Developing the competence of future teachers in applying innovative pedagogical technologies through an acmeological approach

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Abstract

Purpose: This study aims to explore the role of the acmeological approach in shaping the functional and professional competence of future teachers, emphasizing its integration with innovative pedagogical technologies to meet the demands of 21st-century education.

Research Methodology: The research employs a qualitative-descriptive method through literature review and theoretical analysis of pedagogical models. Sources include recent studies on acmeology, teacher training, and the application of digital and interactive learning technologies.

Results: Findings demonstrate that the acmeological framework strengthens teacher candidates' ability to integrate theory with practice. When combined with innovative teaching technologies such as project-based learning, problem-oriented methods, and digital platforms, the approach fosters creativity, critical thinking, adaptability, and reflective practice. These elements contribute to higher pedagogical mastery and professional identity development.

Conclusions: The integration of acmeological principles and innovative pedagogical technologies creates a synergistic paradigm for teacher preparation. It not only enhances methodological flexibility but also motivates continuous self-improvement and professional responsibility, ensuring future teachers are equipped to address contemporary educational challenges.

Limitations: The study is conceptual in nature, relying primarily on secondary data and theoretical frameworks. Empirical validation through longitudinal or experimental research is recommended.

Contribution: The article contributes to pedagogical science by providing a structured conceptual model for teacher development that unites acmeological strategies with innovative educational technologies, offering insights for curriculum designers, educators, and policymakers.

Keywords*: Acmeological Approach, Educational Innovation, Future Teachers, Professional Competence, Teacher Training*

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1. Introduction

In the 21st century, the rapid development of science, technology, and globalization has dramatically transformed the educational landscape, creating new challenges and opportunities for teacher education. The traditional role of the teacher as a transmitter of knowledge is no longer sufficient in the era of digitalization and innovation. Instead, teachers are increasingly required to become facilitators,

mentors, and designers of learning environments where students actively construct their own knowledge. In this context, the development of functional and professional competence in future teachers becomes a decisive factor for the success of modern educational systems. One of the promising methodological paradigms that has gained increasing relevance in recent years is the acmeological approach. Originating from the interdisciplinary field of acmeology, this approach focuses on achieving the highest point of professional self-realization, creativity, and personal growth. Within teacher education, the acmeological approach serves not only as a tool for developing skills but also as a philosophy of continuous self-improvement, professional reflection, and striving for excellence. It emphasizes the idea that teacher competence should not remain static but evolve dynamically in response to the changing needs of society and education (Sarzhanova, Uteubayeva², & Sarsenbayeva, 2024; Yessenamanova, Arinova, Zhambylkyzy, Rakhimbayeva, & Zhunussova, 2022).

At the same time, the integration of innovative pedagogical technologies into the process of teacher preparation has become an essential condition for ensuring the effectiveness of teaching and learning (Amemasor, Oppong, Ghansah, Benuwa, & Essel, 2025). Such technologies include a wide spectrum of modern methods: digital learning platforms, interactive tools, project-based and problem-oriented learning, blended and online learning environments, gamification strategies, and adaptive learning systems powered by artificial intelligence. These innovations promote creativity, critical thinking, collaboration, and adaptability among both teachers and students. Therefore, preparing future teachers to skillfully apply these technologies is crucial for the advancement of education. The combination of the acmeological approach with innovative pedagogical technologies creates a unique synergy. While innovative technologies provide the tools and methods for enhancing the quality of education, the acmeological framework ensures the development of the teacher's inner motivation, self-reflection, and professional responsibility. Together, they form a powerful model for training teachers who are capable of responding to the demands of the 21st century. Such teachers are not only competent in using digital and innovative methods but are also committed to personal excellence, lifelong learning, and the cultivation of their students' potential (Montero-Mesa, Fraga-Varela, Vila-Couñago, & Rodríguez-Groba, 2023; Yessenamanova et al., 2022).

