WISE Pendidikan Indonesia

DIGITAL LEARNING, SOCIAL SCIENCE, AND LIFE-COURSE STUDIES
VOL. 2 NO. 1 (2026)

ISSN: 3109-8096

Safe Exam Browser (SEB) in Digital Examinations: Supporting Students' Academic Integrity in Secondary Education

Suwidiyanti*, Silwana Mumthaza, Burhan Rahmat Auladi, and Alful Musrifah

To cite this article. Suwidiyanti, S. Mumthaza, B. R. Auladi, and A. Musrifah, "Safe Exam Browser (SEB) in Digital Examinations: Supporting Students' Academic Integrity in Secondary Education," *Dig. Soc. Life.*, vol. 2, no. 1, pp. 14–27, 2026. **DOI**: https://doi.org/10.70211/disolife.v2i1.736

To link to this article:

Published online: 30 June 2025

Submit an article to this journal

View crossmark data

OPEN ACCESS

https://doi.org/10.70211/disolife.v2i1.736

Digital Learning, Social Science, and Life-course Studies Vol 2 No 1 (2026)

Research Article

Safe Exam Browser (SEB) in Digital Examinations: Supporting Students' Academic Integrity in Secondary Education

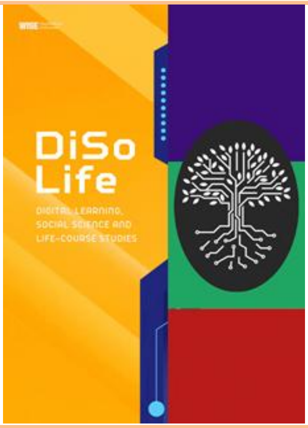
Suwidiyanti*, Silwana Mumthaza, Burhan Rahmat Auladi, and Alful Musrifah

Received: 18 March 2025	Revised: 25 May 2025	Accepted: 27 June 2025	Online: 30 June 2025

Abstract

Digital examinations improve efficiency and accessibility, but maintaining fairness and academic integrity remains challenging. This study examined the association between students' perceptions of Safe Exam Browser (SEB) implementation and their self-reported academic integrity, as well as the challenges encountered during SEB-based examinations in secondary education. A quantitative correlational survey was conducted with 136 Grade 10 students at SMA Muhammadiyah 2 Sidoarjo. A 15-item, four-point Likert-type questionnaire assessed perceived SEB implementation, examination-related academic integrity, and implementation challenges. Data were analyzed using descriptive statistics, internal consistency analysis, residual normality and linearity tests, and simple linear regression. The overall mean was 2.592 for SEB implementation and 3.243 for academic integrity. Regression analysis indicated a significant positive association ($R = .589$, $R^2 = .347$, $p < .001$), with perceived SEB implementation accounting for 34.7% of the variance in academic integrity. Internet connectivity ($n = 99$; 72.79%) and technical application issues ($n = 88$; 64.71%) were the most frequently reported challenges. These findings indicate that SEB can support controlled examination conditions when paired with adequate infrastructure, technical preparation, supervision, and sustained academic integrity education. Because this single-school study used a nonexperimental, self-report design, its findings should be interpreted as associative rather than causal.

Keywords: Safe Exam Browser; academic integrity; digital assessment; online examination; secondary education



INTRODUCTION

Digital transformation has expanded the role of technology-supported assessment from a logistical alternative into a core element of contemporary educational practice. Recent studies show that technology-based examinations can improve administrative efficiency, enable flexible assessment delivery, and support more systematic use of assessment information, although successful implementation depends on user acceptance, digital competence, usability, and institutional readiness [1], [2], [3], [4], [5]. These considerations are particularly important when digital examinations are used for consequential decisions, because technical functionality must be accompanied by valid assessment design and an acceptable experience for students and educators.

The quality of an online examination cannot, therefore, be reduced to whether the platform operates successfully. Research on online assessment design emphasizes the need to balance academic integrity, feedback quality, accessibility, fairness, authenticity, information security, and the student experience [6], [7], [8]. Restrictions imposed during an examination also shape what the assessment actually measures; consequently, decisions about closed-book, open-book, monitored, or digitally restricted conditions should be aligned with the intended learning outcomes rather than selected only for administrative convenience [6], [7].

Academic integrity remains one of the most persistent concerns in digital examinations. Large-scale and review evidence indicates that online examination cheating is influenced by opportunity, assessment conditions, student motivations, perceived peer behavior, and the credibility of deterrence mechanisms [9], [10], [11]. Digital proctoring has consequently expanded as an integrity-control strategy, but systematic evidence shows that no single surveillance or restriction mechanism eliminates misconduct [12]. Experimental work further suggests that less intrusive interventions can reduce cheating when they clearly communicate expectations and the likelihood of detection, indicating that integrity protection can be designed as a layered rather than purely surveillance-based process [13].

At the same time, integrity technologies create educational and ethical trade-offs. Studies of the rapid transition to online examinations reported concerns about fairness, changing definitions of misconduct, student anxiety, institutional preparedness, and the need to redesign assessment rather than merely reproduce face-to-face examinations online [14], [15], [16]. Research on cheating behavior and institutional responses similarly shows that prevention is more effective when technological controls are combined with clear expectations, supportive academic-integrity strategies, and attention to the reasons students engage in misconduct [17], [18].

