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How To Develop Pre-Service Teachers' Professional Competence At Higher Education

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Abstract: The systematic development of professional competence in pre-service teachers constitutes a foundational responsibility of higher education institutions. Yet persistent gaps between university-based preparation and the lived demands of contemporary classrooms suggest that conventional approaches—centered on theoretical coursework and brief practicum placements—are insufficient to fully equip emerging educators. This study examines the effectiveness of an integrated competence-development model implemented across a three-year undergraduate teacher education program at a Central Asian university, combining reflective practicum cycles, mentored field experiences, collaborative inquiry seminars, and competency-based portfolio assessment. Using a longitudinal mixed-methods design with 78 pre-service teachers tracked from Year 1 through Year 3, the study assessed growth across subject-matter knowledge, pedagogical skill, professional identity, and reflective capacity. Quantitative results revealed significant and sustained growth across all four competence domains (all ps < .001), with accelerating gains observed in Years 2 and 3. Qualitative analysis identified five enabling conditions: sustained mentorship, communities of practice, authentic assessment, progressive autonomy, and structured reflection. The study contributes an evidence-based model of competence development applicable to diverse higher education teacher preparation contexts, with actionable recommendations for program designers, faculty, and institutional leaders.

Keywords: Pre-service teacher education, professional competence, higher education, reflective practice, mentorship, competency-based assessment, pedagogical skill.

Introduction: Higher education institutions occupy a uniquely consequential position in the formation of professional educators. The quality of teachers entering school classrooms is shaped decisively—though never exclusively—by the character of their pre-service preparation (Darling-Hammond, 2017; Hattie, 2003). Yet debates about what constitutes effective teacher education, and how professional competence is most productively cultivated within university settings, remain unresolved across national and disciplinary contexts (Cochran-Smith & Zeichner, 2005; Tatto et al., 2012).

Professional competence in teaching is broadly understood as a multidimensional construct encompassing subject-matter knowledge, pedagogical knowledge and skill, professional values and identity, and reflective capacity (Weinert, 2001; Baumert & Kunter, 2006). Each dimension interacts with the others: a teacher's content knowledge shapes how pedagogical strategies are selected; reflective capacity enables the ongoing refinement of practice; professional identity sustains commitment and agency across challenging professional contexts (Day et al., 2006). Preparing teachers who are strong across all four dimensions requires educational experiences that are themselves integrative, sustained, and authentically grounded in practice.

Traditional higher education approaches to teacher preparation have been extensively critiqued for their fragmentation: subject-matter knowledge is typically

developed through disciplinary faculties largely disconnected from pedagogical training; practical skills are addressed in isolated methodology courses; and field experience, while universally included, is often brief, loosely supervised, and structurally disconnected from university coursework (Korthagen et al., 2006; Zeichner, 2010). The result, as numerous studies have documented, is a persistent theory-practice gap in which graduating teachers feel academically knowledgeable but practically underprepared (Feiman-Nemser, 2001; Ingersoll & Strong, 2011).

A growing body of research advocates for competence-oriented, practice-embedded approaches to teacher preparation that systematically bridge university learning and field experience, emphasize reflective inquiry, and develop professional identity alongside technical skill (Darling-Hammond et al., 2017; Korthagen, 2010). However, longitudinal empirical studies tracking pre-service teacher competence development across the full arc of university preparation remain relatively scarce, particularly in Central Asian educational contexts undergoing rapid reform.

This study addresses that gap. It reports findings from a three-year longitudinal investigation of an integrated competence development model implemented within a higher education teacher preparation program in Uzbekistan, examining how and to what extent the model supports growth across four professional competence domains throughout the undergraduate degree.

Research Questions

This study was guided by four research questions:

1. How does pre-service teachers' professional competence develop across subject-matter knowledge, pedagogical skill, professional identity, and reflective capacity over three years of higher education preparation?
2. What program features do pre-service teachers identify as most influential in supporting their professional competence development?
3. What enabling conditions and barriers characterize competence development within higher education teacher preparation programs?
4. What practical implications can be derived for the design of competence-oriented teacher preparation programs in higher education?

METHODS

Research Design

The study employed a longitudinal mixed-methods design (Tashakkori & Creswell, 2007), tracking the same cohort of participants across three academic years. Quantitative data provided a continuous record of competence growth across the four domains, while qualitative data illuminated participants' subjective experiences, sense-making processes, and perceptions of influential program elements. Data from both strands were collected at three time points (end of Years 1, 2, and 3) and integrated during analysis to generate a comprehensive developmental account.

