

User Acceptance of a Web-Based Anti-Cheating Online Examination System Using the Technology Acceptance Model

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Abstract: This study evaluated user acceptance of a web-based anti-cheating online examination system implemented in the Informatics Engineering Education Study Program. The system had been designed to support orderly and objective examinations through user authentication, online question delivery, answer storage, activity logging, and restrictions on selected browser interactions. A quantitative explanatory survey was conducted with 18 users selected through total sampling after they had directly used the system. Data were collected using a 20-item questionnaire representing perceived ease of use, perceived usefulness, attitude toward using, behavioral intention to use, and actual system use. Descriptive analysis and partial least squares structural equation modeling were performed using SmartPLS. The descriptive results showed that perceived ease of use achieved the highest respondent achievement level at 87.22%, followed by attitude toward using at 81.39%, actual system use at 80.28%, perceived usefulness at 79.44%, and behavioral intention at 78.61%. All six hypothesized relationships were positive and significant. Behavioral intention had the strongest effect on actual system use ($\beta = 0.919$, $p < 0.001$), while perceived ease of use significantly affected perceived usefulness ($\beta = 0.714$, $p < 0.001$). The findings demonstrated that the system was accepted positively and that ease, usefulness, and user attitudes were important determinants of continued use. Improvements should prioritize web responsiveness, network-failure tolerance, and automatic answer saving.

Keywords: anti-cheating examination; online examination; PLS-SEM; Technology Acceptance Model; user acceptance.

1. Introduction

The rapid development of information technology has transformed educational assessment. Online examinations enable institutions to distribute questions, collect answers, calculate scores, and archive results more efficiently than paper-based procedures. Web delivery also reduces installation requirements and permits centralized maintenance. Nevertheless, online assessment creates technical and ethical challenges, including unstable connectivity, answer loss, unauthorized access to external resources,

communication among participants, and the use of additional devices during examinations.

Academic cheating weakens the validity of assessment because obtained scores may not represent the actual competence of learners. Anti-cheating systems address this issue through mechanisms such as full-screen mode, tab-switch detection, restrictions on copying and selected keyboard shortcuts, randomized questions, controlled examination sessions, and activity logs. These mechanisms can improve examination control, but they may also increase user burden when the interface is difficult, the rules are unclear, or the system is intolerant of network disruptions. Therefore, successful implementation cannot be assessed solely from technical functionality.

User acceptance is a critical indicator of whether a technology will be used continuously. The Technology Acceptance Model (TAM) explains technology use through perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATU), behavioral intention to use (BI), and actual system use (AU) [1]. PEOU reflects the belief that a system can be operated without excessive effort, while PU reflects the belief that the system improves performance. These beliefs shape attitude and intention, which subsequently influence actual use. TAM has been applied to academic information systems, mobile academic applications, and digital learning services [2]-[6].

Previous studies generally reported that ease and usefulness were important predictors of technology acceptance. However, most studies focused on academic information systems or learning applications rather than examination platforms with anti-cheating restrictions. Such restrictions create a distinct context because they simultaneously support academic integrity and potentially affect comfort, autonomy, and trust. The novelty of this study lies in applying the complete five-construct TAM to a web-based anti-cheating online examination system and interpreting the results as an engineering evaluation of a deployed educational technology product.

This study aimed to determine the level of user acceptance and test six structural relationships: PEOU to PU, PEOU to ATU, PU to ATU, PU to BI, ATU to BI, and BI to AU. The results were expected to provide evidence-based recommendations for improving system responsiveness, reliability, usability, and continued implementation.

2. Material and methods

2.1 Research design and participants

This study used a quantitative survey with an explanatory and cross-sectional design. The object was a web-based anti-cheating online examination system used in the Informatics Engineering Education Study Program. The system included authentication, timed examination sessions, online question presentation, answer recording, activity monitoring, and browser-interaction restrictions.

The accessible population consisted of system users who had completed an online examination. Eighteen users met the inclusion criteria and were included through total sampling. The criteria required respondents to have used the

system, completed the examination process, understood its basic functions, and submitted a complete questionnaire. Seventeen respondents (94.44%) had participated in online examinations more than twice, indicating adequate experience for system evaluation.

