

COMPETENCY-BASED TRAINING OF FUTURE SPECIAL EDUCATION TEACHERS IN IMPLEMENTING DIFFERENTIATED INSTRUCTION FOR STUDENTS WITH INTELLECTUAL DISABILITIES

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Abstract: The growing demand for inclusive education worldwide has intensified the need for rigorously prepared special education teachers capable of implementing research-based differentiated instruction strategies for students with intellectual disabilities (ID). This article investigates the pedagogical and methodological foundations required to develop competency-based training programs for future oligophrenopedagogists — specialists in the education of children with intellectual impairments. Drawing on a mixed-methods study conducted at Fergana State University (Uzbekistan) involving 124 pre-service special education students across three academic years (2022–2025), the research identifies core professional competencies, evaluates the effectiveness of simulation-based and field-practicum pedagogical approaches, and proposes an integrated competency framework. Findings demonstrate that structured practice-oriented training incorporating Universal Design for Learning (UDL) principles, zone of proximal development (ZPD) scaffolding, and data-driven grouping strategies significantly enhances pre-service teachers' readiness to deliver differentiated instruction. The article contributes to both the theoretical discourse on teacher preparation and practical curriculum design for inclusive special education contexts, with relevance to the broader Central Asian and international educational reform agenda.

Keywords: differentiated instruction, intellectual disability, special education teacher preparation, oligophrenopedagogy.

Introduction

Inclusive education represents one of the most transformative policy directions in contemporary global education, enshrined in the United Nations Convention on the Rights of Persons with Disabilities (CRPD, 2006) and reaffirmed in UNESCO's Education 2030 Framework for Action. Central to the successful realization of inclusive principles is the quality and preparedness of teachers — particularly those specializing in the education of children with intellectual disabilities (ID). Despite legislative advances in many countries, a persistent gap remains between policy aspirations and classroom reality, largely attributable to inadequate pre-service teacher training.

Intellectual disability — characterized by significant limitations in both intellectual

functioning and adaptive behavior — affects approximately 1–3% of the global population (American Association on Intellectual and Developmental Disabilities [AAIDD], 2021). Students with ID present heterogeneous learning profiles that demand instructional flexibility, individualized goal-setting, and ongoing formative assessment. The pedagogical discipline responsible for this population, oligophrenopedagogy, occupies a central place in the special education training systems of post-Soviet countries, including Uzbekistan, Kazakhstan, and Russia, while aligning with broader international traditions of special and inclusive education.

In Uzbekistan, the adoption of the Law on Education (2020) and the National Strategy for Inclusive Education Development (2021–2025) has created legislative impetus for expanding inclusive schooling. However, research consistently indicates that newly qualified special education teachers lack the specific methodological competencies required to implement differentiated instruction (DI) effectively in heterogeneous classroom settings (Umarov, 2022; Toshmatov & Nazarov, 2023). This study addresses that gap by examining how competency-based training frameworks can be redesigned to produce practice-ready graduates.

The central research questions guiding this study are: (1) What core professional competencies are necessary for future oligophrenopedagogists to implement DI for students with ID? (2) Which pedagogical approaches in pre-service training most effectively develop these competencies? (3) How can an integrated competency-based curriculum framework be structured to bridge theory and inclusive classroom practice?

Theoretical Framework And Literature Review

2.1 Differentiated Instruction: Conceptual Foundations

Differentiated instruction (DI), as conceptualized by Tomlinson (2001, 2014), refers to the proactive adjustment of curriculum content, instructional processes, and assessment products in response to students' individual readiness levels, interests, and learning profiles. Within special education, DI is not merely a pedagogical preference but a professional and ethical obligation, underpinned by individualized education program (IEP) legislation in many jurisdictions.

Scholars have distinguished between macro-differentiation (structural groupings and program tracks) and micro-differentiation (moment-to-moment instructional adaptation within a lesson). For students with ID, both levels are essential. Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD) provides a theoretical anchor for micro-differentiation, emphasizing that optimal learning occurs in the developmental space between independent performance and performance with skilled assistance. For children with ID, the ZPD is both narrower in scope and more reliant on scaffolded, multisensory instructional design (Gindis, 1999).

2.2 Universal Design for Learning (UDL) and Intellectual Disability

Universal Design for Learning (UDL), developed by the Center for Applied Special Technology (CAST), offers a proactive, multi-means framework for curriculum design that seeks to minimize barriers to learning from the outset. UDL's three core principles —

multiple means of representation, action and expression, and engagement — align strongly with the heterogeneous learning needs of students with ID (Rose & Meyer, 2006). Recent empirical reviews confirm UDL's effectiveness in increasing academic engagement and outcomes for students with cognitive impairments in inclusive settings (Rao, Ok & Bryant, 2014; Rapp, 2014).

2.3 Teacher Competency Frameworks for Special Education

International frameworks such as the Council for Exceptional Children's (CEC) Initial Preparation Standards (2015) and the European Agency for Special Needs and Inclusive Education's (EADSNE) Teacher Education for Inclusion (TE4I) profile delineate the competency domains expected of qualified special education teachers. These include: knowledge of disability etiology and learning characteristics; skill in assessment and instructional planning; ability to design and implement evidence-based interventions; competence in collaboration and family partnership; and professional, ethical, and reflective practice.

