



## Exploring Pre-Service Teachers' Perceptions of Computer-Based Testing in a Curriculum and Instruction Course

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### ABSTRACT

This study aimed to examine student teachers' perceptions of the use of Computer-Based Testing (CBT) in the Curriculum and Instruction course. The study employed a descriptive quantitative design grounded in the Unified Theory of Acceptance and Use of Technology framework, focusing on five dimensions: performance expectancy, effort expectancy, social influence, facilitating conditions, and acceptance toward CBT. Data were collected through an online questionnaire administered to 152 student teachers at Universitas Pendidikan Indonesia who had completed the course and had prior experience with CBT. The instrument consisted of 31 valid and reliable items measured on a five-point Likert scale. The data were analyzed using descriptive statistics with the support of SPSS. The findings showed that all measured dimensions were in the high category, indicating that student teachers generally perceived CBT positively. Respondents considered CBT beneficial for improving assessment efficiency, objectivity, and feedback, while also viewing it as relatively easy to use. They further reported that social encouragement and institutional support contributed to their positive acceptance of CBT. These results suggest that CBT was not merely seen as a technical alternative to paper-based testing, but as a relevant and acceptable assessment method in teacher education. The study implies that the successful implementation of CBT in higher education depends on the interaction between perceived usefulness, ease of use, social support, and institutional readiness.

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### ARTICLE INFO

**Article History:**

Submitted/Received 05 Oct 2025

First Revised 25 Sep 2025

Accepted 25 Nov 2025

First Available Online 28 Nov 2025

Publication Date 01 Dec 2025

**Keyword:**

*Acceptance Toward CBT, Computer-Based Testing, Effort Expectancy, Performance Expectancy, Student Teachers, UTAUT.*



## 1. INTRODUCTION

The digital transformation of higher education in the twenty-first century has fundamentally reshaped the ways students learn, instructors teach, and institutions assess learning outcomes. This shift became particularly visible during the COVID-19 pandemic, when higher education institutions worldwide were compelled to adopt online and hybrid learning systems on a large scale. According to [Al-Banna \(2025\)](#), post-pandemic instructional practices have positioned digital technology as an integral component of higher education delivery. This transformation has also created a pressing need to innovate assessment systems, in which paper-based testing has increasingly been replaced by computer-based testing as a form of assessment that is more compatible with the digital learning ecosystem. Computer-based testing has emerged as an efficient and relevant alternative within this new educational paradigm because it simplifies examination administration, facilitates automated scoring, and enhances flexibility in the time and place of test implementation ([Öz & Özturan, 2018](#); [Suvorov & Hegelheimer, 2013](#)).

In the global context, the adoption of computer-based testing has become not only a response to efficiency demands but also part of a broader strategy toward more sustainable and environmentally responsible education. [Rajiha and Rini \(2023\)](#) argue that the implementation of computer-based testing in higher education reflects a green computing strategy aimed at reducing paper consumption while accelerating the collection, processing, and reporting of learning outcomes. Universities in many countries have gradually shifted from traditional assessment formats to computer-based systems because these systems are considered faster, more cost-effective, more accurate, and more capable of providing immediate feedback. This transition also reflects the readiness of higher education institutions to respond to post-pandemic digitalization, in which infrastructure readiness, digital literacy, and the adaptability of both lecturers and students are central to successful implementation ([Rullyana & Triandari, 2025](#); [Sholihah et al., 2025](#)).

However, the transition from paper-based testing to computer-based testing requires readiness that is not only technological but also pedagogical, particularly among student teachers who are expected to become future agents of educational change. In teacher education, student teachers are expected to understand, adapt to, and eventually implement technology-based assessment as part of their professional competence in the digital era. Yet such readiness remains challenged by a range of barriers. [Wulandari et al. \(2022\)](#) found that although computer-based testing is widely perceived as more efficient, environmentally friendly, and aligned with national curriculum demands, its implementation continues to face limitations related to infrastructure, including inadequate computer availability, limited laboratory capacity, and unstable internet connectivity.