2.2 Instrument and data collection

Data were collected after system use through a 20-item questionnaire. Each TAM construct was represented by four reflective indicators. PEOU measured ease of learning, navigation clarity, operability, and flexibility. PU measured efficiency, orderly examination implementation, support for academic honesty, and improvement of evaluation quality. ATU measured comfort, acceptance, enjoyment, and positive evaluation. BI measured willingness to reuse, continued use, preference, and recommendation. AU measured frequency, involvement, consistency, and use according to purpose.

Each item used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Supporting documentation was used to describe user characteristics, devices, internet access, and examination experience. Data preparation included editing, coding, entry, and cleaning.

2.3 Data analysis

Descriptive analysis summarized respondent characteristics and calculated the respondent achievement level (RAL) using the mean score divided by the maximum score and multiplied by 100%. Scores of 81-100% were interpreted as very good, 61-80% as good, 41-60% as moderate, 21-40% as poor, and 20% or below as very poor.

PLS-SEM analysis was conducted using SmartPLS because the model contained several latent constructs and the sample was limited [7], [8]. The measurement model was evaluated using outer loading, average variance extracted (AVE), cross loading, Cronbach's alpha, rho_A, and composite reliability. Indicators were considered acceptable when outer loading was at least 0.50, AVE was at least 0.50, and reliability coefficients exceeded 0.70. The structural model was evaluated using variance inflation factor (VIF), coefficient of determination (R^2), path coefficients, t-statistics, and p-values. Hypotheses were supported when the path direction was positive, $t \geq 1.96$, and $p \leq 0.05$ [8], [9].

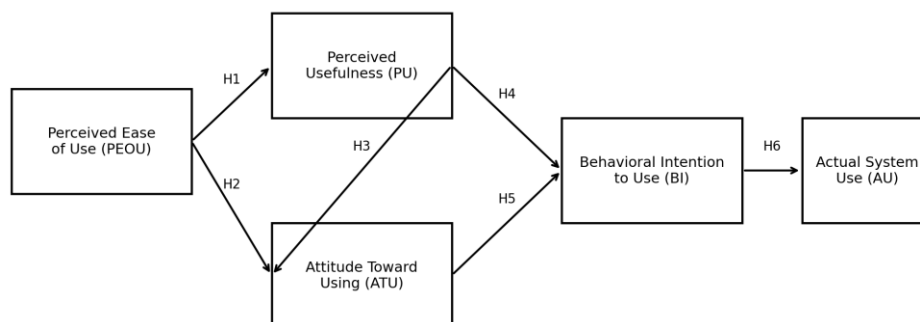


Figure 1. Proposed Technology Acceptance Model for the anti-cheating online examination system.

3. Results and discussion

3.1 Respondent characteristics

The respondents consisted of 10 men (55.56%) and eight women (44.44%). Computer or laptop access was reported by 17 respondents (94.44%), smartphone access by 16 respondents (88.89%), and tablet access by two respondents (11.11%). All respondents used campus Wi-Fi, while 11 also used private Wi-Fi and 10 used mobile data. These results indicated that the system was mainly accessed through computers or laptops and that campus network quality was essential to the examination experience.

3.2 Descriptive acceptance results

Table 1 presents the descriptive scores for the five TAM constructs. PEOU obtained the highest RAL and was categorized as very good. ATU was also very good, whereas PU, BI, and AU were categorized as good.

Table 1. Descriptive results of user acceptance constructs.

Construct	Mean	RAL (%)	Category
Perceived Ease of Use	4.36	87.22	Very good
Perceived Usefulness	3.97	79.44	Good
Attitude Toward Using	4.07	81.39	Very good
Behavioral Intention to Use	3.93	78.61	Good
Actual System Use	4.01	80.28	Good

The high PEOU score indicated that users found the system easy to learn and operate. However, BI and PU produced the lowest achievement levels. Although both remained in the good category, this pattern suggested that users required stronger evidence of long-term benefits and greater confidence in continued use. User comments particularly emphasized web responsiveness, connection tolerance, and automatic saving. These engineering issues can directly influence usefulness because a system may be easy to navigate but still be considered less beneficial if it cannot protect answers during network disruptions.

