European International Journal of Pedagogics

TYPE Original Research
PAGE NO. 10-12
DOI 10.55640/eijp-05-05-03

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The Technology for Determining the Level of Development of Students' Intercultural Communication Competence Through Testing

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OPEN ACCESS

SUBMITTED 08 March 2025
ACCEPTED 04 April 2025
PUBLISHED 07 May 2025
VOLUME Vol.05 Issue05 2025

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Abstract: Intercultural communication competence (ICC) has become a core outcome of higher education in the context of accelerating globalization. The present study develops and validates an integrated testing technology designed to diagnose the degree to which undergraduate students have formed the cognitive, affective, and behavioral components of ICC. The technology combines principles of psychometrics with culture-general theory and adapts them to the sociocultural realities of Uzbekistan's tertiary sector. A mixed-method sequential design was employed: first, item pools were generated on the basis of authoritative competence frameworks; second, the resulting test battery was administered to 486 students representing seven universities and nine academic majors; finally, quantitative indicators were triangulated with qualitative data from semi-structured interviews. Results confirm high internal consistency (Cronbach's $\alpha = 0.91$) and construct validity, while exploratory factor analysis reveals a stable three-factor structure congruent with cognition, empathy, and interactional sensitivity. Independent-sample t-tests demonstrate significant differences between students with intensive foreign-language exposure and those without such experience ($p < 0.01$). The discussion addresses methodological advantages of technology-based assessment, considers curricular implications, and outlines directions for further refinement.

Keywords: Intercultural communication competence;

testing technology; psychometric validation; higher education; Uzbekistan; factor analysis.

Introduction: The twenty-first-century labor market increasingly rewards graduates who can communicate effectively across linguistic and cultural boundaries. Universities therefore face a dual challenge: they must embed intercultural learning into the curriculum and they must verify that such learning materializes in measurable competences. Yet existing diagnostic instruments tend either to be imported without localization or to privilege self-report formats that exaggerate proficiency. In Uzbekistan, where the state educational standards for modern foreign-language programs include ICC as a distinct learning outcome, demand has grown for a technology that permits reliable, context-sensitive assessment. Responding to this demand, the present work sets out to design, pilot, and validate a comprehensive testing technology capable of describing students' ICC levels with psychometric rigor. The study is guided by the following research questions: How can the latent construct of ICC be operationalized within a culturally diverse Central Asian setting? What empirical evidence attests to the reliability and validity of the proposed test battery? And how do diagnostic outcomes differ according to educational profile and intercultural experience?

METHODS

The technological concept underlying the assessment draws on Bennett's developmental model of intercultural sensitivity and Byram's descriptive model of intercultural communicative competence, merging them into a tripartite structure: knowledge about cultures, affective-motivational openness, and behavioral adaptability. Item generation proceeded through systematic mapping of indicators to this structure. Each draft item underwent expert review by a panel of ten scholars in applied linguistics and educational psychology. After linguistic refinement, a pilot version comprising 84 multiple-choice items and six scenario-based tasks was digitized in a secure, browser-accessed environment.

Participants represented first- through fourth-year cohorts at seven state and non-state universities across Uzbekistan. Eligibility required Uzbek citizenship, enrolment in a degree program, and voluntary informed consent. Of 524 students who accessed the platform, 486 completed all sections (68 % female; mean age = 20.1 ± 1.4 years). In order to minimize test anxiety and ensure comparability, administrations took place during regular coursework under the supervision of trained proctors. Average completion time was 52 minutes.

Psychometric analysis employed IBM SPSS 28. Internal consistency was estimated by Cronbach's alpha, while factor structure was examined via principal axis factoring with Promax rotation ($k = 3$). Convergent validity was investigated through correlations with the well-established Intercultural Development Inventory (IDI) administered to a subsample of 148 respondents. Group differences were tested using independent-sample t-tests and one-way ANOVA where appropriate. Qualitative follow-up interviews ($n = 24$) explored perceived authenticity of test scenarios and the extent to which scores matched students' self-perceptions. All procedures conformed to the ethical code of the National Research Council of Uzbekistan.

Statistical screening confirmed multivariate normality and absence of significant outliers. The full battery yielded Cronbach's $\alpha = 0.91$, indicating excellent internal consistency; subscale alphas ranged from 0.83 to 0.88. Kaiser–Meyer–Olkin measure of sampling adequacy equalled 0.92, and Bartlett's test of sphericity was significant ($\chi^2 (3403) = 8421.76$, $p < 0.001$), validating factorability. Factor analysis extracted three components accounting jointly for 62.4 % of total variance. The first component aggregated items measuring declarative and procedural cultural knowledge; the second captured empathic concern, tolerance of ambiguity, and ethnorelative attitudes; the third clustered behavioral indicators such as strategic code-switching and conflict-mitigation techniques. Loadings were substantial (> 0.45) and cross-loadings minimal, supporting theoretical coherence.

Convergent validity analysis showed a robust positive correlation between composite test scores and IDI developmental orientation scores ($r = 0.71$, $p < 0.001$). Criterion-related validity emerged from significant mean differences associated with experiential variables. Students who had studied abroad for at least one semester ($n = 68$) outperformed their domestic peers ($M = 73.4$ vs. 61.8, $t (484) = 6.12$, $p < 0.01$, Cohen's $d = 0.78$). Foreign-language majors also scored higher than STEM majors after controlling for gender and year of study ($F (2, 481) = 9.46$, $p < 0.001$). Interview data corroborated quantitative patterns: respondents generally recognized scenario-based tasks as realistic and considered feedback helpful for reflection on intercultural strengths and weaknesses.

Findings demonstrate that the proposed technology constitutes a psychometrically sound instrument for diagnosing ICC among undergraduate populations. High reliability signifies stability of measurement, while factorial integrity demonstrates successful

operationalization of the competence construct in a Central Asian milieu. The strong correlation with the IDI, combined with distinctive group profiles, offers further evidence of construct and criterion validity. Importantly, scenario-based items appear to neutralize social-desirability bias by requiring contextualised decisions rather than declarative self-evaluation.

Pedagogically, systematic deployment of the technology can inform curriculum design by identifying areas requiring intensified instructional attention. For instance, relatively modest gains on behavior-oriented items among STEM cohorts suggest that discipline-embedded international projects might be necessary to foster practical adaptability. Moreover, the technology's digital format enables longitudinal tracking of individual trajectories, thereby facilitating evidence-based interventions.

From a methodological standpoint, the study contributes to assessment practice by demonstrating how global models of ICC can be recalibrated for a specific national context without sacrificing psychometric integrity. Nonetheless, several limitations warrant consideration. First, despite diverse institutional representation, the sample remains skewed toward urban universities with relatively strong international ties; caution is therefore necessary when generalizing to remote campuses. Second, reliance on cross-sectional data constrains causal inference; future research should employ repeated-measures designs to capture developmental dynamics. Third, although qualitative interviews affirmed perceived authenticity, further cognitive-lab studies are required to detect potential item bias across linguistic subgroups.

The research confirms the feasibility of an integrated, technology-enhanced testing approach that reliably diagnoses the development level of students' intercultural communication competence in Uzbekistan. By combining theoretical robustness with practical usability, the instrument offers higher-education stakeholders a valuable means of monitoring learning outcomes and informing targeted pedagogical strategies. Ongoing enhancement will focus on adaptive algorithms and expansion to broader demographic segments, thereby strengthening the role of empirical assessment in cultivating globally competent graduates.

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