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Moodle-Based Automated Assessment in Online Education for University Students with Disabilities

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Keywords

adaptive interface, digital educational environment, educational analytics, pedagogical support, students with special educational needs

Abstract

This study examined a Moodle-based automated assessment configuration for university students with disabilities. A quantitative, one-group, quasi-experimental, pretest-posttest design combined a historical comparison of 30 students with a descriptive review of nine platforms. Mean module grades increased from 72.3 to 81.7, task completion rose from 62% to 85%, and technical-support requests decreased from 15 to 5. Satisfaction, autonomy, and perceived interface accessibility were also higher after implementation. The findings describe improved academic participation and a more manageable assessment experience within the cohort. Interpretation remains specific to the small purposive sample, historical comparison, and study-specific experience indicators. The study connects Universal Design for Learning (UDL) with accessible assessment, feedback, and implementation support. Practical priorities include student participation in accessibility testing, staff training, flexible assessment arrangements, and continuous monitoring of learning and support needs.

Introduction

The growing demand for inclusive higher education gives particular importance to accessible and timely assessment for students with disabilities. In Kazakhstan, educational access remains uneven. UNICEF (2023) reported that 102,000 of 153,230 children with disabilities received education, including 61,336 enrolled in inclusive schools. These figures provide a national context for barriers encountered along educational pathways. Human Rights Watch (2019) also documented barriers to educational inclusion. Automated assessment offers flexible timing, adapted materials, and immediate feedback. Effective implementation depends on accessible infrastructure, appropriate learning resources, and trained educators. The present study examines academic participation and student experience following the introduction of an accessible Moodle assessment configuration in one university cohort.

Literature Review

Recent research shows that formal commitments to inclusion have advanced more rapidly than practical implementation in Kazakhstan. Allan and Omarova (2022) identified persistent social

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and institutional barriers, while Assanbayev and Makoel (2024) emphasised physical accessibility, curriculum adaptation, and staff readiness. Aubakirova et al. (2025) highlighted individualised psychological and pedagogical support, and Uyzbayeva et al. (2025) reported constraints involving staff training, software access, and compatibility with existing infrastructure. Zhanarstanova (2026) associated meaningful inclusion with flexible learning, support mechanisms, and elements of Universal Design for Learning (UDL). Collectively, this evidence connects inclusive higher education with usable digital systems and sustained pedagogical support.

International research presents online learning as an opportunity that also introduces accessibility challenges for students with disabilities. Meleo-Erwin et al. (2021), Petretto et al. (2021), Reyes et al. (2022), and Lomellini et al. (2025) have described benefits involving flexible participation and organised digital materials alongside requirements for accessible course design, instructor support, and assistive technology compatibility. Bartolo et al. (2025) emphasise individualised accommodations and student participation in the design of inclusive university environments. Rajapakshe et al. (2026) identify screen-reader usability, platform design, and institutional guidance as continuing concerns among visually impaired undergraduates. Inclusive digital delivery therefore requires deliberate design and sustained support.

Technological approaches address accessibility through screen-reader compatibility, text-to-speech functions, adjustable interfaces, mobile access, flexible formats, and adaptive learning options. Li et al. (2021) demonstrated the potential of online collaboration technologies for students with learning disabilities. Systematic reviews by Zárate-Rueda et al. (2025) and Navas-Bonilla et al. (2025) connected technological support with personalisation, participation, independence, and inclusive pedagogy. Uyzbayeva et al. (2025) similarly link assistive technology use in Kazakhstan with institutional capacity and educator competence. Much of this literature focuses on technology availability, accessibility characteristics, and user perceptions. Evaluation of academic and operational changes following a specific assessment implementation remains an important empirical task.

Assessment has increasingly been recognised as a central inclusion issue. Nieminen et al. (2024) identified assessment practices as a source of barriers for students with disabilities. Nieminen (2026), drawing on 139 qualitative survey responses and nine narrative interviews, proposes student-informed principles for inclusive assessment design. Khalil et al. (2024) described the potential of learning analytics for inclusive and personalised support and identified limited disability-focused empirical research. Zhao (2025) examined student experiences of generative artificial intelligence, including accessibility benefits and concerns about reliability, cost, academic integrity, and institutional guidance. Together, these studies establish a need for cohort-level evidence connecting automated assessment with academic performance, task completion, support needs, and student experience.