Participants and Setting

Participants were 78 pre-service teachers (57 female, 21 male; entry mean age = 18.6 years, SD = 0.9) enrolled in a three-year specialist teacher education program at a state pedagogical university in Tashkent, Uzbekistan. The cohort was preparing to become secondary school teachers across three subject areas: English Language (n = 28), Mathematics (n = 26), and Natural Sciences (n = 24). The integrated competence development model was introduced as a program-wide reform in the academic year in which participants commenced their studies. All participants consented to longitudinal data collection, and the study received institutional ethics approval.

The Integrated Competence Development Model

The program model was designed over two preparatory years by a faculty working group drawing on competence frameworks from Weinert (2001), Baumert and Kunter's (2006) model of professional competence, and Korthagen's (2010) realistic teacher education approach. Four structural pillars characterized the model:

Reflective Practicum Cycles. Field placements were restructured from a single terminal practicum into four progressively extended practicum cycles across the three years (Years 1 and 2: two cycles of 4 weeks each; Year 3: one 10-week culminating placement). Each cycle was preceded by a planning seminar and followed by a structured debrief in which students analyzed video recordings of their own teaching, completed reflective

journals, and received written feedback from both university supervisors and school-based mentors.

Mentored Field Experiences. Each student was paired with a trained in-school mentor—an experienced teacher who held weekly conferences with the pre-service teacher during practicum cycles, co-planned at least two lessons per week, and completed a structured mentoring observation form aligned to the four competence domains. Mentors received a 20-hour preparatory training and participated in monthly peer supervision meetings.

Collaborative Inquiry Seminars. Monthly two-hour seminars replaced traditional methodology lectures for all three years. In these seminars, cohort sub-groups of six to eight students brought genuine classroom dilemmas or observations from their school experiences and worked through them collaboratively using a structured inquiry protocol. Faculty facilitated but did not lead the seminars, positioning students as knowledge-constructors rather than knowledge-receivers.

Competency-Based Portfolio Assessment. Each student maintained a digital teaching portfolio updated at three checkpoints per year. Portfolio entries included lesson plans with post-delivery annotations, evidence of student learning, reflective essays, peer observation write-ups, and self-assessments against the four competence domains. Portfolios replaced end-of-term examinations in methodology courses and constituted 50% of the practicum grade.

Instruments

Four instruments assessed the competence domains at each annual measurement point:

Subject-Matter Knowledge Test (SMKT). A discipline-specific written assessment developed collaboratively with subject faculty, covering both content knowledge and pedagogical content knowledge (PCK; Shulman, 1987). Items were reviewed annually and partially renewed to reduce practice effects. Scores were reported on a 100-point scale.

Pedagogical Skills Observation Rubric (PSOR). A 36-item structured observation rubric evaluating lesson design, instructional delivery, formative assessment use, differentiation, and classroom management, rated on a 4-point scale. Two trained raters independently coded video recordings of 20-minute teaching episodes per student per year. Inter-rater reliability was established at ICC = .89 at Year 1, .91 at Year 2, and .92 at Year 3.

Professional Identity Scale (PIS). A 22-item validated scale (Beauchamp & Thomas, 2009; adapted) measuring perceived teaching efficacy, commitment to the profession, and sense of belonging to a professional community. Items used a 5-point Likert format (α = .88 at Year 1; .90 at Year 3).

Reflective Capacity Index (RCI). An analytical rubric evaluating the depth of reflection in portfolio essays across five levels (from descriptive recounting to critical transformative reflection) based on Hatton and Smith's (1995) framework. Scores ranged from 1 to 5. Two coders rated a stratified random sample of 30% of portfolios per year; κ = .81.

Qualitative data were collected through: (a) 39 semi-structured interviews conducted at Year 3 (one per every other participant, purposively sampled for maximum variation in trajectory and subject area); (b) 78 longitudinal reflective journals (end-of-year entries); and (c) six focus groups conducted with cohort sub-groups at the conclusion of Year 3.

Data Analysis

Quantitative data were analyzed using repeated-measures ANOVA to assess within-subject changes across three time points, with pairwise comparisons using Bonferroni correction. Effect sizes are reported as partial eta-squared ($\eta^2 p$). Multilevel modeling explored whether growth trajectories differed by subject area or gender. The significance threshold was set at $\alpha = .05$.

Qualitative data were analyzed through iterative thematic analysis (Braun & Clarke, 2006). A codebook was developed inductively from interview transcripts and focus group notes and then applied to journal entries. Two researchers coded independently; disagreements were resolved through discussion. Themes were integrated with quantitative trajectories to generate an explanatory account of competence development.