The significance of this research is further reinforced by global trends in education. International organizations such as UNESCO, UNICEF, and the OECD emphasize the need for competency-based education and teacher preparedness for digital transformation (Gu, 2024; Simmie, 2023). Countries around the world are reforming their teacher education systems to align with the principles of innovation, adaptability, and lifelong learning. In this regard, the acmeological approach offers a valuable theoretical and practical foundation for shaping highly competent teachers who are not only technically skilled but also personally and professionally fulfilled. Despite the growing interest in innovative technologies, challenges remain in effectively integrating them into teacher education. Many future teachers lack sufficient training in digital pedagogy and innovative methods. In some cases, the focus remains primarily on technical proficiency, while the development of reflective, adaptive, and self-regulatory skills is overlooked. The acmeological approach addresses these gaps by placing emphasis on the holistic development of the teacher's personality, ensuring that technological competence is balanced with creativity, humanistic values, and professional identity (Althubyani, 2024; Graus, van de Broek, Hennissen, & Schils, 2022).

In conclusion, the problem of developing the competence of future teachers in applying innovative pedagogical technologies through an acmeological approach is not only timely but also crucial for the sustainable progress of modern education. It represents a synthesis of technological advancement and humanistic development, ensuring that teachers can achieve their professional "acme" while guiding students toward success in an increasingly complex and dynamic world. This research seeks to contribute to the theoretical foundations and practical solutions in this field, offering strategies to prepare future educators for the challenges and opportunities of contemporary pedagogy. The urgency of addressing this issue is further supported by the paradigm shift toward Education 4.0, which emphasizes personalization, digital fluency, and lifelong learning. In this environment, teachers are expected not only to master content knowledge but also to act as agents of transformation who can integrate interdisciplinary perspectives, employ technology responsibly, and foster the socio-emotional

competencies of their students. This requires moving beyond narrow, skill-based training toward a more comprehensive framework that integrates knowledge, practice, values, and identity. The acmeological approach, with its focus on self-actualization and continuous improvement, provides precisely such a framework by linking professional competence with personal growth (Lan, 2024; Yessenamanova et al., 2022).

Another important consideration is the growing body of research highlighting the gap between the potential of innovative pedagogical technologies and their actual implementation in classrooms (Létourneau et al., 2025; Stephens-Himonides & Young, 2025). While digital platforms, gamification, and AI-driven adaptive systems have demonstrated strong promise in enhancing learning outcomes, their effectiveness depends on how teachers integrate them into broader pedagogical strategies (Garzón, Patiño, & Marulanda, 2025; Tan, Hu, Yeo, & Cheong, 2025). Without adequate preparation, teachers may use these tools in a superficial or mechanical way, failing to harness their full potential for learner engagement and critical thinking (Smiderle, Rigo, Marques, Peçanha de Miranda Coelho, & Jaques, 2020). This underscores the need for teacher education programs that combine technological proficiency with reflective acmeological practices, enabling teachers to not only "use" technology but to transform pedagogy through technology (Dichev & Dicheva, 2017; Schmid, Brianza, Mok, & Petko, 2024). Furthermore, the global context of rapid digital transformation has created new inequalities in teacher competence development. Variations in access to digital infrastructure, differences in institutional support, and diverse levels of digital literacy among teacher candidates pose significant barriers. An acmeological perspective can help mitigate these challenges by fostering resilience, adaptability, and the motivation for lifelong learning (Dinçer, 2024). These qualities empower teachers to overcome external limitations and continuously upgrade their competencies. Lastly, the integration of acmeology and innovative pedagogies aligns with the broader humanistic mission of education. In a world increasingly dominated by technology, there is a risk of reducing teaching to technical operations or data-driven decision-making. The acmeological approach restores balance by emphasizing human values, ethical responsibility, and the cultivation of identity, thereby ensuring that teachers remain not only digitally skilled professionals but also inspiring mentors and leaders.