The present study addresses three linked contributions. RQ1 examines academic, operational, and experiential changes following implementation of the Moodle configuration. RQ2 descriptively connects the configured functions with student evaluations and observed outcomes. RQ3 integrates documented platform characteristics with cohort findings to identify conditions relevant to inclusive assessment.

Research Objectives

The purpose of the study was to evaluate a Moodle-based automated assessment configuration for students with disabilities and connect the configured features with academic, operational, and experiential evidence. Three research questions were addressed:

(1) What changes in academic performance, task completion, technical-support requests, satisfaction, autonomy, and perceived interface accessibility were observed between pre-implementation and post-implementation measurement after the Moodle-based automated assessment configuration was introduced?

(2) How did the configured Moodle features relate descriptively to student-reported usability, accessibility, feedback quality, assessment objectivity, autonomy, motivation, satisfaction, and the observed academic and operational outcomes?

(3) How do the platform-level accessibility comparison and the student-level results jointly explain Moodle's potential and limitations as an inclusive learning-support mechanism for students with disabilities?

Methods

Research Methodology

A quantitative, one-group, quasi-experimental, pretest-posttest design with a historical baseline was combined with a descriptive comparison of assessment platforms. The empirical analysis examined within-cohort change, and the documentary comparison provided platform context. UDL guided the interpretation of accessibility, flexibility, and assessment support (CAST, 2018).

Population and Sample

A criterion-based purposive sample comprised 30 students aged 18–24 with officially confirmed disabilities who studied pedagogical programmes at M. Kozybayev North Kazakhstan University. Eligibility required enrolment in the selected pedagogy course, participation in the preceding semester, and internet access. Exclusion criteria covered unstable access to a suitable device and temporary health conditions preventing participation. All 30 students had matched pre-implementation and post-implementation records and were analysed as one cohort. The sample supports conclusions about the participating students in this course setting.

Instruments

For RQ1, academic records supplied individual module grades and cohort task-completion rates, while operational records supplied technical-support request counts. These administrative indicators represented academic achievement, participation, and support use. The eight-item questionnaire supplied the experiential outcomes for RQ1 and the student evaluations for RQ2. The configuration description supplied the corresponding feature information for RQ2. The questionnaire covered convenience, independent navigation, interface accessibility, feedback quality, perceived assessment objectivity, perceived motivation change, technical difficulties, and satisfaction. Satisfaction, autonomy, and perceived accessibility were expressed on a 0–100 scale for paired comparisons. The motivation item assessed perceived change at the end of the implementation. Items corresponded to the experience domains in RQ1 and RQ2. The questionnaire served as a study-specific indicator set whose psychometric properties require further evaluation. For RQ3, publicly available documentation for Moodle, Canvas LMS, Blackboard Learn, Google Forms, Microsoft Forms, Open edX, Classtime, Testportal, and

Schoology was compared across assessment functionality, accessibility, settings flexibility, integration, and disability-related adaptation. The documentation provided contextual feature information for interpretation alongside the student outcomes.

Procedure

Data collection combined the preceding-semester baseline with the autumn 2024 implementation period. Matched baseline grades, task-completion records, and support-request counts were compiled for the 30 students. Before activation of the automated functions, the baseline questionnaire referred to the preceding semester's assessment process. Moodle was configured with multiple question formats, adjustable time limits, retakes, screen-reader-compatible content, scaling, high contrast, keyboard navigation, alternative formats, and automated module feedback. Platform orientation and a technical-support channel accompanied the configuration. During the semester, academic and operational records were collected. The post-implementation questionnaire was administered at the semester's end, and anonymised identifiers matched the measurement points. Procedures followed the American Sociological Association's *Code of ethics* (1997).

The documentary comparison applied the same five criteria to nine assessment platforms using the cited 2025 platform documentation. Google Drive, Google Sheets, Microsoft 365, Microsoft Teams, OneDrive, and Zoom were classified as supporting services (Google Drive, 2025; Google Sheets, 2025; Microsoft 365 Corporation, 2025; Microsoft Teams, 2025; OneDrive, 2025; Zoom, 2025). Moodle supplied the empirical course environment. The other platform profiles supplied the context for RQ3.