Beyond technical barriers, student teachers may also develop negative perceptions of computer-based testing due to technological anxiety, including concerns about system errors, data loss, and the perceived reliability of automated scoring ([Bloom et al., 2018](#); [Brown, 2019](#)). This phenomenon suggests that psychological readiness is as important as technical competence in responding to computer-based assessment. As future educators who will shape the next generation of learners, student teachers need to develop reflective and adaptive capacities in relation to educational technology, including digital forms of assessment ([Susilana et al., 2024](#)). For this reason, teacher education institutions need to strengthen their support through digital literacy training, computer-based testing simulations, and repeated exposure to online assessment systems so that student teachers can integrate computer-based assessment more effectively and confidently into their future

professional practice (Wulandari et al., 2022).

At the same time, the implementation of computer-based testing in higher education has generally been shown to improve the efficiency and flexibility of student assessment. Khairuddin et al. (2023), reported that students tended to hold positive perceptions of computer-based language testing because it allowed them to complete examinations independently with relatively minimal internet requirements. The system was considered capable of expanding access and streamlining assessment processes, particularly during periods of distance learning. Nevertheless, the effectiveness of computer-based testing remains dependent on technological readiness and students' digital literacy. Technical challenges such as device compatibility, audio quality, and internet stability remain major constraints (Csapó et al., 2011; Zhang & Adipat, 2005).

To understand more deeply how students accept and use technologies such as computer-based testing, the Unified Theory of Acceptance and Use of Technology (UTAUT) provides a highly relevant analytical framework. Research by Sari et al. (2024) reports demonstrates that technology acceptance is strongly influenced by four main factors, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy refers to the belief that a technology will be useful, effort expectancy refers to the perceived ease of use, social influence refers to the degree of support from significant others, and facilitating conditions refer to the availability of resources and institutional support. Through an experimental study involving UTAUT-based promotional videos, Almaiah et al. (2022) showed that stronger perceptions of usefulness and social encouragement significantly increased individuals' intentions to use digital technology.

Although previous studies have examined the effectiveness, challenges, and user acceptance of computer-based testing in higher education, most have focused on general student populations or on contexts such as language assessment and entrance examinations. Relatively little attention has been given to student teachers' perceptions of computer-based testing, particularly in core courses such as Curriculum and Instruction, which are directly related to their future professional competence as educators.

This gap is important because understanding student teachers' perceptions and readiness is essential for ensuring the successful implementation of digital assessment in primary and secondary education in the future. It is this research gap that the present study seeks to address, with the expectation that the findings will contribute to both the theoretical and practical development of technology-based assessment in teacher education. Based on this background, this study aims to explore student teachers' perceptions of the use of computer-based testing in the Curriculum and Instruction course by using the Unified Theory of Acceptance and Use of Technology as the guiding analytical framework.

## 2. METHOD

### 2.1 Research Design

This study employed a descriptive quantitative design to examine student teachers' perceptions of the use of Computer-Based Testing (CBT) in the Curriculum and Instruction course. A descriptive quantitative approach was considered appropriate because the study aimed to describe systematically the tendencies of respondents' perceptions, attitudes, and levels of acceptance toward a technology-based assessment system based on measurable numerical data, rather than to test causal relationships among variables.

The study was grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003). The model explains technology acceptance

through four main constructs, namely Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. In this study, these four constructs were used to map student teachers' perceptions of CBT, and an additional construct, Acceptance Toward CBT, was included to capture respondents' overall acceptance of the assessment system.

## 2.2 Data Collection

The sample was selected using purposive sampling, as the study required respondents with specific characteristics relevant to the research focus. The inclusion criteria were: (1) active student teacher status, (2) completion of the Curriculum and Instruction course, and (3) prior experience in taking a CBT-based examination. Based on these criteria, 152 respondents were included in the main study. This number was considered adequate for descriptive statistical analysis.

Data were collected through a closed-ended questionnaire using a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. The questionnaire was distributed online through Google Forms to facilitate efficient data collection and provide respondents with flexible access. Online administration was also considered appropriate because it allowed broader reach and faster response management.

The instrument was developed based on the UTAUT framework and consisted of 31 items distributed across five dimensions: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Acceptance Toward CBT. The items were designed to capture respondents' perceptions of the usefulness of CBT, the ease of using it, the influence of the surrounding academic environment, the adequacy of supporting facilities, and their overall acceptance of CBT in pedagogical assessment contexts. Before the main data collection, the instrument was piloted with at least 30 respondents representing the target population in order to examine its validity and reliability and to improve item clarity where necessary.