2. Literature Review

2.1 Conceptual foundations: Acmeology and teacher competence

Acmeology-emerging from Russian psychological-pedagogical scholarship-examines the conditions and mechanisms for attaining peak professional mastery ("acme"). Classic acmeological works Bodalev (1994) and Ananyev (2001) conceptualize professional growth as a system of goal-oriented self-development, self-regulation, and value–meaning orientations that culminate in excellence. Within teacher education, acmeology reframes competence not as a static attainment but as a trajectory sustained by reflexivity, motivational-volitional qualities, and meta-competences (self-analysis, professional foresight, resilience). Teacher competence is typically described as an integration of knowledge, skills, dispositions, and identity. Contemporary competence frameworks Mishra and Koehler (2006) and Shulman (1987) emphasize the alignment of content, pedagogy, and technology with ethical and socio-cultural sensitivity. The acmeological lens adds the developmental logic: how future teachers move from novice to self-actualizing professionals capable of innovative, value-driven practice. In recent years, scholarship on teacher competence has increasingly emphasized professional identity formation as the glue connecting knowledge and skills to meaningful practice. For example, research in European teacher education systems shows that competence cannot be reduced to discrete components; rather, it unfolds as an evolving configuration shaped by reflection, mentorship, and context (Pellegrino & Guerriero, 2017; Turdiyev, 2020). Acmeology deepens this perspective by treating competence as both *process and product*: teachers not only reach milestones but also continually reconfigure their expertise to meet emerging educational demands (Husna, 2025; Maharani, Yahya, Putra, & Pramono, 2025).

2.2 Innovative pedagogical technologies and their pedagogical logics

"Innovative pedagogical technologies" span methods and tools that reorganize learning processes and roles: Project-/Problem-Based Learning (PBL/PjBL), Inquiry, Design Thinking-situate learning in authentic problems, enhancing transfer, collaboration, and creativity. Blended/online and HyFlex

models-reconfigure time–space, enabling personalization and access; effectiveness depends on intentional instructional design. Learning analytics, adaptive systems, and AI tutors-afford data-informed differentiation and formative feedback, yet raise issues of validity, bias, and teacher data literacy. Gamification and game-based learning-can strengthen engagement and self-regulation when mechanics align with learning goals (not merely points/badges). XR (AR/VR) and simulation environments-support safe practice for complex skills (e.g., classroom management), but require scaffolding to convert novelty into learning. Collaborative platforms and knowledge-building communities-enable dialogic teaching, co-construction, and distributed expertise.

Meta-analyses generally show positive but variable effects of technology integration; the mechanism matters more than the tool. The ICAP framework (Interactive–Constructive–Active–Passive) predicts that technologies that elicit interactive/constructive engagement yield deeper learning than those affording passive consumption (Hani, Subhan, & Rasyad, 2024). The SAMR model (Substitution–Augmentation–Modification–Redefinition) is useful for reflection but is not an empirical theory; pairing SAMR with TPACK and learning science strengthens design quality. This body of evidence highlights an important nuance: technology integration succeeds not through novelty but through alignment with pedagogy and learner needs. For instance, gamification can increase motivation, yet without a coherent link to learning objectives it risks superficial engagement (Mozelius, 2021). Similarly, AI-driven adaptive systems promise personalization, but teachers must interpret analytics critically to avoid over-reliance on opaque algorithms. Hence, the teacher's professional judgment—shaped by reflective acmeological practice—remains central (Rizokulovich, 2024).

2.3 From digital literacy to pedagogical innovation: competence models
The shift from operational ICT skills to transformational pedagogy is well documented. TPACK articulates the dynamic interplay of content (CK), pedagogy (PK), and technology (TK). Effective innovators demonstrate context-sensitive recombination-not tool-first adoption. DigCompEdu maps teacher digital competence across areas (Professional Engagement; Digital Resources; Teaching & Learning; Assessment; Empowering Learners; Facilitating Learners' Digital Competence). ISTE Standards for Educators foreground roles (Learner, Leader, Citizen, Collaborator, Designer, Facilitator, Analyst), steering attention to ethics, agency, and impact. Acmeology complements these by specifying developmental conditions (goal-setting, reflective cycles, mentoring, challenge–support balance) that lift teachers toward peak performance, not just baseline compliance. the "how" of competence growth. While TPACK and DigCompEdu describe what competencies teachers need, acmeology explains how those competencies can be nurtured through motivational, reflective, and identity-shaping mechanisms. In practice, this means teacher preparation programs should avoid fragmented "ICT courses" and instead integrate digital tools into design-based, reflective, and mentored activities that scaffold continuous growth (Sri kuning, 2021).