Academic integrity should also be understood as more than compliance with examination rules. Recent scholarship describes integrity as a multidimensional educational and ethical practice shaped by students' understanding of acceptable conduct, institutional norms, learning culture, and opportunities for ethical participation [19], [20], [21], [22], [23]. This perspective is relevant to secure digital examinations because a student may comply with restrictions imposed by technology without necessarily internalizing honesty, responsibility, fairness, and independent academic practice. A secure examination environment can therefore support integrity-related behavior, but it should not be treated as a substitute for integrity education.

This distinction is especially important in secondary education. Evidence indicates that many students enter higher education with uneven prior exposure to academic-integrity literacy during their K-12 years [24]. A recent international study of K-12 schools likewise identified substantial variation in academic-integrity policies and instruction and emphasized the need for earlier, systematic integrity education in school settings [25]. These findings suggest that research at the secondary-school level should examine both the technological conditions of assessment and the educational context in which students learn what academic integrity means.

Institutional culture and student experience also influence whether integrity measures function as intended. Studies of institution-wide responses to online assessment highlight the value of coordinated policies, assessment redesign, integrity messaging, and educator support [26]. Other evidence links academic dishonesty to contextual and psychological factors, including anxiety and learning conditions [27], while research on remote proctoring shows that technological difficulties, inconsistent test environments, and fear of false accusations can negatively affect students' assessment experiences [28]. Consequently, technical security should be evaluated together with usability, infrastructure, communication, and perceived fairness.

Within this broader landscape, secure examination environments can be positioned as one layer of integrity protection. Randomized experimental evidence indicates that monitoring can deter dishonest behavior in online examinations, although the effect depends on the examination design and the credibility of the monitoring process [29]. More recent work on online proctoring also foregrounds privacy responsibilities and the need for transparent governance when student data are collected or monitored [30]. Evidence from real-world online examinations further confirms that misconduct can persist even when technological monitoring is available, reinforcing the need to avoid claims that technology alone can guarantee honest behavior [31].

Measurement is another important consideration. Academic misconduct and integrity are sensitive constructs, and recent instrument-development research emphasizes the value of clear, psychometrically defensible measures that distinguish different forms of misconduct [32]. Program-level research also shows that self-reported misconduct is associated with contextual variables such as peer norms and perceptions of integrity culture [33]. For this reason, questionnaire-based integrity scores should be interpreted as students' reported perceptions and behaviors, not as direct observation of actual cheating incidents.

Educational responses can complement technological restrictions. Interventions that explicitly teach academic-integrity principles can improve students' awareness of misconduct and strengthen their ability to reason about ambiguous situations [34]. At the same time, the contemporary digital environment exposes students to file-sharing and homework-help services that can blur boundaries between legitimate support and inappropriate assistance [35]. A sustainable integrity strategy therefore requires both secure assessment conditions and continuing education about acceptable academic practices across digital environments.

Against this background, evidence specifically connecting students' experience of a secure-browser examination environment with self-reported academic integrity in secondary schools remains comparatively limited. The present study therefore treats Safe Exam Browser (SEB) as a technological component of the examination environment rather than as a mechanism that directly creates integrity. It addresses three research questions: (1) How is SEB implementation perceived by students during digital examinations? (2) Is perceived SEB implementation significantly associated with students' self-reported academic integrity during examinations? and (3) What implementation challenges are most frequently reported by students? The study aims to provide empirical evidence that can inform more effective, fair, and sustainable use of secure digital-assessment technology in secondary education. The remainder of the article presents the methods, results and discussion, conclusion, limitations, and supporting statements.

METHODS

Research Design

This study used a quantitative correlational survey with a descriptive component. The design was selected to describe students' experience of Safe Exam Browser (SEB) implementation, test the statistical association between perceived SEB implementation and self-reported academic integrity, and identify implementation challenges. The study was conducted at SMA Muhammadiyah 2 Sidoarjo. Participants had experience completing SEB-based examinations over four consecutive days. The analysis focused on students' experience of the implemented examination environment rather than on an independent technical audit of the SEB configuration.

Population and Sample

The study population consisted of Grade 10 students at SMA Muhammadiyah 2 Sidoarjo who had taken examinations using SEB. Purposive sampling was used because direct experience with an SEB-based examination was required for respondents to evaluate its implementation. Eligible students had completed SEB-based examinations and were willing to participate as respondents. The final sample comprised 136 students.

Data Collection Procedures

The research variables were perceived SEB implementation (X) and students' self-reported academic integrity during examinations (Y), as illustrated in Figure 1. SEB implementation was measured through five indicators: usability, exam administration, restrictions on access to other applications or websites, orderly exam conduct, and effectiveness of supervision. Academic integrity was measured through honesty during examinations, compliance with exam rules, responsibility for one's own results, independence in taking examinations, and rejection of cheating behavior. Because academic integrity was measured using questionnaire responses, the dependent variable represents self-reported exam-related integrity rather than directly observed cheating behavior. The study also recorded five implementation challenges: internet connectivity, device compatibility, understanding of SEB use, technical application issues, and adequacy of pre-exam guidance.