**Table 3.1** Research Instrument

Code	Dimension	Statement
PE1	<b>Performance Expectancy (PE)</b>	The use of CBT helps me stay more focused during examinations.
PE2		CBT makes the evaluation process more objective than conventional paper-based tests.
PE3		Through CBT, I can demonstrate my understanding of <i>Curriculum and Instruction</i> more effectively.
PE4		CBT improves time efficiency during examinations.
PE5		CBT helps me achieve better learning outcomes.
PE6		CBT increases my confidence when taking examinations.
PE7		I believe CBT accelerates feedback on learning outcomes.
EE1	<b>Effort Expectancy (EE)</b>	I find it easy to understand the instructions for CBT implementation.
EE2		CBT is easy to use without assistance from others.
EE3		The navigation and test interface in CBT are easy to understand.
EE4		I do not experience technical difficulties when using CBT.
EE5		I do not need special skills to take a CBT-based examination.
EE6		CBT does not require a long time to learn.
EE7		I feel confident using CBT even without special training.

Code	Dimension	Statement
SI1	<b>Social Influence (SI)</b>	My lecturers encourage the use of CBT in course assessment.
SI2		My peers have positive views toward CBT.
SI3		My academic environment supports the use of CBT.
SI4		I feel encouraged to take CBT because many other students use it.
SI5		CBT is considered a new standard in assessment in my faculty.
FC1	<b>Facilitating Conditions (FC)</b>	I have adequate access to devices (laptop/gadget) to take CBT.
FC2		My internet connection is generally stable when taking CBT.
FC3		I receive technical support when I experience difficulties during CBT.
FC4		Guidelines or training related to CBT are available and easily accessible.
FC5		Campus facilities and infrastructure support the implementation of CBT.
FC6		CBT is conducted through a system that is free from major technical disruptions.
AT1	<b>Acceptance Toward CBT (AT)</b>	I feel comfortable using CBT for examinations.
AT2		I am willing to take CBT again in the future.
AT3		I prefer CBT to conventional paper-based examinations.
AT4		CBT is appropriate for permanent implementation in the <i>Curriculum and Instruction</i> course.
AT5		CBT is a suitable assessment method for student teachers.

The instrument was tested for validity and reliability before the main survey. The validity test showed that all 31 items had *r*-calculated values greater than the *r*-table value of 0.133, indicating that each item was capable of measuring the intended construct appropriately. Therefore, all items were considered valid and retained for the main study. The reliability test produced a Cronbach's Alpha coefficient of 0.96, which was substantially above the minimum acceptable threshold of 0.70. This result indicates that the instrument had very high internal consistency and was therefore reliable for measuring student teachers' perceptions of CBT.

### 2.3 Data Analysis

The data were analyzed using descriptive statistics with the support of SPSS version 26. The analysis focused on calculating the mean, standard deviation, and percentage distribution for each dimension in order to describe respondents' general perceptions of CBT. The mean score was used to identify the overall tendency of student teachers' perceptions, while the standard deviation was used to indicate the variability of responses.

This descriptive analysis was intended to provide an objective picture of how student teachers perceived CBT in relation to usefulness, ease of use, social support, facilitating conditions, and overall acceptance. The findings from these analyses served as the basis for drawing conclusions regarding the level of student teachers' acceptance of computer-based assessment in the *Curriculum and Instruction* course.

### 3. RESULT AND DISCUSSION

#### 3.1 Result

This study involved 152 student teachers from various study programs at Universitas Pendidikan Indonesia who had completed the Curriculum and Instruction course and had prior experience with Computer-Based Testing (CBT). Based on the demographic data, the respondents were predominantly female, accounting for 67.1% of the sample, while male respondents represented 32.9%. This distribution reflects the general composition of teacher education programs, which are commonly characterized by a higher proportion of female students.

In terms of academic level, the respondents were mostly drawn from the middle stages of undergraduate study. The largest group came from Semester 5, followed by Semester 7, Semester 3, Semester 1, and a very small number from Semester 8. This distribution suggests that the sample was largely composed of students who had already accumulated sufficient academic experience and were therefore in a relevant position to evaluate the use of CBT in a pedagogical course context.

