained how specific design elements contributed to motivational change. Students reported that the mission structure reduced ambiguity by breaking complex professional tasks into manageable stages with visible progression. This supported perceived competence because students could locate their current level and understand what constituted improvement. Learners also emphasized the motivational function of immediate, informational feedback from interactive checks and templates. Rather than feeling controlled, many described the system as "guiding" because it clarified expectations while allowing choice in topic selection, lesson themes, and the format of instructional

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artifacts. Peer collaboration was frequently described as a driver of persistence, particularly when students faced difficulty in designing assessment criteria or managing simulated classroom dilemmas. The social dimension of the model promoted a sense of shared professional learning, which students associated with increased responsibility and engagement.

At the same time, the results revealed constraints. A minority of participants reported initial fatigue from the intensity of continuous tasks, especially when multiple deadlines clustered. Others noted that gamified signals such as points were motivating only when they reflected meaningful mastery and were paired with feedback; when points felt disconnected from learning quality, their value diminished. Some learners also experienced technical barriers, including internet instability and limited device access outside campus, which occasionally interrupted engagement. Despite these constraints, most students evaluated the model positively and emphasized that its strongest feature was the perceived relevance of tasks to real primary-school teaching work.

Overall, the combined quantitative and qualitative results suggest that a carefully designed digital-interactive learning environment, structured through non-competitive gamification and supported by formative feedback and reflection, can strengthen internalized motivation and improve professional task performance in pedagogical university preparation for primary education.

Discussion

The results support the premise that learning motivation in prospective primary school teachers can be strengthened when digital interactive technologies and gamification are implemented as a coherent pedagogical design rather than as decorative technological additions. The observed shift toward more internalized motivation aligns with theoretical expectations from self-determination theory: when students experience greater autonomy, clearer competence signals, and socially meaningful participation, they are more likely to sustain engagement and persist through complex learning. In this study, autonomy was not created by removing structure, but by providing structured choice and professional relevance. Students could select lesson themes, design options, and artifact

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formats within a clear competency framework, which appears to have supported ownership without generating confusion. This is consistent with the principle that autonomy support is compatible with strong instructional guidance, particularly in professional education where novices benefit from scaffolding.

The competence-related findings are especially informative. Increased perceived competence and improved performance on rubric-based professional tasks suggest that the model's feedback architecture was not merely motivating at an emotional level but also instructionally effective. Interactive checks, transparent criteria, and staged missions created frequent "success experiences," which likely strengthened expectancy of success and reduced avoidance. The behavioral indicators of revision and feedback responsiveness further reinforce this interpretation. In teacher education, willingness to revise is a central professional habit: teachers must repeatedly refine plans, interpret evidence of learning, and adjust instruction. Therefore, the model's impact on iterative improvement behaviors can be interpreted as both motivational and professional in value. From an expectancy-value perspective, the model likely increased expectancy through scaffolding and increased value by linking tasks to authentic classroom demands, while modestly reducing perceived costs by clarifying what to do next and how to improve.

The study also highlights the importance of how gamification is framed. The pattern of results suggests that non-competitive gamification, focused on progression, mastery, and informational feedback, can avoid common risks such as excessive competition, anxiety, or reward dependence. The decision to avoid leaderboards appears methodologically justified given the audience and professional aim. Prospective primary school teachers often study in cohorts with high relational sensitivity; competitive ranking can undermine collaboration and reduce psychological safety. Instead, mission-based progression and badges tied to competency signals may have functioned as "motivational affordances" that made learning visible, coherent, and trackable. Importantly, qualitative feedback indicated that points were motivating only when perceived as meaningful evidence of mastery. This supports a broader

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implication: gamification works best when it is epistemically connected to learning quality, not when it is used as external decoration.

Another notable insight concerns professional identity formation. Teacher education is not purely the acquisition of knowledge; it is a process of becoming, in which learners begin to see themselves as capable teachers. The reported increase in task value and the improved depth of reflection suggest that authentic digital tasks can accelerate this identity work by allowing students to rehearse professional decisions in safe, feedback-rich environments. Interactive cases, scenario branching, and artifact creation can function as "identity laboratories," where students test pedagogical reasoning and learn to justify choices. When such experiences are framed within gamified progression, learners may also experience professional growth as a narrative of improvement, which can strengthen persistence during challenge.