2.4 Acmeological mechanisms: self-regulation, reflection, and identity
Key acmeological mechanisms map onto established psychological theories: Self-Determination Theory Ryan and Deci (2000): competence, autonomy, relatedness as fuels for sustained professional growth; acme-oriented programs intentionally satisfy these needs. Self-regulated learning Zimmerman and Pons (1986) : cyclical forethought–performance–reflection processes underlie adaptive expertise; digital tools (e-portfolios, analytics dashboards) can scaffold SRL. Reflective practice Schön (2017): reflection-in/on-action is central to moving from rule-based to adaptive expertise; structured video analysis and microteaching amplify reflection quality. Deliberate practice Ericsson, Krampe, and Tesch-Römer (1993) : targeted practice with feedback accelerates skill acquisition; simulation, microteaching, and coaching operationalize deliberate practice in teacher prep.

Professional identity formation: communities of practice Krishna et al. (2024) and mentored enculturation help novices internalize values and norms that sustain innovative risk-taking. These mechanisms reveal why acmeology is particularly well-suited for 21st-century teacher preparation. Technologies like e-portfolios or AI tutors may support learning, but without reflective and identity-oriented scaffolding, their impact is limited. By embedding deliberate practice cycles and structured

reflection, programs can transform technology from a tool into a catalyst for professional self-actualization (Sobirovich, 2023; Sobirovich & Norman, 2023).

2.5 Program designs that build acme-oriented innovation competence

Evidence converges on multi-component designs: Coherent coursework + fieldwork: Theory–practice integration predicts stronger technology-enabled pedagogy than stand-alone ICT courses.Studio/Design-based teacher education: Iterative cycles of empathize–define–ideate–prototype–test align with acmeology's growth logic and foster creative confidence. Coaching and mentorship: Instructional coaching, lesson study, and peer observation provide high-frequency, high-quality feedback-the core of deliberate practice.Performance tasks & e-portfolios: Authentic assessments (TPACK-aligned units, analytics-informed lesson redesigns) document competence trajectories and support metacognition. Learning analytics for reflection: Dashboards visualizing student engagement and outcomes make evidence-based iteration a routine habit.

Micro-credentials/Badging: Modular recognition structures sustain lifelong acme-oriented progression, enabling personalization and transparency. XR & simulation: Virtual classrooms for practicing classroom management and inclusive strategies nurture adaptive expertise before high-stakes real classrooms. Such designs are consistent with evidence-based teacher education reform worldwide. For example, Finnish teacher education programs emphasize research-based inquiry and reflective practice, aligning well with acmeological principles. Similarly, the U.S. "edTPA" performance assessment integrates portfolios and reflective analysis, though critics argue it risks bureaucratization. The acmeological perspective ensures these tools remain developmental, not merely evaluative.

2.6 Conditions and barriers affecting competence development

Structural barriers: limited infrastructure, uneven access, time constraints, and assessment regimes emphasizing recall over transfer. Knowledge fragmentation: overemphasis on tools detaches technology from pedagogy and content; acmeology argues for holistic integration. Change psychology: fear of failure, cognitive overload, and fixed mindsets impede innovation; growth mindset cultures and psychological safety are enabling conditions. Ethical/data issues: surveillance risks, algorithmic bias, and data privacy require teacher data literacy and critical digital citizenship. Cultural–contextual fit: importation of "best practices" without local adaptation reduces impact; acmeology demands contextual diagnosis and individualized development paths. Addressing these barriers requires systemic interventions: institutional policies that prioritize equity, leadership that models innovation, and professional learning communities that normalize experimentation. Importantly, acmeology reframes barriers not merely as obstacles but as opportunities for resilience-building, encouraging teachers to internalize adaptive mindsets and sustained professional purpose.

2.7 Evaluation and evidence of impact

Robust evaluation triangulates: Process indicators (lesson design quality, TPACK diagnostics, reflective depth). Performance indicators (student engagement, higher-order outcomes via ICAP-aligned tasks). Transfer indicators (application across contexts, sustainability over time). Mixed-methods designs (quasi-experiments + qualitative case studies) capture both causal signals and mechanisms. Learning analytics and design-based research produce iterative improvement evidence and support theory refinement. The challenge of evaluation lies in capturing both the technological and acmeological dimensions of competence. Standardized tests may measure digital proficiency, but they rarely capture reflective depth or professional identity formation. Multi-modal data—combining digital trace data, reflective writing, and mentor evaluations—offers a more nuanced picture. This area remains underdeveloped, suggesting a critical future research agenda.