The descriptive statistics indicate that all five dimensions examined in this study were rated in the high category, suggesting an overall positive perception of CBT among student teachers. The highest mean score was found in Effort Expectancy, indicating that respondents generally perceived CBT as relatively easy to understand and operate. The remaining dimensions, namely Performance Expectancy, Social Influence, Facilitating Conditions, and Acceptance, also showed similarly high mean values, which suggests that respondents not only recognized the benefits of CBT but also tended to perceive the surrounding conditions and their own level of acceptance positively.

**Table 2.** Descriptive Statistics

<b>Descriptive Statistics</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Category</b>	<b>Std. Dev</b>
Performance Expectancy	152	11.00	35.00	3.8	High	4.638
Effort Expectancy	152	10.00	35.00	3.9	High	5.062
Social Influence	152	8.00	25.00	3.8	High	3.703
Facilitating Conditions	152	10.00	35.00	3.8	High	5.470
Acceptance	152	7.00	25.00	3.8	High	3.808

The consistently high mean scores across all dimensions indicate that respondents tended to perceive CBT as useful, manageable, socially supported, and acceptable within the context of the Curriculum and Instruction course. Although the overall pattern was positive, the standard deviation values reveal some degree of variation in student responses. Facilitating Conditions showed the largest standard deviation, indicating that respondents varied more noticeably in their perceptions of the availability of devices, internet stability, technical support, and institutional readiness. This suggests that while many students perceived the supporting infrastructure positively, access to these supporting conditions may not have been experienced equally by all respondents.

By contrast, Social Influence showed the smallest standard deviation, suggesting that perceptions related to lecturer encouragement, peer attitudes, and the broader academic environment were relatively more homogeneous. This pattern indicates that respondents tended to share a similar view that the use of CBT was supported by their learning environment. In practical terms, this result suggests that the social climate surrounding CBT

implementation was generally favorable and did not differ substantially across respondents.

A similar pattern can be observed in Performance Expectancy and Acceptance, both of which were also rated highly. This indicates that respondents generally believed that CBT could contribute positively to the assessment process and that they were inclined to accept its continued use. In addition, the relatively high score for Effort Expectancy suggests that ease of use was one of the strongest positive aspects perceived by the respondents. Taken together, these findings provide an initial indication that student teachers viewed CBT as a credible and favorable assessment approach, supported not only by perceived usefulness and usability but also by relatively strong acceptance and a supportive academic context.

Overall, the descriptive results suggest that student teachers' perceptions of CBT were broadly positive across the dimensions measured in this study. The findings show that CBT was not merely viewed as a technical replacement for conventional testing, but as an assessment mode that was perceived as beneficial, manageable, and increasingly accepted in higher education settings. At the same time, the variation found in facilitating conditions indicates that institutional and technical readiness remain important aspects to consider in future implementation.

### 3.2 Discussion

The findings indicate that student teachers perceived Computer-Based Testing (CBT) as a beneficial and pedagogically meaningful assessment system. Their responses suggest that CBT was not viewed merely as a technical substitute for conventional paper-based examinations, but as a form of digital assessment capable of supporting concentration during examinations, improving objectivity, accelerating feedback, enhancing time efficiency, and strengthening confidence in completing evaluative tasks. In the context of the Curriculum and Instruction course, this perception is particularly important because assessment is closely linked to students' understanding of instructional planning, evaluation principles, and pedagogical accountability. Accordingly, CBT appears to have been understood not only as an assessment delivery system but also as a relevant instrument for modern pedagogical practice.

This interpretation is consistent with the UTAUT perspective, which emphasizes that users are more likely to accept a technology when they believe that it improves their performance and supports their goals. In this case, the perceived usefulness of CBT appears to have encouraged student teachers to regard it as functionally appropriate for academic assessment. This finding is in line with [Aslinda et al. \(2025\)](#), who reported that performance expectancy contributed positively to satisfaction and intention to use educational technology in Indonesian higher education. The present study therefore suggests that the successful adoption of CBT in teacher education depends not only on its operational efficiency, but also on the extent to which student teachers recognize its pedagogical value and relevance to professional assessment practices.

Among the dimensions examined, effort expectancy emerged as the strongest positive perception, indicating that respondents generally regarded CBT as easy to understand and use. The platform was perceived as requiring no advanced technical expertise, and its interface, navigation, and instructions were considered sufficiently clear to enable students to focus on the substance of the examination rather than on operational difficulties. This finding is important because ease of use is often decisive in the early stages of technology adoption, especially when users are still forming their attitudes toward a new system ([Acosta-Enriquez et al., 2024](#); [Koç et al., 2016](#)).