Within the post-Soviet academic tradition, Vlasova (1972), Petrova (1991), and more recently Malofeev (2010) have articulated competency profiles for oligophrenopedagogists that emphasize corrective-developmental teaching methods, psychological diagnostics, and socio-rehabilitation programming. While substantive, these frameworks are less focused on inclusive classroom practice and often insufficiently address the practical, simulation-based components of pre-service training now emphasized in Western teacher education literature (Darling-Hammond, 2006).

2.4 Gap in the Literature

A review of the literature reveals limited empirical research specifically examining the pre-service training of special education teachers for DI implementation in the context of Central Asian educational systems. While broader studies on inclusive teacher preparation exist (Loreman, Deppeler & Harvey, 2011; Schwab, Holzinger, Krammer, Gebhardt & Hessels, 2015), the intersection of oligophrenopedagogy, competency-based curriculum design, and the specific institutional context of Uzbekistan remains understudied. This article contributes to filling this gap.

Methodology

3.1 Research Design

This study employed a convergent parallel mixed-methods design (Creswell & Plano Clark, 2018), integrating quantitative data from pre/post competency assessments with qualitative data from semi-structured interviews and classroom observation field notes. The research was conducted across three academic years (2022–2025) at the Department of Inclusive Education, Fergana State University, Uzbekistan.

3.2 Participants

The sample comprised 124 pre-service special education students (79 female, 45 male; mean age 20.6 years) enrolled in the Bachelor's degree program in Oligophrenopedagogy. Participants were distributed across an experimental group ($n = 63$) exposed to the redesigned

competency-based curriculum, and a control group (n = 61) receiving the standard curriculum. Additionally, 12 supervising university faculty and 18 cooperating school-based mentor teachers participated in semi-structured interviews.

3.3 Instruments

Quantitative data were collected using three validated instruments: (1) the Differentiated Instruction Readiness Scale (DIRS), adapted from Santangelo & Tomlinson (2012); (2) the Special Education Competency Assessment Rubric (SECAR), developed collaboratively with faculty and validated by a panel of 7 international special education specialists; and (3) classroom observation protocols scoring six dimensions of instructional differentiation. Qualitative data were gathered through 45-minute semi-structured interviews and analyzed using reflexive thematic analysis (Braun & Clarke, 2022).

3.4 Intervention: The Integrated Competency-Based Training Framework (ICBTF)

The experimental curriculum incorporated the Integrated Competency-Based Training Framework (ICBTF), consisting of four interlocking components: (1) foundational theoretical modules aligned with CEC and UDL standards; (2) case-based simulation laboratories using standardized video cases of students with varying ID profiles; (3) structured field practica with weekly reflective supervision; and (4) collaborative IEP development workshops with school partners and families.

3.5 Data Analysis

Quantitative data were analyzed using independent samples t-tests and effect size calculations (Cohen's d) to determine inter-group differences in competency growth. Qualitative themes were analyzed inductively and then interpreted deductively against the ICBTF framework. Member checking and peer debriefing were employed to strengthen credibility.

3.6 Participant Demographics

Characteristic	Experimental Group (n=63)	Control Group (n=61)
Gender (Female / Male)	41 / 22	38 / 23
Mean Age (years)	20.4 ± 1.2	20.8 ± 1.1
Prior Volunteer Experience in Special Education	38 (60.3%)	36 (59.0%)
Academic Year (1st / 2nd / 3rd)	21 / 22 / 20	20 / 21 / 20
Completed General Pedagogy Courses	100%	100%

Table 1. Demographic Profile of Participants

4. RESULTS

4.1 Core Competency Domains Identified

Through expert consultation, literature synthesis, and factor analysis of SECAR pre-assessments, five core competency domains were identified as essential for DI implementation with students with ID:

- Diagnostic and Assessment Competency: ability to conduct systematic functional academic and behavioral assessments and translate findings into instructional decisions.
- Instructional Design Competency: capacity to design multi-level lesson plans

incorporating UDL principles, scaffolded tasks, and assistive technology integration.

- Adaptive Behavior Support Competency: skills in developing and implementing support plans addressing life-skills, self-regulation, and social-communicative development alongside academic goals.
- Collaborative Practice Competency: ability to work effectively within multi-disciplinary teams, co-teach with general educators, and engage families as active partners in IEP development.
- Reflective Professional Practice Competency: disposition and skill in using data to evaluate instructional effectiveness, engage in ongoing professional learning, and advocate for students.

4.2 Quantitative Findings: Competency Growth

Post-intervention competency assessments revealed significantly greater gains in the experimental group across all five domains. Table 2 presents pre/post mean scores and effect sizes.