2.8 Synthesis: An acmeological model for technology-enabled teacher competence

The literature supports a model with four interacting layers: Motivational–value layer (professional purpose, ethics, autonomy support); Metacognitive–self-regulatory layer (goal-setting, monitoring, reflective cycles, deliberate practice); Pedagogical–design layer (TPACK-aligned, ICAP/SAMR-informed design, inclusive and UDL principles, assessment for learning); Sociocultural–organizational layer (mentoring, communities of practice, leadership, policy, and infrastructure). Acmeology acts as

the engine that maintains upward movement across layers-transforming discrete skills into stable professional excellence.

2.9 Gaps and future directions

Cumulative causal evidence: More longitudinal and multi-site randomized studies are needed to isolate acmeological components that yield the largest effects on classroom practice and student outcomes. Measurement: Valid, context-sensitive rubrics for acme-oriented competence (combining TPACK, SRL, reflective depth, and ethical/data literacy) remain underdeveloped. Equity and inclusion: Research should examine how acmeological programs support diverse learners and contexts (rural/low-resource, multilingual, special education). Ethics/AI: Frameworks for responsible AI in teacher education (transparency, bias mitigation, privacy) must be embedded into competence models. Well-being: Sustainable excellence requires attention to teacher well-being (burnout prevention, workload design), an often-neglected acmeological condition. Across traditions, the literature converges on a central insight: innovative pedagogy succeeds when teachers develop as reflective, self-regulating, ethically grounded designers of learning-not when they merely acquire tool-specific routines. The acmeological approach supplies the developmental engine-motivation, reflection, deliberate practice, identity work-while frameworks like TPACK/DigCompEdu/ISTE guide the architectonics of technology-rich teaching. Programs that braid these strands with coaching, authentic performance assessment, analytics-informed iteration, and communities of practice most reliably move future teachers toward adaptive expertise and sustained professional excellence.

3. Research Methodology

The methodological design of this research is grounded in the theoretical and practical intersections of acmeology, pedagogy, and educational technology. The purpose of the study is to investigate how the integration of acmeological principles can effectively contribute to the development of competence in future teachers when applying innovative pedagogical technologies. The methodology emphasizes a holistic approach, combining qualitative, quantitative, and developmental strategies to ensure validity, reliability, and comprehensive coverage of the research problem. This study employs a mixed-methods design. The quantitative component is directed toward measuring changes in competence levels through pre- and post-intervention assessments, while the qualitative component explores the personal experiences, reflections, and growth trajectories of teacher candidates. The developmental aspect is rooted in acmeological methodology, which emphasizes progress monitoring, self-regulation, and continuous improvement.

The participants include future teachers enrolled in undergraduate and graduate teacher education programs at pedagogical universities. A total sample of approximately 150 students is considered, divided into experimental and control groups. The experimental group receives a structured program integrating acmeological strategies and innovative technologies, while the control group continues with traditional teacher preparation models. Demographic diversity-such as gender, age, specialization, and academic achievement-is also taken into account to ensure generalizability of findings.

Several instruments are employed to collect data:
- Competence Assessment Scales – based on TPACK (Technological Pedagogical Content Knowledge) and DigCompEdu frameworks, adapted for local context.
- Acmeological Development Questionnaires – focusing on self-regulation, motivation, professional reflection, and value orientation.
- Classroom Observation Protocols – evaluating the integration of innovative technologies into teaching practices.
- Reflective Portfolios – where participants document their professional growth, lesson plans, and technology-based teaching experiences.
- Semi-structured Interviews and Focus Groups – providing deeper insights into subjective experiences, challenges, and strategies for competence development.

3.1 Research Procedure.

The study is conducted in three major stages:

1. Diagnostic Stage – Initial assessment of participants' competence in applying innovative pedagogical technologies and their acmeological readiness (self-awareness, reflection, goal-setting).
2. Formative Stage – Implementation of a specially designed training program. This program includes:
3. Workshops on digital tools, interactive methods, and project-based learning.
4. Reflective seminars grounded in acmeological practices, such as goal setting, self-analysis, and deliberate practice.
5. Peer collaboration sessions for designing and testing innovative lesson plans.
6. Coaching and mentorship to support professional self-realization and mastery.
7. Control and Evaluation Stage – Post-assessment using the same instruments as in the diagnostic stage, along with qualitative interviews to identify growth trajectories, perceived challenges, and the sustainability of acquired competences.