From a technology acceptance perspective, a high level of effort expectancy suggests that CBT had reached an acceptable threshold of usability. In practical terms, this means that resistance to adoption was likely reduced because student teachers did not perceive the system as intimidating or unnecessarily complicated. Such a condition is particularly relevant in teacher education, where digital assessment tools should function as supportive technologies rather than additional sources of cognitive burden. This interpretation supports the view of [bin Wan Sulaiman \(2020\)](#), who argued that usability plays a crucial role in minimizing barriers to educational technology adoption. It also aligns with [Hendrawan and Wahyuni \(2023\)](#), who found that CBT reduced test-related anxiety when the system offered clear navigation and a familiar interface. In this study, the positive perception of ease of use suggests that CBT was experienced as an accessible technology that facilitated rather than disrupted the assessment process.

The findings also show that student teachers' acceptance of CBT was shaped by social influence, particularly through lecturer encouragement, peer attitudes, and the broader academic environment. This suggests that the adoption of CBT was not interpreted solely as an individual technological choice, but as something influenced by shared norms, institutional expectations, and collective academic culture. In other words, the perception of CBT was socially embedded. Student teachers appeared more willing to accept digital assessment when it was reinforced by their lecturers, normalized by peers, and positioned as part of an academically supported practice ([Mei et al., 2019](#)).

This result is consistent with the UTAUT assumption that social influence becomes especially relevant when technology use is introduced within formal institutions, where authority figures and peer communities shape legitimacy and acceptance. The present findings support [Rullyana et al. \(2024\)](#), who emphasized that institutional innovation culture is a strong determinant of technology adoption. In the context of teacher education, this point is particularly significant because student teachers do not adopt assessment technologies in isolation. Their acceptance is strengthened when lecturers act as pedagogical role models who frame CBT not merely as an administrative requirement, but as an appropriate and credible assessment strategy. Without such pedagogical reinforcement, the influence of social support may weaken over time and reduce long-term acceptance ([Gravin et al., 2016](#); [Lam, 2018](#)).

The positive perception of facilitating conditions suggests that respondents generally believed that the infrastructure supporting CBT was sufficiently available. Access to devices, internet connectivity, technical assistance, and institutional support appear to have contributed to a favorable experience of digital assessment. This dimension is crucial because it represents the structural side of technology adoption. While performance expectancy and effort expectancy are more perception-based, facilitating conditions reflect whether the environment enables actual use in a stable and manageable way.

Within the UTAUT framework, facilitating conditions are assumed to influence actual use behavior directly. The findings of this study confirm that the acceptance of CBT cannot be explained by attitude alone; it also depends on whether users experience the surrounding system as supportive and reliable. This interpretation is in line with [Rochmatillah et al. \(2025\)](#), who argued that technological adoption is sustained when institutional conditions reduce practical barriers to use. In the present study, the generally favorable view of facilitating conditions suggests that student teachers did not perceive CBT implementation as structurally fragile or inaccessible. This is important because the sustainability of digital assessment in higher education ultimately depends on the consistency of infrastructural

support, not only on positive user perceptions.

The findings further indicate that student teachers demonstrated a positive level of acceptance toward CBT. This means that respondents did not simply tolerate CBT as a temporary or pragmatic solution, but appeared willing to regard it as an appropriate and sustainable form of assessment, including in pedagogical courses. Such acceptance is significant because it reflects the cumulative influence of the other UTAUT dimensions. When students perceive a system as useful, easy to use, socially supported, and institutionally facilitated, they are more likely to develop stable acceptance toward its continued use.

This pattern is consistent with [Aprianto \(2022\)](#), who noted that technology acceptance is shaped by the interaction of perceived utility, ease of use, and contextual support. In the present study, acceptance of CBT also carries an important professional implication. Because the respondents were student teachers, their positive experience with CBT may influence how they perceive assessment technology in their future role as educators. In this sense, CBT is not only an assessment tool used in higher education, but also a formative experience that may shape future teachers' readiness to adopt digital assessment practices in schools. The findings therefore suggest that teacher education programs can use CBT not only to improve assessment delivery in university courses, but also to cultivate future teachers' confidence in educational technology adoption.