Microsoft Excel supported the analyses. For RQ1, means and standard deviations summarised grades and the three 0–100 experience indicators, with paired-samples *t*-tests at $p < 0.05$ and Cohen's $dz = t/\sqrt{30}$ describing within-cohort change. Completion rates and support-request counts were compared descriptively. For RQ2, response percentages and a feature-to-outcome matrix summarised student experience. For RQ3, documented feature availability was scored 1 for full support and 0.5 for partial or limited support, with summed scores rounded down. Platform profiles were interpreted alongside the cohort results. Inferential findings were treated as exploratory.

Results

RQ1: Changes in Academic Participation and Assessment Experience

Following implementation, students obtained higher module grades and reported greater satisfaction, autonomy, and interface accessibility (Table 1). The mean grade increased by 9.4 percentage points, from 72.3 to 81.7. Satisfaction increased from 52 to 82, autonomy from 48 to 80, and perceived accessibility from 50 to 85 on the 0–100 scales. These changes describe a more favourable learning and assessment experience within the participating cohort. Paired effect sizes were $dz = 0.75$ for grades, 1.14 for satisfaction, 1.30 for autonomy, and 1.44 for accessibility.

Table 1: Paired Pre-implementation and Post-implementation Outcomes in the Main-Study Cohort (*N* = 30)

Indicator	Pre-implementation (M±SD)	Post-implementation (M±SD)	*t*-value	*p*-value
Average module grade (%)	72.3±8.5	81.7±7.2	4.12	< 0.001
Satisfaction with assessment process (0–100)	52±15	82±10	6.25	< 0.001
Autonomy of use (0–100)	48±12	80±9	7.10	< 0.001
Perceived interface accessibility (0–100)	50 ±13	85±8	7.88	< 0.001

Source. As reported by Moodle, 2025.

Task completion increased by 23 percentage points, from 62% to 85%, and technical-support requests fell from 15 to 5 across the cohort. In practical terms, a larger share of assigned work was completed while fewer requests for technical assistance were recorded. The combined pattern suggests more manageable participation during implementation. Attribution remained bounded by the historical comparison and changing semester conditions.

RQ2: Student Evaluations and Configured Assessment Functions

Most participants gave favourable evaluations of the assessment experience (Table 2). The reported positive shares were 75% for convenience, feedback, motivation change, and satisfaction, and 80% for navigation autonomy, accessibility, and perceived objectivity. A 75% share reported either smooth use or minor technical difficulties. For everyday course participation, the pattern indicated generally usable assessment and understandable feedback. The remaining responses identify continuing needs for navigation assistance, clearer feedback, and technical support.

Table 2: Post-implementation Responses (%) to Eight Questionnaire Items in the Study Cohort (*N* = 30)

1. How convenient was the automated assessment system for you?	Very convenient	Somewhat convenient	Neutral	Somewhat inconvenient	Very inconvenient
	40	35	15	7	3
2. Were you able to navigate the system independently?	Yes, fully independently	Yes, partly independently	No, I required assistance	No, I could not navigate it independently	-
	50	30	15	5	-
3. How accessible was the system interface?	Fully accessible	Mostly accessible	Partly accessible	Inaccessible	-
	45	35	15	5	-

4. How do you assess the quality of feedback?	Very informative and clear	Quite informative	Moderately informative	Slightly informative	No feedback
	40	35	15	7	3
5. How objective was the assessment?	Fully objective	Mostly objective	Not always objective	Subjective	-
	50	30	15	5	-
6. Has the system affected your motivation?	Motivation has increased significantly	Motivation has increased slightly	No effect	Motivation decreased	-
	35	40	20	5	-
7. What level of technical difficulties did you face?	No difficulties	Minor difficulties	Moderate difficulties	Significant difficulties	Constant problems
	45	30	15	7	3
8. How satisfied are you with using the system?	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
	40	35	15	7	3

Note. Values reproduce the reported descriptive response shares.
Source. Study questionnaire summaries.

Table 3 explains the practical meaning of the feature-to-outcome pattern. Higher accessibility and autonomy ratings are consistent with the intended purposes of adaptable presentation, organised navigation, and orientation. Favourable feedback and objectivity responses indicate student acceptance of automated scoring and explanations. The evidence concerns the complete implementation package, with feature-specific contributions remaining a question for further evaluation.