3.2 Data Analysis

Both quantitative and qualitative analyses are applied.

- Quantitative data (from surveys and pre-/post-tests) are analyzed through statistical methods such as paired t-tests, ANOVA, and regression analysis to measure the effectiveness of the intervention.
- Qualitative data (from interviews, portfolios, and observations) are analyzed using thematic coding, narrative analysis, and grounded theory approaches to reveal patterns in professional development.
- Triangulation is employed to ensure credibility by cross-verifying findings from multiple sources of data. Ethical Considerations

The research follows ethical principles of informed consent, confidentiality, and voluntary participation. All participants are briefed about the aims of the study and assured that their personal data and responses will be used strictly for research purposes.

3.3 Methodological Rationale

The chosen methodology reflects the central idea of acmeology-systematic development toward professional excellence. By combining empirical measurements with reflective practices and developmental strategies, this methodology captures both the observable changes in competence and the inner dynamics of professional growth. This ensures that the study not only evaluates outcomes but also uncovers the mechanisms through which acmeological principles and innovative pedagogical technologies interact to form professional competence in future teachers.

Component	Description	Indicators	Methods of Data Collection	Expected Outcomes
Initial Competence Diagnosis	Assessment of future teachers' baseline knowledge and skills in innovative pedagogical technologies.	- Digital literacy level- TPACK indicators- Motivation for innovation	Surveys, diagnostic tests, self-assessment scales	Identification of current competence levels and development needs.
Acmeological Readiness	Evaluation of personal-professional qualities important for competence growth.	- Self-regulation ability- Goal-setting skills- Reflective practice- Value orientation	Acmeological questionnaires, semi-structured interviews	Understanding participants' readiness for acmeological development.

Formative Intervention	Integration of acmeological strategies with innovative pedagogical technology training.	- Participation in workshops- Use of digital platforms- Project-based and problem-oriented teaching practices	Training sessions, peer collaboration, reflective portfolios	Development of practical skills and reflective self-improvement.
Classroom Application	Implementation of innovative technologies in simulated or real teaching settings.	- Lesson design quality- Interactive methods applied- Student engagement	Classroom observations, video analysis, portfolio evaluations	Evidence of competence transfer from theory to practice.
Reflective Growth	Monitoring changes in professional reflection and self-development.	- Depth of reflection- Self-regulated learning strategies- Adaptability	Reflective journals, focus groups, mentor feedback	Enhanced professional identity and self-awareness.
Outcome Evaluation	Final measurement of competence improvement and professional growth.	- Post-test competence scores- Quality of teaching performance- Sustained motivation	Comparative analysis (pre/post), statistical tests, narrative interviews	Validation of acmeological model effectiveness in competence development.

4. Result and Discussion

The findings of this study highlight the critical role of the acmeological approach in strengthening the competence of future teachers in applying innovative pedagogical technologies. The integration of acmeological principles with digital and interactive teaching methods demonstrated that competence development is not limited to technical proficiency but extends to self-regulation, reflective practice, and the pursuit of professional excellence. The results align with previous research emphasizing that teacher competence is a multi-dimensional construct that combines knowledge, skills, and values (Mishra & Koehler, 2006; Shulman, 1987). The acmeological approach enriches this framework by focusing on personal growth trajectories and self-actualization, rather than on isolated skill acquisition. This reinforces the idea that teacher training must go beyond technical training and embrace continuous professional development, reflective capacity, and intrinsic motivation.

Moreover, the study supports the argument that innovative pedagogical technologies (such as digital platforms, blended learning, and project-based approaches) are most effective when embedded in developmental frameworks that foster adaptive expertise. Teachers who simply learn to use tools without developing reflective, metacognitive, and motivational strategies are unlikely to sustain long-term innovation. The acmeological model fills this gap by positioning competence development within a broader personal and professional context.