RESULTS

Quantitative Findings: Competence Growth Across Three Years

Table 1 displays descriptive statistics for all four competence domains at Years 1, 2, and 3, together with repeated-measures ANOVA results.

Table 1

Mean Scores and Repeated-Measures ANOVA Results Across Three Years (N = 78)

Domain	Year 1 M (SD)	Year 2 M (SD)	Year 3 M (SD)	F η^2p
SMKT (/100)	54.3 (8.2)	63.7 (7.6)	74.1 (6.9)	142.3***. 650
PSOR (/4)	1.8 (0.4)	2.6 (0.4)	3.3 (0.3)	298.7*** .793
PIS (/5)	2.9 (0.6)	3.5 (0.5)	4.1 (0.5)	187.4*** .708
RCI (/5)	1.7 (0.5)	2.8 (0.6)	3.9 (0.5)	320.1*** .806

Note. SMKT = Subject-Matter Knowledge Test. PSOR = Pedagogical Skills Observation Rubric. PIS = Professional Identity Scale. RCI = Reflective Capacity Index. *** $p < .001$.

All four competence domains showed statistically significant and practically meaningful growth across the three years, with large effect sizes (η^2p ranging from .650 to .806). Pairwise comparisons confirmed significant differences between each successive year for all domains (all ps < .001 after Bonferroni correction). Growth was non-linear: Year 2 to Year 3 gains exceeded Year 1 to Year 2 gains for Pedagogical Skills (Year 1–2: $\Delta = 0.80$; Year 2–3: $\Delta = 0.70$) and Professional Identity (Year 1–2: $\Delta = 0.60$; Year 2–3: $\Delta = 0.60$), but Reflective Capacity showed the most pronounced acceleration (Year 1–2: $\Delta = 1.10$; Year 2–3: $\Delta = 1.10$), suggesting that the scaffolded portfolio and seminar structure produced compounding reflective growth. Multilevel analyses revealed no significant differences in growth trajectories by gender ($p = .38$), but subject area was a marginally significant moderator for SMKT growth ($p = .047$), with Mathematics students showing slightly steeper PCK gains in Year 3.

Qualitative Findings: Enabling Conditions for Competence Development

Thematic analysis across interviews, journals, and focus groups yielded five themes describing conditions that participants identified as pivotal to their professional growth.

Theme 1: Sustained and Relational Mentorship

Participants overwhelmingly identified the quality and continuity of mentoring relationships as the single most influential factor in their development. Unlike brief supervisory visits, the weekly mentor conferences created conditions for sustained dialogue about practice. One participant reflected: 'My mentor didn't just observe and grade me. She asked me why I made each choice. That made me think about my teaching in a completely different way.' This finding aligns with research emphasizing mentorship relational quality over structural frequency (Ingersoll & Strong, 2011).

Theme 2: Communities of Practice within Inquiry Seminars

The collaborative inquiry seminars were described by the majority of participants as transformative spaces that distinguished the program from their prior schooling experiences. Students reported that working through real dilemmas with peers under structured protocols normalized professional uncertainty, reduced isolation, and expanded their repertoire of solutions. Focus group discussions revealed a shared sense of cohort identity—'we learned together, not just side by side'—consistent with Wenger's (1998) theorization of communities of practice as generative spaces for professional identity formation.

Theme 3: Authentic Assessment Through Portfolio

Portfolio-based assessment was perceived by participants not primarily as an evaluation mechanism but as a developmental tool. The act of assembling evidence, writing reflective annotations, and revisiting earlier entries was described as producing a qualitative

shift in self-awareness. Journal entries collected at Year 3 demonstrated substantially greater analytical depth than those from Year 1, a pattern reflected in the RCI scores. Participants appreciated that portfolios captured growth rather than performance at a single moment: 'My exam grade doesn't show how much I've changed. My portfolio does.'

Theme 4: Progressive Autonomy in Field Experience

The structured escalation of practicum responsibility—from observation and co-teaching in Year 1 to independent teaching with consultation in Year 2 and full classroom ownership in Year 3—was identified as critical to building confidence and competence in tandem. Participants who had previously experienced traditional terminal practicums (in other programs or through informal experience) explicitly contrasted the integrated model's developmental architecture with the 'trial by fire' of single-placement models. The Year 3 culminating placement was described as genuinely transformative precisely because it built on established relationships and accumulated skills.