Table 3: Configured Assessment Functions and the Practical Meaning of Observed Outcomes

Configured Component	**Observed Evidence**	**Practical Meaning and Scope**
Accessible presentation and alternative formats	80% favourable accessibility responses. Accessibility score: 50 → 85.	The configuration was perceived as easier to access. Evidence covers the implemented presentation package.
Organised navigation and orientation	80% full or partial independent navigation. Autonomy: 48 → 80.	Students reported greater independence. Interface design and orientation formed a combined support package.

Configured Component	Observed Evidence	Practical Meaning and Scope
Automated feedback and standardised scoring	75% favourable feedback responses. 80% favourable objectivity responses. Satisfaction: 52 → 82.	Feedback and scoring were generally accepted. Objectivity represents students' perceptions.
Flexible timing, retakes, and assessment formats	75% favourable convenience responses. Task completion: 62% → 85%.	The assessment process was generally manageable. Evidence concerns the complete assessment arrangement.
Technical-support channel	75% smooth use or minor difficulties. Support requests: 15 → 5.	Fewer assistance requests were recorded. Continuing difficulty responses indicate a need for support.

Source. Authors' synthesis of the configured Moodle components and the main-study results in Tables 1 and 2.

RQ3: Platform Capabilities and Institutional Implementation

The platform comparison identifies choices relevant to university implementation (Table 4). Comprehensive learning management systems offer broad assessment and adaptation options alongside configuration and training demands. Form-based tools provide simpler deployment and more limited assessment options. The practical choice therefore depends on assessment requirements, accessibility needs, staff capacity, and available resources. The comparison represents documented platform profiles, while the cohort evidence concerns the implemented Moodle configuration.

Table 4: Documented Assessment Platform Characteristics Relevant to Implementation

Platform	Type	Main Advantages	Implementation Demands	Reported Adaptation
Moodle	Open-source	Free, flexible, expandable	Complex configuration	Yes
Canvas LMS	Commercial	Intuitive interface, analytics, mobile support	Expensive, requires training	Yes
Blackboard Learn	Commercial	Advanced functionality, security, integrations	Steep learning curve, high cost	Yes
Google Forms	Free	Simplicity, Google integration, instant feedback	Basic assessment and adaptation options	Partially
Microsoft Forms	Free	Microsoft 365 integration, ease of use	Limited options for complex assessments	Partially

Platform	Type	Main Advantages	Implementation Demands	Reported Adaptation
Open edX	Open-source	Scalability, analytics, MOOC support	High technical barrier	Partially
Classtime	Commercial	Interactivity, feedback tools	Limitations in the free version	Partially
Testportal	Commercial	Safe testing, adaptability	Paid access to advanced features	Limited
Schoology	Freemium	Integrations, course organisation, social-learning functions	Complex interface, limited free version	Yes

Source. Authors' descriptive comparison based on Blackboard Learn (2025), Canvas Learning Management System (LMS) (2025), Classtime (2025), Google Forms (2025), Microsoft Forms (2025), Moodle (2025), Open edX (2025), Schoology (2025), and Testportal (2025).

Moodle received the same maximum documented-feature score as Canvas LMS, Blackboard Learn, Open edX, and Schoology (Table 5). The cohort findings illustrate the use of Moodle's configurable functions in one course setting. The combined evidence points to an implementation priority: accessible platform features need appropriately prepared course content, student orientation, and responsive support. Documented availability and experienced accessibility provide complementary information. Comparative effectiveness across platforms remains an empirical question.

Table 5: Documented Availability of Accessibility-Related Platform Features

Platform	Screen Reader Support	Interface Scaling	Audio/Video with Subtitles	Flexible Timers	Mobile Access	Feature Score (1–5)
Moodle	Yes	Yes	Yes	Yes	Yes	5
Canvas LMS	Yes	Yes	Yes	Yes	Yes	5
Blackboard Learn	Yes	Yes	Yes	Yes	Yes	5
Google Forms	Partial	Yes	Partial	Limited	Yes	3
Microsoft Forms	Partial	Yes	Partial	Limited	Yes	3
Open edX	Yes	Yes	Yes	Yes	Yes	5
Classtime	Partial	Yes	Partial	Yes	Yes	4
Testportal	Yes	Yes	Partial	Yes	Yes	4
Schoology	Yes	Yes	Yes	Yes	Yes	5

Note. Full support was scored 1 and partial or limited support 0.5; totals were conservatively rounded down to a whole-number score from 1 to 5. *Source.* Authors' descriptive scoring based on Blackboard Learn (2025), Canvas Learning Management System (LMS) (2025), Classtime (2025), Google Forms (2025), Microsoft Forms (2025), Moodle (2025), Open edX (2025), Schoology (2025), and Testportal (2025).