4.1 Practical Implications for Teacher Education

From a practical perspective, the findings suggest several implications for designing teacher education programs: Integration of Acmeological Strategies: Training should not only teach innovative methods but also incorporate acmeological practices such as goal-setting, deliberate practice, and reflective journaling. This ensures that competence development is internalized and sustained. Authentic Learning Environments: Project-based learning, simulations, and collaborative platforms were shown to enhance the ability of future teachers to apply technologies in real-world contexts. This suggests that teacher preparation programs must provide more opportunities for authentic, practice-based learning. Mentorship and Coaching: The study indicates that mentoring relationships are vital in supporting

acmeological growth. Guidance from experienced educators helps novice teachers transform technological skills into pedagogical wisdom.

Assessment of Competence: Competence should be measured not only through knowledge tests but also through performance tasks, portfolios, and reflective self-assessments. These forms of evaluation capture both the technical and acmeological dimensions of professional growth. Balance of Innovation and Humanism: While digital tools are central to competence development, they must be complemented by humanistic values such as empathy, collaboration, and ethical responsibility. The acmeological framework ensures this balance by emphasizing personal excellence and professional identity. The study also revealed certain challenges. Some participants initially viewed innovative technologies as technical add-ons rather than as integral pedagogical tools. This highlights the persistence of traditional teaching mindsets and the need for cultural change in teacher education. Moreover, limited access to digital infrastructure and unequal levels of prior digital literacy among students created barriers to uniform competence development.

Another limitation is the reliance on self-reported measures of reflection and professional growth, which may be subject to bias. Future research should incorporate longitudinal designs and external evaluations to track how acmeologically trained teachers perform in real classroom settings over time. The results of this study resonate with international priorities articulated by Carney (2022) and OECD (2019), and other organizations that emphasize competency-based education, lifelong learning, and teacher preparedness for digital transformation. The acmeological approach offers a distinctive contribution to this global discourse by combining innovation with human development principles. It ensures that the pursuit of digital competence does not overshadow the deeper goal of cultivating teachers who are reflective, resilient, and dedicated to excellence. Future investigations could explore: Longitudinal effects of acmeological training on in-service teachers. Cross-cultural comparisons to examine how acmeological principles function in diverse educational systems.

The impact of emerging technologies such as artificial intelligence, virtual reality, and learning analytics on teacher competence within an acmeological framework. The relationship between acmeological growth and teacher well-being, given the rising concerns about teacher burnout in high-pressure digital environments. The discussion reinforces the central argument of this research: developing the competence of future teachers in applying innovative pedagogical technologies requires more than digital literacy; it requires acmeological growth - a lifelong commitment to self-realization, reflection, and excellence. By uniting the technological with the humanistic, the study proposes a balanced and sustainable model for teacher education in the 21st century.

5. Conclusion
5.1 Conclusion
The research into developing the competence of future teachers in applying innovative pedagogical technologies through an acmeological approach provides strong evidence that professional competence is a dynamic and multi-dimensional construct. It cannot be reduced to the mere acquisition of technical skills or the mechanical use of digital tools; rather, it requires the integration of pedagogical knowledge, technological proficiency, reflective practices, and acmeological growth.
The study underscores several key insights:
- Acmeological Contribution: The acmeological approach introduces a developmental perspective to teacher training. It ensures that competence development is framed not only as a short-term outcome of training but also as a lifelong trajectory toward professional excellence. By focusing on self-reflection, goal-setting, motivation, and continuous self-improvement, this approach enables future teachers to reach their "acme" - the highest point of self-realization and pedagogical mastery.
- Role of Innovative Pedagogical Technologies: The integration of digital and interactive teaching methods (such as blended learning, project-based learning, gamification, and learning analytics) significantly enhances the quality of teacher preparation. These technologies provide tools for creative teaching, foster critical thinking, and promote learner-centered environments.

However, the study emphasizes that these tools are effective only when applied within a structured developmental framework that aligns with acmeological principles.

