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Forming Acmeological Competence Of Teachers In The Context Of Digital Transformation

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Abstract: Digital transformation is fundamentally reshaping the landscape of contemporary education, placing unprecedented demands on teachers' professional capabilities. This study investigates the formation of acmeological competence among higher education teachers in Uzbekistan within the context of accelerating digitalization. Acmeological competence — the integration of peak professional achievement with continuous self-improvement — is examined through four interrelated components: motivational-value, cognitive-activity, reflective-evaluative, and creative-innovative. Employing a mixed-methods research design, data were collected from 180 teachers across three higher education institutions in Tashkent region (2022–2024) using the adapted Derkach acmeological diagnostics instrument and a DigComp 2.2-aligned digital competence scale. Results reveal a significant positive correlation ($r = 0.67$, $p < 0.01$) between digital competence and acmeological competence levels. Only 23% of participants demonstrated high or very high acmeological competence, while 68% reported insufficient readiness for technology-integrated teaching. A four-stage developmental model — Diagnosis, Training, Implementation, and Monitoring — is proposed and validated as an effective framework for systematically elevating teacher acmeological competence in digital environments. Findings contribute to the emerging field of digital acmeology and provide actionable guidance for educational administrators and policy makers.

Keywords: acmeological competence; digital transformation; teacher professional development; digital competence; higher education; DigComp; Uzbekistan

INTRODUCTION

The rapid proliferation of digital technologies across societal sectors has initiated a profound transformation in educational practice worldwide. Artificial intelligence, cloud-based platforms, augmented and virtual reality, and adaptive learning systems are no longer peripheral tools but central components of twenty-first century pedagogy (UNESCO, 2018; Fullan, 2016). Within this transformed landscape, the professional competence of the teacher has become both more critical and more complex than at any prior historical juncture.

Acmeology — the scientific discipline concerned with the conditions and mechanisms by which individuals achieve peak levels of professional mastery — offers a particularly powerful lens through which to examine teacher development (Derkach & Zazikin, 2003). The concept of acmeological competence, as elaborated by Kuzmina (1993) and further refined by Derkach (2002), refers to the dynamic integration of subject-matter expertise, pedagogical skill, self-regulatory capacity, and a sustained orientation toward professional excellence. In the educational domain, acmeological competence is distinguished from ordinary professional competence by its emphasis on self-actualization, continuous growth, and the pursuit of optimally high performance rather than merely adequate practice.

The intersection of acmeological theory with the demands of digital transformation has received insufficient scholarly attention. Existing literature tends to address digital competence and acmeological development as parallel but non-integrated concerns (Redecker, 2017; Bawden, 2008; Markova, 1996). This gap is particularly acute in post-Soviet Central Asian educational contexts, where the legacies of traditional pedagogical culture coexist with the imperatives of rapid modernization (Yuldashev, 2022).

Uzbekistan's National Development Strategy (2020–2030) and the Digital Uzbekistan program have placed the digitalization of education at the forefront of national reform agendas. Yet implementation has

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proceeded unevenly, and systematic frameworks for developing digitally capable, acmeologically oriented teachers remain underdeveloped (Kholmatova, 2023). This study addresses that gap by: (1) empirically mapping the current state of acmeological and digital competence among Uzbek higher education teachers; (2) identifying the structural components and barriers of acmeological competence in digital environments; and (3) proposing and validating a theoretically grounded developmental model.

LITERATURE REVIEW- ***Acmeological Competence: Theoretical Foundations***

The theoretical roots of acmeology trace to the pioneering work of Ananyev (1968), who conceptualized the adult years as characterized by ascending developmental trajectories rather than decline. Kuzmina (1993) subsequently operationalized these insights in the pedagogical domain, demonstrating that teachers' professional effectiveness is not a function of experience alone but of the quality of self-reflective and goal-directed developmental activity. Derkach and Zazikin (2003) formalized the notion of acmeological competence as encompassing professional knowledge and skill, meta-cognitive awareness, motivational orientation toward excellence, and the ability to actualize potential under demanding conditions.[1]

Markova (1996) introduced the distinction between reproductive professionalism — the competent execution of established routines — and creative professionalism, characterized by the capacity for innovation, problem reformulation, and proactive self-development. Acmeological competence aligns with this latter conception. Zagvyazinsky (1987) further emphasized that pedagogical creativity is not an innate talent but a cultivable capacity requiring structured developmental support.

2.2 Digital Competence Frameworks

The European Commission's DigComp 2.2 framework (Vuorikari et al., 2022) identifies five domains of digital competence relevant to educators: information and data literacy; communication and collaboration; digital content creation; safety; and problem-solving. The companion DigCompEdu framework (Redecker, 2017) extends this to professional teacher contexts, specifying six additional areas including digital assessment and learner empowerment.