From a theoretical perspective, this study reinforces the relevance of the Unified Theory of Acceptance and Use of Technology (UTAUT) in explaining student teachers' perceptions of digital assessment in higher education. The positive pattern across all core dimensions confirms that the UTAUT model remains applicable in pedagogical contexts, particularly when the technology under study is closely related to future professional competence. These findings support [Venkatesh et al. \(2003\)](#), who proposed that acceptance is influenced by perceived usefulness, ease of use, social pressure, and facilitating conditions. More specifically, the present study extends that logic into the context of teacher education by showing that student teachers evaluate CBT not only as users of a digital system, but also as future educators who may later implement similar forms of technology-based assessment in their own classrooms.

This study also contributes to the literature by positioning CBT within a pedagogical rather than purely technical frame. Performance expectancy in this context is not simply about convenience, but about whether CBT supports fair, efficient, and educationally meaningful evaluation. Effort expectancy is not only about interface simplicity, but about whether the system reduces anxiety and allows students to focus on demonstrating competence. Social influence reflects the role of lecturers and academic culture in legitimizing digital assessment, while facilitating conditions emphasize that technological adoption is inseparable from institutional readiness. In this regard, the findings support, who each emphasize the importance of usability, academic culture, and institutional support in shaping educational technology acceptance ([Chuenyindee et al., 2023](#); [Dalle et al., 2024](#); [Revythi & Tselios, 2019](#)).

From a practical perspective, the study offers several implications for lecturers, teacher education institutions, curriculum developers, and policy makers. For lecturers teaching Curriculum and Instruction, the findings highlight the importance of introducing CBT through pedagogically meaningful implementation rather than merely using it as an administrative testing platform. Student teachers need opportunities to experience CBT as part of an assessment design that is transparent, objective, and aligned with course learning outcomes. In this respect, lecturers play a central role in framing CBT as a legitimate instructional tool through orientation, simulation, and repeated use. This point is supported by [Mirke et al.](#)

(2019), who found that positive experiences with digital assessment contribute to student teachers' professional readiness.

For teacher education institutions, the findings stress the importance of strengthening facilitating conditions through adequate infrastructure, stable connectivity, and accessible technical support. Positive perceptions of support conditions indicate that institutional readiness directly affects students' comfort and willingness to use CBT. This supports Duraku et al. (2025), who recommended the development of a sustainable roadmap for CBT implementation in higher education. At the curriculum level, the integration of CBT into pedagogical courses may also serve as an opportunity to familiarize student teachers with contemporary assessment practices that emphasize efficiency, accountability, and digital competence. In this way, CBT functions not only as an assessment medium, but also as a professional learning experience.

Finally, from a policy perspective, the findings provide empirical support for strengthening digital examination policies within teacher education institutions. The successful implementation of CBT appears to require synergy among lecturers, institutional systems, curriculum planning, and policy support. When these elements work together, digital assessment can move beyond technical innovation and become a meaningful part of teacher preparation in the era of educational digitalization. Overall, this study suggests that CBT has strong potential to enhance the quality of assessment in higher education while simultaneously preparing student teachers for the digital demands of future professional practice.

#### 4. CONCLUSION

This study found that student teachers generally perceived Computer-Based Testing (CBT) positively in the Curriculum and Instruction course. The results indicate that CBT was viewed as useful, relatively easy to use, socially supported, and institutionally facilitated. These perceptions suggest that CBT was not understood merely as a technical replacement for paper-based examinations, but as a relevant and acceptable form of digital assessment within teacher education. The findings also confirm the relevance of the UTAUT framework in explaining student teachers' acceptance of assessment technology in a pedagogical context.

From a practical perspective, the study implies that the successful implementation of CBT in teacher education depends on the interaction between perceived usefulness, usability, social encouragement, and institutional readiness. Positive experiences with CBT may also contribute to shaping student teachers' readiness to adopt digital assessment practices in their future professional work. For this reason, teacher education institutions should continue strengthening digital assessment through adequate infrastructure, clear implementation guidelines, and pedagogically meaningful integration of CBT into coursework, so that it functions not only as an efficient assessment tool but also as part of preparing future teachers for technology-rich educational environments.

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