At the same time, the constraints observed in the results indicate that motivational designs must account for workload, infrastructure, and equity. Continuous task sequences can produce fatigue if pacing is not calibrated to students' broader academic load. This suggests the need for careful scheduling, optional pathways for enrichment, and explicit attention to cognitive load. Technical limitations, such as internet instability and device access, remain practical barriers that can undermine motivation even when the instructional design is strong. In contexts where access varies, offline-compatible materials, mobile-friendly formats, and flexible submission windows become essential components of motivational fairness. Without these, motivational gains may disproportionately benefit students with better resources, which would conflict with inclusive education goals.

Methodologically, the findings should be interpreted with attention to design-based influences. Because the intervention integrated multiple elements simultaneously—interactive tasks, gamified progression, feedback cycles, and reflection supports—it is difficult to isolate which component contributed most strongly to motivational change. However, the triangulation of self-report, behavioral analytics, and qualitative themes suggests that the mechanism is not singular; rather, motivation improved through the synergy of relevance,

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structure, feedback, and social participation. This interpretation is consistent with contemporary views that motivation in learning environments is an emergent property of the instructional system, not a simple outcome of one tool or one incentive.

For pedagogical universities preparing primary school teachers, these results suggest practical implications. First, digital interactivity should be designed around professional tasks with clear criteria and iterative feedback, because such designs simultaneously develop competence and sustain motivation. Second, gamification should emphasize mastery progression and reflective checkpoints, avoiding competitive ranking when collaboration and psychological safety are core. Third, learning analytics can be used ethically to support self-regulation and timely help, but should not become a surveillance mechanism that shifts motivation toward external control. Finally, institutional support for infrastructure and digital accessibility is not secondary; it is a precondition for motivational equity.

Overall, the study contributes evidence that motivational development in teacher education can be enhanced through carefully aligned digital-interactive and gamified learning designs, especially when these designs cultivate internalization, competence growth, and professional relevance while accounting for workload and access constraints.

Conclusion

This study demonstrated that learning motivation among prospective primary school teachers can be strengthened when digital interactive educational technologies and gamification are implemented as an integrated instructional model grounded in professional task authenticity, formative feedback, and mastery-oriented progression. The observed changes suggest a meaningful shift toward internalized motivation, reflected in increased intrinsic interest and identified regulation, alongside gains in perceived competence and task value. These motivational improvements were not merely attitudinal; they were supported by behavioral evidence from the digital environment, including higher task completion, greater revision activity, stronger responsiveness to feedback,

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and more active peer participation. In parallel, performance outcomes improved in competency areas that are central to primary education, such as coherent lesson design, alignment between objectives and assessment, differentiation strategies, and the quality of reflective practice.

The findings indicate that motivation in teacher education is shaped by how learning is organized and experienced rather than by technology itself. Digital interactivity contributed to motivation when it provided structured opportunities for decision-making, frequent informational feedback, and iterative improvement in authentic professional tasks. Gamification contributed when it served as motivational architecture that clarified goals, made progress visible, balanced challenge levels, and supported collaboration without introducing high-pressure competition. In this configuration, gamification functioned less as a reward system and more as a design logic that organizes learning into coherent sequences of competence development. Such a model is especially relevant for future primary school teachers because it simultaneously strengthens personal motivation and models pedagogical practices that can later be adapted for motivating young learners.

The study also underscores the necessity of ethical and inclusive implementation. Motivational benefits can be undermined by excessive workload intensity or by unequal access to stable internet and appropriate devices. Therefore, successful adoption in pedagogical universities requires not only sound instructional design but also institutional strategies for pacing, accessibility, and learner support. When learning analytics are used, they should remain supportive and formative, helping learners regulate their study and enabling instructors to provide timely assistance, rather than functioning as surveillance that shifts motivation toward external control.

In practical terms, the study supports several recommendations for primary teacher education programs. Courses that aim to develop professional competence and sustained motivation should prioritize authentic digital tasks linked to classroom realities, incorporate clear criteria and rapid formative feedback, and structure learning as progressive mastery journeys with reflective checkpoints. Gamified elements should be used to increase transparency and

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coherence, not to intensify competition or reduce learning to point accumulation. Faculty development is also essential, as instructors need competencies in digital instructional design, feedback facilitation, and motivationally sensitive course management.

Overall, the study contributes a context-sensitive framework for enhancing learning motivation in teacher preparation through digital interactive learning and gamification. By connecting motivational theory with practical design mechanisms and observable learning behaviors, it offers pedagogical universities actionable guidance for improving engagement, persistence, and professional readiness in future primary school teachers.

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