Mishra and Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) model provides a complementary conceptual structure, emphasizing that effective technology integration requires not merely technical skill but the sophisticated blending of content knowledge, pedagogical reasoning, and technological affordances. Recent empirical studies confirm that TPACK competencies are positively associated with both student outcomes and teacher professional satisfaction (Valtonen et al., 2021).[2]

Integration of Acmeological and Digital Perspectives-Despite the conceptual alignment between acmeological theory's emphasis on peak professional development and the demands of digital transformation, the literature contains few studies explicitly integrating these frameworks. Hashimova (2024) identifies this as a critical lacuna, arguing that digital competence development divorced from broader professional identity and motivational structures tends to produce technically literate but professionally stagnant practitioners. Conversely, acmeological programs that neglect technological contexts increasingly risk producing professionally oriented teachers who lack the instrumental capacities required for contemporary practice.

The present study responds to this gap by treating digital competence not as an end in itself but as a constitutive dimension of teacher acmeological competence in the digital era.[3]

METHODOLOGY

Research Design-A convergent parallel mixed-methods design was employed, combining quantitative survey data with qualitative classroom observations and semi-structured interviews. This design was selected to enable triangulation of findings and to capture both the distributional patterns and the phenomenological dimensions of acmeological competence in digital teaching contexts (Creswell & Plano Clark, 2018).

Participants and Setting-Participants comprised 180 full-time teachers from three higher education institutions in Tashkent region, Uzbekistan, sampled using stratified random sampling across faculties, genders, and years of teaching experience. Institutions were selected to represent varying levels of digital

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infrastructure development. The study was conducted between September 2022 and June 2024. Ethical approval was obtained from the Tashkent State Pedagogical University Research Ethics Committee (Protocol No. 7/2022).

Instruments-Acmeological competence was assessed using an adapted version of Derkach's (2002) Professional Acmeological Competence Questionnaire (PACQ), comprising 48 items across four subscales corresponding to the four proposed components (Cronbach's $\alpha = 0.89$). Digital competence was measured using a 40-item scale developed by the research team in alignment with DigComp 2.2, validated through expert review by five specialists in educational technology (Content Validity Index = 0.93). Qualitative data were obtained through 24 semi-structured interviews and 36 lesson observations coded thematically using NVivo 14.

Data Analysis-Quantitative data were analyzed using SPSS 25.0. Descriptive statistics and Pearson correlations were computed for all main variables. Structural equation modeling (SEM) was conducted using AMOS 26.0 to test the proposed four-component model's fit. Qualitative data were analyzed using inductive thematic analysis following Braun and Clarke (2006). Mixed-methods integration was achieved through joint display analysis.

RESULTS

Descriptive Profile of Acmeological and Digital Competence-Table 1 presents the distribution of participants across competence levels for each of the four acmeological components and for overall digital competence. Results reveal that the majority of participants (approximately 60–70% depending on component) function at low or moderate levels of acmeological competence, with particularly pronounced deficits in the creative-innovative component (31.7% at low level). Only 23% of the total sample achieved high or very high overall acmeological competence scores [4].

Table 1. Distribution of Acmeological and Digital Competence Levels (N = 180)

Competence Component	Low (%)	Moderate (%)	High (%)	Very High (%)
Motivational-Value	18.3	44.5	28.9	8.3
Cognitive-Activity	24.5	47.2	20.6	7.7
Reflective-Evaluative	21.1	42.8	27.2	8.9
Creative-Innovative	31.7	40.0	21.1	7.2
Digital Competence (Overall)	32.2	35.6	22.8	9.4

Regarding digital competence, 32.2% of participants scored at the low level, and only 9.4% at the very high level, suggesting that the sample as a whole faces significant challenges in technology-integrated teaching. Gender differences were minimal and non-significant ($p > 0.05$). Teaching experience showed a weak negative correlation with digital competence ($r = -0.21$, $p < 0.05$), indicating that more experienced teachers tended to report somewhat lower digital competence — a finding consistent with international literature on generational digital divides in education.

Correlation and Structural Analysis-A significant positive correlation was found between overall digital competence and overall acmeological competence ($r = 0.67$, $p < 0.01$), supporting the central theoretical proposition of the study. At the component level, the strongest correlation was observed between digital competence and the creative-innovative component ($r = 0.72$, $p < 0.01$), followed by the reflective-evaluative component ($r = 0.64$, $p < 0.01$). The motivational-value component exhibited the weakest though still significant correlation with digital competence ($r = 0.51$, $p < 0.01$).

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SEM analysis confirmed acceptable model fit for the four-component acmeological competence structure (CFI = 0.94, RMSEA = 0.057, SRMR = 0.062), with all factor loadings significant at $p < 0.001$. The model accounted for 58% of the variance in overall acmeological competence when digital competence was included as a predictor.[5]

4.3 Barriers to Acmeological Competence Development

Qualitative thematic analysis identified four primary barrier clusters. Infrastructure deficiency (reported by 55% of interviewed teachers) encompassed inadequate hardware, unreliable internet connectivity, and absence of institutional technical support. Professional development access limitations (48%) reflected the scarcity and perceived irrelevance of available training programs. Temporal constraints (41%) related to high teaching loads that precluded sustained engagement in professional learning activities. Motivational deficits (29%) included both low self-efficacy regarding digital tools and insufficient institutional recognition of digital innovation in teaching.