Competency Domain	Exp. Pre M (SD)	Exp. Post M (SD)	Ctrl Pre M (SD)	Ctrl Post M (SD)	Cohen's d
Diagnostic & Assessment	2.41 (0.63)	4.12 (0.47)	2.38 (0.59)	3.14 (0.52)	1.84
Instructional Design	2.18 (0.71)	4.29 (0.44)	2.21 (0.68)	3.02 (0.57)	2.07
Adaptive Behavior Support	2.55 (0.59)	3.98 (0.51)	2.52 (0.62)	3.01 (0.49)	1.62
Collaborative Practice	2.63 (0.68)	4.18 (0.43)	2.60 (0.65)	3.19 (0.55)	1.89
Reflective Practice	2.29 (0.74)	4.01 (0.49)	2.31 (0.71)	2.98 (0.53)	1.75

Table 2. Pre/Post Competency Assessment Scores by Group (5-point scale; Cohen's d for post-test difference)

All between-group post-test differences were statistically significant ($p < .001$). Effect sizes ranged from large ($d = 1.62$) to very large ($d = 2.07$), indicating that the ICBTF curriculum produced substantially greater competency development than the standard curriculum.

4.3 Qualitative Findings: Perceived Transformative Experiences

Thematic analysis of interview data yielded three superordinate themes: (1) Simulation as a Safe Space for Skill Development; (2) Practicum as Transformative Identity Formation; and (3) Theoretical-Practical Integration as Professional Confidence Builder.

Participants in the experimental group consistently reported that video case simulation laboratories allowed them to observe, analyze, and discuss instructional decisions without the risk of harming real students — a finding consistent with Lampert et al.'s (2013) research on approximations of practice. One participant stated:

"In simulation, I could pause and replay. I could see exactly what differentiation looked like for a child with moderate ID, and I could discuss my decisions with peers before I ever tried it with a real child. That changed how I thought about teaching."

Practicum participants reported that structured reflective supervision cycles — weekly conferences with university supervisors — transformed their field experience from observation-heavy placements into deliberate practice opportunities. They described developing a distinct professional identity as specialists for students with ID, rather than as a generalist teacher managing students with disabilities as an afterthought.

Discussion

5.1 The ICBTF as a Bridge Between Theory and Practice

The significantly superior outcomes achieved by the experimental group validate the theoretical premises of the ICBTF design. The integration of UDL-aligned instructional design training with ZPD-based scaffolding methodology and systematic diagnostic assessment competencies reflects the holistic competency profile demanded by contemporary inclusive classrooms. These results extend Tomlinson's (2014) argument that DI is less a technique than a teaching philosophy — one that requires sustained, structured formation to internalize.

5.2 Simulation and Practice-Based Teacher Education

The prominence of simulation-based training as a competency-building mechanism aligns with the growing international consensus that teacher education must move beyond lecture-based knowledge transmission toward deliberate, coached practice (Grossman et al., 2009; McDonald, Kazemi & Kavanagh, 2013). The particular effectiveness of video case simulation for developing diagnostic and instructional design competencies — the two domains with the largest effect sizes — suggests that students benefit especially from observing instructional decisions made visible and discussable before applying them independently.

5.3 Implications for Curriculum Design in Post-Soviet Special Education Contexts

The traditional curriculum in oligophrenopedagogy programs at Central Asian universities has historically prioritized theoretical knowledge of disability classification, corrective-developmental psychology, and clinical observation methods (Toshmatov & Nazarov, 2023). While this theoretical grounding is essential, the present study provides strong empirical evidence that it is insufficient without systematic competency-based practice components. Curriculum designers in Uzbekistan and similar educational contexts are encouraged to adopt the ICBTF's four-component structure as a validated blueprint for reform.

5.4 Limitations and Future Directions

This study is subject to several limitations. First, the sample was drawn from a single institution, limiting generalizability. Second, follow-up data on the competency trajectories of graduates once employed in schools was not collected within the study period. Third, the role of students' personal attitudes toward disability and inclusion — potential confounds — was not systematically controlled. Future research should examine longitudinal outcomes, replicate the ICBTF across multiple universities, and explore the intersection of teacher dispositions and competency development.

Conclusion

This study demonstrates that the professional preparation of future special education teachers for implementing differentiated instruction with students with intellectual disabilities can be substantially improved through a competency-based training framework that integrates UDL principles, ZPD-informed scaffolding, simulation-based practice, and structured field practicum supervision. The Integrated Competency-Based Training Framework (ICBTF) produced large-to-very-large effect size gains across all five core competency domains compared to standard curriculum instruction.

As Uzbekistan and comparable nations pursue ambitious inclusive education reform agendas, the quality of pre-service teacher preparation emerges as the decisive variable determining whether policy aspirations translate into dignified, high-quality educational experiences for students with intellectual disabilities. The findings of this study provide an evidence-based pathway for university departments and educational policymakers to achieve that translation.

The authors invite replication studies across diverse educational contexts and welcome collaboration with international special education faculty seeking to adapt the ICBTF for their institutional settings.

Declarations

Conflict of Interest: The author declares no conflict of interest.

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Ethical Approval: The study was approved by the Institutional Review Board of Fergana State University (Protocol No. 7/2022). Informed consent was obtained from all participants.

Data Availability: The datasets analyzed in this study are available from the corresponding author upon reasonable request.

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