Discussion and Implications

Academic Participation and Student Experience

The findings connect improved academic participation with a more manageable assessment experience. Higher grades, greater task completion, and reduced technical-support use occurred alongside favourable student evaluations. Lomellini et al. (2025) identified course design, institutional responsibility, and accessibility barriers as central concerns in online learning. Nieminen et al. (2024) place assessment practices at the centre of inclusion, while Nieminen (2026) emphasises student-informed assessment design. The present contribution is a contextual account of academic, operational, and experiential change within a course in Kazakhstan. Semester difficulty, maturation, instructor practices, and familiarity with the platform remain plausible contributors to the observed pattern. The small purposive cohort and historical baseline support an exploratory interpretation specific to this setting.

Accessibility Usability and Student Autonomy

The joint movement in accessibility and autonomy suggests a useful distinction between access to assessment and ease of independent participation. UDL provides a framework for flexible representation, action, expression, and engagement (CAST, 2018). The Technology Acceptance Model connects adoption with perceived usefulness and ease of use (Davis, 1989). Herrera Nieves et al. (2025) applied a UDL-informed Moodle usability methodology combining accessibility, assistive technology, and student experience. This work supports evaluation of the actual course configuration alongside platform functionality. The present feature matrix identifies plausible alignments between configured functions and experience domains. The bundled implementation leaves the relative contribution of feedback, interface settings, timing, retakes, orientation, and human support open to further study. Favourable objectivity ratings represent perceived fairness, while grading quality requires separate scrutiny.

Institutional Context and Transferability

Student experience also depends on institutional conditions. Rajapakshe et al. (2026) identify platform-design barriers, screen-reader limitations, and gaps in institutional guidance through interviews with visually impaired undergraduates in Sri Lanka. Bartolo et al. (2025) emphasised individualised accommodations and student empowerment. These findings help interpret the residual assistance and technical difficulties reported in the Moodle cohort. Overall positive percentages can coexist with persistent barriers for particular learners. Ogunsakin et al. (2026), analysing large-scale online-platform reviews, similarly associate technical instability and structural access barriers with poorer engagement. That broader platform evidence offers contextual insight, with transfer to disability-specific university assessment requiring careful evaluation. The common implication is that documented platform capabilities need institutional support and testing with diverse students.

Implications for Inclusive Assessment

The findings support coordinated attention to accessible design, student agency, and responsive support. Utami et al. (2025) identified limited empirical UDL evidence in online disability

education and highlighted professional development and resource allocation. The present study adds a small cohort account of implementation while maintaining distinctions between documentary features, administrative outcomes, and student perceptions. Khalil et al. (2024) similarly identified a limited evidence base for disability-focused learning analytics. The practical contribution is an implementation logic linking configurable assessment with orientation and support. A feature score alone supplies limited evidence about everyday accessibility. Independent participation, continuing support needs, and completion patterns provide additional criteria for institutional evaluation.

Recommendations for Inclusive Automated Assessment

Institutional implementation should combine documented accessibility requirements with student-led testing of the actual course configuration. Priority checks include screen-reader compatibility, keyboard navigation, contrast, scaling, captioned media, and flexible assessment timing. Staff training and clear responsibility for accessibility review strengthen implementation. Student involvement in identifying persistent barriers provides a practical route from general platform specifications to usable assessment.

At the course level, transparent criteria, understandable feedback, alternative response formats, orientation, and rapid support should accompany automated assessment. Educator review and an accessible appeal route support appropriate interpretation of automated scores. Monitoring should track grades, task completion, accessibility concerns, support requests, and experience indicators together. Where sample size and confidentiality permit, evaluation across disability groups can identify uneven participation hidden within cohort averages. Individualised support also aligns with evidence-based disability education practices (Strnadova et al., 2023).

Suggestions for Further Research

Further research should use larger multi-university cohorts, established measurement instruments, and prospective designs with contemporaneous comparison groups. Equivalent assessment conditions, confidence intervals, effect sizes, and transparent missing-data reporting would strengthen interpretation. Component-level designs, interviews, and accessibility walkthroughs could distinguish the roles of interface adaptation, timing, feedback, and support. Cross-platform evaluations should use equivalent tasks and assessment criteria.

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