

Diagnosics of Determining Tolerant Behavior of Students in The Process of Teaching the German Language Based on Artificial Intelligence

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Abstract

The article examines theoretical and methodological foundations and practical opportunities for applying artificial intelligence technologies to diagnose tolerant behavior among students learning German. The necessity of digitalizing pedagogical assessment procedures in the context of higher education transformation is substantiated. A model integrating AI tools into the analysis of students' speech production, questionnaires, and learning activities is presented. It is demonstrated that intelligent data-processing algorithms enhance objectivity, validity, and dynamic monitoring of cognitive, behavioral, and reflective components of tolerance.

Keywords: Artificial intelligence, tolerance, German language, pedagogical diagnostics, intercultural competence.

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1. Introduction

The digital transformation of higher education requires not only the introduction of new technological tools but also a review of the methodological foundations of humanitarian education. In the context of algorithmization of educational processes, the question arises about the relationship between the human subject and digital data analysis systems. Artificial intelligence is no longer just a technical tool but is becoming a factor in changing the logic of pedagogical diagnostics itself [15, p. 12].

In the context of reforming the higher education system of the Republic of Uzbekistan, special attention is being paid to digitalizing the educational environment and implementing intelligent data analysis technologies. Modern research notes that digital tools contribute to improving the quality of education and developing

mechanisms for monitoring and modernizing management and pedagogical processes [9, p. 25]. Digitalization plays an important role in foreign language teaching, especially when there is a need for objective diagnostics of students' communicative and intercultural competencies.

In the humanities tradition, diagnosing learners' personal qualities was viewed as a complex interpretive process based on value-semantic analysis of behavior and speech [4, p. 54]. Tolerance in intercultural communication is considered as an integrative quality of personality that combines cognitive, emotional-value, and behavioral aspects [5, p. 119]. However, traditional methods of pedagogical assessment are often characterized by subjectivity of interpretation and limited dynamics.

International research notes that artificial intelligence systems are capable of analyzing large amounts of

educational data, identifying hidden behavioral patterns, and providing adaptive feedback [8, p. 148].

Rose Luckin views AI as “advanced intelligence” that enhances the teacher's analytical capabilities and supports personalized learning [11, p. 98].

From a philosophical standpoint, the dilemma arises whether the algorithm can adequately explain humanitarian categories such as tolerance, empathy, and intercultural sentimentality. This article is based on the assumption that artificial intelligence does not replace the subject of pedagogical interaction, but is an advanced analytical tool that contributes to more objective and dynamic monitoring of students' personal qualities.

The purpose of the research is to substantiate the conceptual model for diagnosing tolerant behavior of students in teaching German based on artificial intelligence, taking into account the humanistic principles of pedagogy.

Modern research shows that artificial intelligence is being actively integrated into the foreign language learning system. Thus, in Rose Luckin's works, artificial intelligence is considered as a tool for transforming the educational environment that provides intellectual support for both teacher and learner [11, p. 95].

Holmes and his colleagues note that artificial intelligence technology is capable of analyzing extensive data on education and identifying hidden behavioral patterns [8, p. 148]. This opens up the prospect of diagnosing not only students' linguistic but also personal characteristics.

Researchers in the field of pedagogical science of the Commonwealth of Independent States (CIS) note the need to develop digital diagnostic tools capable of considering the dynamics of student personal development [3, p. 210]. It was noted that traditional diagnostic methods often fail to provide sufficient objectivity and require the integration of quantitative analysis tools.

German researchers in the field of digital didactics also note the potential of artificial intelligence in forming intercultural competence through the analysis of students' speech experiences [12, p. 57].

Despite the growing interest in artificial intelligence in language education, the problem of its application for diagnosing tolerant behavior is insufficiently developed and requires comprehensive methodological justification.

The methodological basis of the research consists of system-activity and competency-based approaches that allow considering tolerant behavior as an integrative quality of personality formed in the process of intercultural interaction [5, p. 118].