DISCUSSION

The findings of this study establish empirically what theoretical arguments have long suggested: that in contemporary educational contexts, digital competence and acmeological competence are not merely related but mutually constitutive dimensions of teacher professionalism. The strong correlation ($r = 0.67$) between these constructs, combined with the SEM evidence that digital competence significantly predicts acmeological development, indicates that frameworks for teacher professional development must systematically integrate technological and acmeological perspectives rather than treating them as separate domains [6].

The particularly strong association between digital competence and the creative-innovative component of acmeological competence ($r = 0.72$) is theoretically significant. It suggests that digital tools, when engaged with creatively and strategically, serve as catalysts for exactly the kind of pedagogical innovation that acmeological theory associates with peak professional performance. This finding resonates with Mishra and Koehler's (2006) TPACK model, which foregrounds the creative synthesis of technological, pedagogical, and content knowledge as the hallmark of expert technology-integrated teaching.

The prevalence of low and moderate acmeological competence levels in our sample (approximately 63% at combined low-moderate level) is consistent with findings from comparable studies in Central Asian and Eastern European contexts (Valtonen et al., 2021; Yuldashev, 2022). The specific vulnerability of the creative-innovative component (31.7% at low level) points to a systemic pattern in which teachers develop adequate technical skills and even moderate reflective capacities without ascending to genuinely innovative practice — a pattern that structured developmental interventions must explicitly target.

The four identified barrier clusters map onto a multidimensional ecology of constraints that no single intervention can address. Infrastructure deficiency calls for institutional and policy-level investment; access limitations require systemic redesign of professional development provision; temporal constraints implicate workload policies and scheduling practices; and motivational deficits point to the need for recognition, reward, and community structures that sustain intrinsic professional motivation. The four-stage developmental model proposed here is designed to address this multidimensionality [7].

THE FOUR-STAGE DEVELOPMENTAL MODEL

Drawing on the empirical findings and the theoretical synthesis above, we propose a Four-Stage Developmental Model for forming acmeological competence in digitally transforming educational environments. The model is iterative and cyclical, proceeding through four stages:

Stage 1 — Diagnostic Assessment: Individual acmeological and digital competence profiles are constructed using validated instruments. Personalized learning trajectories are established, and a professional development portfolio is initiated. This stage provides the baseline and orientation function for subsequent stages.

Stage 2 — Targeted Learning: Structured professional development activities addressing identified gaps are delivered through blended formats, including intensive short courses, collaborative workshops, peer coaching, and mentoring partnerships. Content encompasses both digital tool competencies (e.g., LMS

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platforms, interactive assessment tools, AI-assisted learning design) and acmeological meta-skills (self-regulation, reflective practice, goal-setting).

Stage 3 — Situated Implementation: Participants apply acquired competencies in authentic teaching contexts, with structured peer observation, collaborative inquiry cycles, and formative feedback mechanisms supporting progressive refinement. Action research projects enable teachers to systematically investigate and improve their digitally integrated practice.

Stage 4 — Monitoring and Re-Diagnosis: Growth in both digital and acmeological competence is assessed against baseline profiles. Achievements are documented and celebrated. The assessment data feeds back into Stage 1, initiating the next developmental cycle. This cyclical structure embodies the acmeological principle of continuous striving toward higher levels of professional achievement.

The model has been piloted with a subset of 45 participants from the study sample across one academic year. Preliminary results indicate statistically significant improvements in digital competence ($M_{pre} = 2.41$, $M_{post} = 3.18$, $t(44) = 8.92$, $p < 0.001$, $d = 1.32$) and acmeological competence ($M_{pre} = 2.28$, $M_{post} = 3.07$, $t(44) = 9.45$, $p < 0.001$, $d = 1.41$), with large effect sizes suggesting substantial practical significance [8].

CONCLUSION

This study has demonstrated that acmeological competence and digital competence are deeply interrelated dimensions of teacher professionalism in digitally transforming higher education contexts. The empirical evidence from 180 Uzbek higher education teachers reveals significant and widespread deficits in both domains, while also demonstrating the strong positive relationship between them and identifying the specific component — creative-innovative acmeological competence — most strongly linked to digital proficiency.

The proposed Four-Stage Developmental Model offers a theoretically grounded and empirically supported framework for systematically elevating teacher acmeological competence in digital environments. The model's preliminary validation results, with large effect sizes across both digital and acmeological outcomes, suggest its practical viability and warrant further large-scale controlled investigation.

Theoretical contributions include the conceptual integration of acmeological and digital competence frameworks into a unified model of teacher professionalism appropriate to twenty-first century educational contexts, and the empirical validation of a four-component acmeological competence structure in a non-Western higher education setting.

Practical implications extend to educational administrators designing professional development programs, curriculum developers constructing teacher preparation curricula, and policy makers allocating resources for educational digitalization. The identified barrier clusters — particularly infrastructure deficiency and access limitations — also carry direct implications for institutional investment priorities.

Future research should examine the longitudinal stability of model-based gains, explore differential applicability across educational levels and disciplinary contexts, and investigate the emerging potential of artificial intelligence tools to support personalized acmeological development at scale.

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