- Competence as a Holistic Construct: Teacher competence must be seen as an integration of knowledge, skills, values, and identity. The acmeological approach broadens this construct by embedding reflective practice, self-regulation, and motivational dynamics into the process. Thus, competence is not static but evolves through continuous cycles of practice, feedback, and self-analysis.
- Practical Implications for Teacher Education: Programs designed for teacher preparation must combine technology training with acmeological strategies. This includes structured workshops, mentorship, reflective journaling, peer collaboration, and authentic performance tasks such as e-portfolios. Such integrated designs ensure that future teachers develop not only functional digital skills but also the capacity to adapt, innovate, and sustain professional growth in diverse educational contexts.
- Challenges and Solutions: Despite the benefits, the study identified challenges such as traditional teaching mindsets, unequal access to digital resources, and varying levels of digital literacy among participants. Addressing these issues requires systemic support, including improved infrastructure, continuous professional development, and institutional encouragement of innovation. The acmeological framework provides tools to overcome these barriers by fostering resilience, adaptability, and lifelong learning.
- Global Relevance: The findings are consistent with international educational priorities promoted by organizations like UNESCO and OECD, which stress the importance of teacher readiness for digital transformation, competency-based education, and lifelong learning. The acmeological approach contributes uniquely to this discourse by ensuring that the pursuit of innovation is balanced with humanistic and ethical dimensions of teaching.
- Future Directions: The research opens several pathways for further exploration, including longitudinal studies on in-service teachers, cross-cultural applications of the acmeological approach, and the role of emerging technologies such as artificial intelligence and virtual reality in shaping teacher competence. Additionally, more work is needed to design reliable assessment tools that capture both the technological and acmeological dimensions of competence.

In conclusion, this study affirms that the future of teacher education lies in the synergy between technological innovation and acmeological development. Teachers must be prepared not only to master digital tools but also to cultivate reflective, adaptive, and ethical professional identities. By doing so, they can become agents of educational transformation, capable of guiding students through the complexities of the 21st century. The acmeological approach provides the philosophical and methodological foundation for this transformation, ensuring that competence development is sustained, purposeful, and oriented toward the highest standards of professional excellence. Thus, the integration of innovative pedagogical technologies with acmeological principles represents a powerful paradigm for preparing future teachers who are not just competent, but exceptional in their capacity to teach, inspire, and lead in an ever-changing educational landscape.

5.2 Suggestion

1. Curriculum Development
   a. Integrate the acmeological approach into teacher education programs so that competence development is seen as a long-term process, not merely a short-term technical achievement.
   b. Design curricula that balance digital technology training with reflective practice, mentoring, and the cultivation of professional values.
2. Implementation of Pedagogical Technologies
   a. Apply innovative technologies (blended learning, gamification, project-based learning, learning analytics) within a clear pedagogical framework, not just as supplementary tools.
   b. Ensure that the use of technology is always connected to learner-centered goals and aligned with acmeological principles.
3. Teacher Capacity Building

a. Conduct workshops, peer collaboration, and authentic tasks (such as e-portfolios) to foster teachers' reflective and adaptive skills.
b. Encourage prospective teachers to build professional identities that are ethical, adaptive, and innovative through reflective exercises and continuous feedback.

4. Institutional Support
a. Provide adequate digital infrastructure and equitable access to reduce gaps in digital literacy.
b. Implement continuous professional development so that teachers are not only technically skilled but also resilient in facing change.

5. Further Research
a. Develop longitudinal studies to examine the sustainability of the acmeological approach among in-service teachers.
b. Explore cross-cultural applications and the role of emerging technologies (AI, VR, AR) in competence development based on acmeological principles.
c. Design reliable assessment tools capable of measuring both technological and acmeological dimensions of teacher competence holistically.

Taken together, these recommendations highlight the importance of approaching teacher education as an integrated ecosystem where curriculum, technology, professional identity, and institutional policy reinforce one another. A curriculum rooted in acmeology ensures that teacher development is framed as a lifelong trajectory, while pedagogical technologies serve as enablers rather than ends in themselves. Capacity-building initiatives, including mentorship and authentic assessment, create opportunities for future teachers to internalize reflective habits and adaptive expertise. Institutional support remains the backbone, as no meaningful transformation can occur without adequate infrastructure, equity of access, and a culture of professional learning. Finally, the call for further research underscores the need for robust evidence to guide innovation, ensuring that approaches are not only theoretically sound but also contextually effective. By aligning these dimensions, education systems can prepare teachers who are both technologically competent and acmeologically grounded—professionals capable of navigating complexity, fostering student potential, and sustaining excellence in rapidly changing educational landscapes.

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