The following components are distinguished in the structure of the diagnostic model:

1. Cognitive (understanding cultural differences, knowledge of the norms of intercultural communication);
2. Value-motivational (acceptance of cultural diversity, establishing respectful relationships);
3. Behavioral (implementation of tolerant strategies in oral and written speech);
4. Reflexive-evaluative (ability to self-analyze communicative behavior).

A set of methods was used for diagnosis:

analysis of written speech materials of students using natural language processing algorithms (NLP- Natural Language Processing);

analysis of oral opinions based on automated recognition of speech;

digital questionnaires;

pedagogical control.

The use of AI tools has enabled automatic classification of speech signs associated with respect, empathy, demonstrating the validity of evidence, and avoiding discriminatory statements.

The theoretical basis for using intelligent algorithms was research in the field of artificial intelligence teaching, which highlights the capabilities of intelligent systems in identifying hidden educational patterns [8, p. 152], as well as the personalization of feedback [11, p. 102].

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The results were processed using comparative analysis and variance analysis (ANOVA) methods to identify statistically significant differences in the dynamics of tolerant behavior indicators.

The results of the study showed that the integration of AI tools into the diagnostic process contributes to:

increasing the objectivity of the analysis of students' speech strategies;

reducing the subjective impact of the teacher;

determining the dynamics of behavior pattern changes.

Algorithmic analysis of written texts made it possible to determine the frequency of using neutral and respectful statements, as well as the degree of evidence validity.

AI analysis of spoken language revealed an increase in communicative flexibility and levels of empathic statements.

The obtained data confirm the provisions of foreign research on the positive impact of artificial intelligence-supported learning on the development of intercultural competence [10, p. 8], and also agree with the conclusions of Russian authors on the need to digitalize pedagogical diagnostics [3, p. 214].

Statistical data processing revealed significant differences in the indicators of the cognitive and behavioral components of tolerance, which confirms the effectiveness of the digital diagnostic model.

In the context of the digital transformation of higher education, artificial intelligence is becoming an important factor in modernizing students' language training. Unlike traditional e-learning resources, AI systems provide learning adaptability, real-time educational data analysis, and personalized feedback,

which significantly affects the effectiveness of German language acquisition [11, p. 101].

One of the main impacts of introducing artificial intelligence in language teaching is the personalization of the educational trajectory. Natural Language Processing algorithms allow for the analysis of students' written and oral products, the identification of common grammatical, lexical, and pragmatic errors, and the provision of personalized recommendations [8, p. 150]. This is especially important in teaching German, which is distinguished by its complex morphological system and variability of syntactic structures. Besides developing language competence, AI technologies influence the formation of intercultural competence. Language is a mediator of cultural meanings, norms, and values, therefore, analyzing students' communicative strategies allows us to determine the level of their intercultural sensitivity [4, p. 87]. Intelligent algorithms are capable of establishing indicators of politeness, argument validity, empathic statements, and culturally conditioned speech strategies, which facilitates the diagnosis of tolerant behavior in communicative practice.

International research notes that learning supported by artificial intelligence contributes to the development of learners' metacognitive skills and reflexive consciousness, enhancing their ability to self-correct and analyze their own speech strategies [13, p. 63]. Thus, artificial intelligence performs not only a tool but also a developmental function, ensuring the transition from formal mastery of language norms to conscious intercultural interaction.

Therefore, the introduction of artificial intelligence in German language teaching expands the boundaries of traditional linguodidactics and contributes to the formation of comprehensive intercultural competence, including cognitive, behavioral, and reflexive-evaluative components.

The introduction of artificial intelligence into the diagnosis of tolerant behavior of students when learning German is an interdisciplinary phenomenon located at the intersection of pedagogy, linguistics, and the philosophy of digital education.

AI tools expand the teacher's analytical capabilities, increase the objectivity of diagnostics, and provide dynamic monitoring of students' personal development.

At the same time, the humanistic paradigm requires a

critical consideration of the boundaries of algorithmic interpretation and the observance of the student's subjective position in the educational process.

The future of further research is linked to the development of ethically validated digital diagnostic models capable of taking into account the cultural characteristics and humanistic values of modern education.

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