3.3 Measurement model evaluation

All 20 indicators had outer loading values above 0.50, ranging from 0.893 to 0.963. The AVE values ranged from 0.838 to 0.895, confirming convergent validity. Cross-loading analysis showed that every indicator loaded more strongly on its intended construct than on other constructs. Table 2 summarizes the reliability and convergent validity results.

Table 2. Reliability and convergent validity of the constructs.

Construct	Cronbach's α	rho_A	Composite reliability	AVE
PEOU	0.936	0.949	0.954	0.838

Construct	Cronbach's α	rho_A	Composite reliability	AVE
PU	0.936	0.938	0.954	0.838
ATU	0.944	0.945	0.960	0.857
BI	0.961	0.963	0.972	0.895
AU	0.960	0.961	0.971	0.892

All constructs exceeded the minimum reliability threshold. Composite reliability values above 0.95 indicated very high internal consistency, but such values may also signal item similarity. Future instrument refinement should therefore examine whether some statements are redundant while retaining adequate construct coverage [8].

3.4 Structural model and hypothesis testing

VIF values ranged from 1.000 to 2.899, indicating no critical multicollinearity. The model explained 51.0% of PU, 79.8% of ATU, 80.5% of BI, and 84.5% of AU. Thus, the explanatory power was moderate for PU and strong for the remaining endogenous constructs.

Table 3. Coefficient of determination for endogenous constructs.

Endogenous construct	R ²	Adjusted R ²
Perceived Usefulness	0.510	0.479
Attitude Toward Using	0.798	0.772
Behavioral Intention to Use	0.805	0.779
Actual System Use	0.845	0.835

Table 4. Path coefficients and hypothesis decisions.

Hypothesis	Path	β	t-statistic	p-value	Decision
H1	PEOU $\rightarrow$ PU	0.714	8.219	<0.001	Supported
H2	PEOU $\rightarrow$ ATU	0.541	3.387	0.001	Supported
H3	PU $\rightarrow$ ATU	0.423	2.430	0.015	Supported
H4	PU $\rightarrow$ BI	0.551	3.186	0.001	Supported
H5	ATU $\rightarrow$ BI	0.391	2.251	0.024	Supported
H6	BI $\rightarrow$ AU	0.919	26.931	<0.001	Supported

PEOU significantly affected PU, demonstrating that users perceived greater benefits when the system was easy to understand and operate. In an examination context, clear navigation, accessible instructions, and predictable controls allow users to focus on answering questions rather than managing the interface. This result was consistent with TAM theory [1] and with studies on educational and academic applications [3], [5].

PEOU and PU both significantly affected ATU. Ease reduced user effort and anxiety, while usefulness created a positive evaluation of the system as a tool for orderly and honest examinations. Anti-cheating restrictions are more likely

to be accepted when their purposes are clear and when they do not interfere with legitimate examination activities. This finding reinforces the need to design monitoring features as transparent and proportionate controls rather than punitive barriers.

PU had a stronger effect on BI than ATU did. Users were more willing to continue using the system when they believed that it improved examination effectiveness, fairness, and documentation. This result suggests that continued use should be encouraged by demonstrating practical benefits, such as reliable answer storage, timely feedback, and trustworthy activity logs, rather than relying only on institutional obligation.

BI produced the strongest coefficient in the model and explained a substantial portion of AU. This result confirmed that willingness to use the system was translated into actual use. Similar relationships have been reported in academic information system studies [4], [6]. Nevertheless, actual use in institutional settings can also be influenced by examination schedules, infrastructure, and mandatory policies. The high R^2 for AU should therefore be interpreted in relation to the system's operational context.

From an engineering perspective, the findings indicate that functional completion is not sufficient. User acceptance must be incorporated into the system lifecycle as a post-implementation evaluation. The lower relative scores for usefulness and intention, together with user suggestions, point to three priorities: responsive page loading, tolerance for intermittent connections, and automatic answer saving. These improvements would reduce the risk of answer loss and strengthen perceived reliability, usefulness, and continued use.