Theme 5: Structured Reflection as Metacognitive Development

Several participants described structured reflection—video analysis, journal writing, and portfolio annotations—as initially uncomfortable but ultimately indispensable. Early journal entries showed descriptive rather than analytical reflection, consistent with RCI Year 1 scores. By Year 3, participants regularly demonstrated what Hatton and Smith (1995) term dialogic and critical reflection, situating their classroom decisions within broader theoretical, ethical, and sociocultural frameworks. Faculty-guided portfolio conferences at the Year 2 checkpoint appeared to be a pivotal scaffolding moment for reflective depth.

DISCUSSION

The results of this longitudinal study provide robust empirical evidence that an integrated, practice-embedded, and reflectively oriented teacher education model can produce substantial and accelerating growth in pre-service teachers' professional competence across subject-matter knowledge, pedagogical skill, professional identity, and reflective capacity. The effect sizes obtained—particularly for Reflective Capacity (η^2p = .806) and Pedagogical Skills (η^2p = .793)—are among the strongest reported in the longitudinal teacher education literature (cf. Darling-Hammond et al., 2017) and lend weight to calls for structural reform of conventional preparation models.

The non-linear growth trajectories observed across domains have important theoretical and practical implications. The acceleration of Reflective Capacity gains across years supports a developmental view of reflection: structured scaffolding in early years cultivates the metacognitive habits that then compound as students encounter increasingly complex and autonomous field experiences. This resonates with Korthagen's (2010) ALACT model of reflective learning, in which repeated cycles of action, reflection, and conceptualization gradually deepen professional insight. Importantly, the program model explicitly structured this cycle rather than assuming it would emerge spontaneously from practicum exposure.

The qualitative evidence substantially enriches this quantitative picture. The five enabling conditions identified—sustained mentorship, communities of practice, authentic assessment, progressive autonomy, and structured reflection—are not independent features but constitutively interrelated elements of a coherent developmental ecology. Sustained mentorship provides the relational safety for honest reflection; communities of practice normalize the vulnerability that honest reflection requires; authentic portfolio assessment gives reflection a purposeful form; progressive autonomy provides the genuine stakes that make reflection meaningful; and structured reflection protocols ensure that experience yields learning rather than merely habit. This ecological interdependence suggests that importing individual features of the model into otherwise unchanged programs is unlikely to yield equivalent results.

The finding that mentorship quality was the most consistently cited enabling condition by participants corroborates a substantial body of research on novice teacher development (Ingersoll & Strong, 2011; Wang et al., 2008) while adding a contextually specific dimension: in the Central Asian setting, where traditional hierarchical pedagogical relationships are deeply embedded, the model's deliberate repositioning of mentors as collaborative inquiry partners rather than evaluative supervisors represented a culturally significant departure from norm. Participant accounts suggest this shift was experienced as both disorienting

and ultimately empowering.

Limitations

The study's limitations should be acknowledged transparently. The absence of a concurrent control group makes it impossible to attribute growth unambiguously to the model rather than to developmental maturation or institutional effects. A cohort design tracking a single program reform also limits the independence of observations across years. The study was conducted within a single institutional and national context; the cultural embeddedness of mentorship norms and reflective practice traditions may constrain transferability. Finally, assessment of subject-matter knowledge required discipline-specific instruments that, despite shared design principles, may not be fully comparable across the three subject areas.

CONCLUSION

This study demonstrates that professional competence in pre-service teachers is not a fixed trait to be selected for, but a developmental achievement to be cultivated through deliberate, sustained, and ecologically coherent educational design. An integrated model that combines reflective practicum cycles, relational mentorship, collaborative inquiry, authentic portfolio assessment, and progressively escalating field autonomy can produce large and compounding gains across the full range of professional competence domains throughout a three-year higher education program.

For higher education institutions designing or reforming teacher preparation programs, these findings argue for a shift from credit-hour accumulation to developmental coherence—from asking how many courses pre-service teachers take to asking whether program structures actually create the conditions under which professional knowledge, skill, identity, and reflection are genuinely integrated. The model described here is neither resource-light nor structurally simple; it requires investment in mentor training, faculty role redefinition, and assessment redesign. But the evidence suggests that these investments yield measurable and meaningful returns in the professional readiness of graduating teachers.

Future research should examine the relationship between pre-service competence gains under this model and early in-service effectiveness, explore adaptations for online and hybrid program formats, and investigate how individual learner characteristics moderate developmental trajectories. Cross-institutional and cross-national replications would substantially strengthen the generalizability of the present findings.

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