4. Conclusion

The web-based anti-cheating online examination system was positively accepted by users. Perceived ease of use and attitude toward using were rated very good, while perceived usefulness, behavioral intention, and actual use were rated good. All proposed TAM relationships were supported, and behavioral intention was the strongest predictor of actual system use. The results showed that ease of operation, perceived benefits, and positive attitudes were essential for sustaining the implementation of anti-cheating examination technology. The system can be applied as an engineering solution to support more orderly, traceable, and objective examinations, provided that monitoring features remain transparent and technically reliable. Future development should strengthen responsive performance, automatic answer saving, connection recovery, and user guidance. Further studies should involve larger and more diverse samples, compare alternative acceptance models, and examine additional variables such as system quality, trust, perceived fairness, and facilitating conditions.

Author's declaration

Author contribution

Dedy Irfan was responsible for the conceptualization, research design, system evaluation, data collection, data analysis, interpretation, and preparation of the manuscript.

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Competing interest

The author declares no competing interest.

Ethical clearance

Participation was voluntary, respondent identities were not disclosed, and collected data were used only for academic research and system evaluation. The study did not involve invasive procedures or animal subjects.

AI statement

The author is responsible for the accuracy, originality, interpretation, and final approval of the manuscript. Any language-support or digital writing tools used during manuscript preparation were reviewed and verified by the author.

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References

- [1] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319-340, 1989, doi: 10.2307/249008.
- [2] Y. Akbar and Y. Bachtar, "Analisis penerimaan pengguna aplikasi Kipin School menggunakan metode Technology Acceptance Model (TAM)," *Jurnal Indonesia: Manajemen Informatika dan Komunikasi*, vol. 5, no. 3, pp. 2827-2839, 2024, doi: 10.35870/jmik.v5i3.1013.
- [3] E. Ernawati et al., "Evaluasi penerimaan mahasiswa terhadap aplikasi akademik mobile dengan pendekatan Technology Acceptance Model (TAM)," *INTI Nusa Mandiri*, vol. 20, no. 1, pp. 65-74, 2025, doi: 10.33480/inti.v20i1.6898.
- [4] Marhaeni and K. Atmadja, "Analisis penerimaan Sistem Informasi Akademik Kampus ISTN dengan pendekatan Technology Acceptance Model (TAM)," *Jurnal Manajemen Informatika Jayakarta*, vol. 5, no. 1, pp. 32-40, 2025, doi: 10.52362/jmijayakarta.v5i1.1747.
- [5] M. Medianty et al., "Analisis Perceived Ease of Use dan Perceived Usefulness terhadap Actual System Use aplikasi SAKTI," *MANDAR: Management Development and Applied Research Journal*, vol. 7, no. 1, pp. 65-76, 2024, doi: 10.31605/mandar.v7i1.4431.
- [6] M. Mulyani et al., "Analisis penerimaan Sistem Informasi Akademik Mahasiswa Institut Teknologi Garut menggunakan Technology Acceptance Model," 2022.
- [7] J. F. Hair, G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, and S. Ray, *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Cham: Springer, 2021, doi: 10.1007/978-3-030-80519-7.

- [8] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 3rd ed. Thousand Oaks, CA: Sage, 2022.
- [9] M. Sarstedt, C. M. Ringle, and J. F. Hair, "Partial least squares structural equation modeling," in Handbook of Market Research, C. Homburg, M. Klarmann, and A. Vomberg, Eds. Cham: Springer, 2022, pp. 587-632, doi: 10.1007/978-3-319-57413-4_15.
- [10] Sugiyono, Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta, 2023.
- [11] V. Venkatesh and F. D. Davis, "A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies," Management Science, vol. 46, no. 2, pp. 186-204, 2000.
- [12] E. Effendi et al., "Analisis Technology Acceptance Model (TAM) aplikasi SISSMART sebagai media pembelajaran pada SMA Adabiyah Palembang," 2021.
- [13] R. Novita and F. Helena, "Analisis penerimaan pengguna menggunakan Technology Acceptance Model dan End-User Computing Satisfaction," 2021.
- [14] Ambiya and Taufiq, "Analisis penerimaan mahasiswa terhadap Sistem Informasi Akademik UMTAS dengan Technology Acceptance Model," 2022.
- [15] Kardianto and Slamet, "Analisis penerimaan Sistem Informasi Akademik dan Kemahasiswaan Fakultas Teknik Universitas Negeri Padang menggunakan Technology Acceptance Model," 2024.