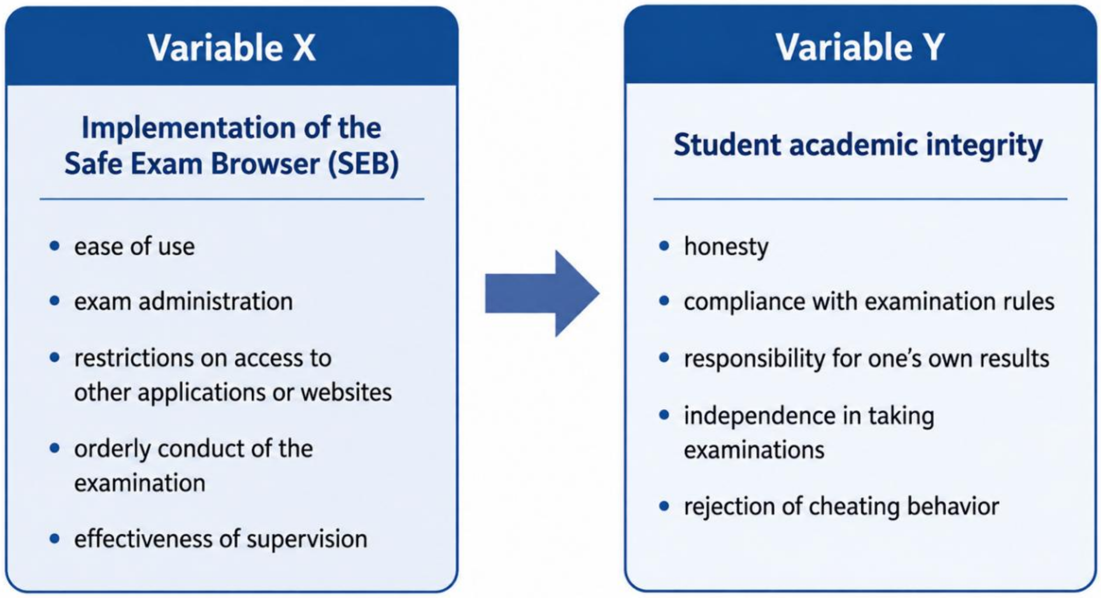


Figure 1. Conceptual Relationship Between Perceived SEB Implementation (X) and Self-Reported Academic Integrity (Y)

Data were collected using a four-point Likert-type questionnaire with the response options Strongly Agree, Agree, Disagree, and Strongly Disagree. The instrument contained 15 items: five items measuring SEB implementation, five measuring academic integrity, and five measuring implementation challenges. Higher scores on the first two scales indicated stronger perceived SEB implementation and higher self-reported academic integrity. For transparency, the descriptive results are reported on the original 1–4 response scale and are interpreted primarily through the observed means and indicator rankings rather than unsupported qualitative cut-off labels.

Item-total correlations were used as an item-screening procedure, and internal consistency was assessed using Cronbach's alpha. The available analysis reports Cronbach's alpha = .872 for the 15-item questionnaire as a whole. Because construct-specific coefficients were not available, this value is interpreted only as overall questionnaire consistency rather than reliability evidence for each construct. Participation was voluntary, and the reported results are presented only in aggregate form without identifying individual students.

Data were analyzed using descriptive and inferential statistics. The first research question was addressed using means, standard deviations, and indicator rankings. The second research question was tested using simple linear regression. Prior to regression, residual normality was evaluated using the Kolmogorov–Smirnov test and a normal Q–Q plot, while linearity was evaluated using the deviation-from-linearity test. Statistical significance was evaluated at $\alpha = .05$. Regression results are reported as associations and are not interpreted as evidence of causality.

The third research question was addressed using the reported frequency counts and percentages for implementation challenges. Percentages were calculated from the reported frequencies using $(n/136) \times 100$, and the challenges were ranked from most to least frequently reported. The challenge indicators were analyzed descriptively and were not included in the regression model. All analyses were conducted using SPSS. These procedures provided a descriptive profile of SEB implementation, evaluated its statistical relationship with self-reported academic integrity, and identified practical implementation constraints.

RESULTS AND DISCUSSION

Participant Characteristics

Descriptive Analysis

This study involved 136 Grade 10 students at SMA Muhammadiyah 2 Sidoarjo who had taken examinations using SEB. The respondents consisted of 85 male students and 51 female students, as shown in Table 1. All respondents had experience taking SEB-based examinations for four consecutive days, which met the study's inclusion criterion of direct experience with the examination system.

Table 1. Gender Distribution of Respondents

Gender	Frequency (n)	Percentage (%)
Male	85	62.5
Female	51	37.5
Total	**136**	**100**

Table 2 summarizes students' perceptions of SEB implementation. The overall mean was 2.592 (SD = 0.739) on the four-point scale. The highest mean was recorded for access restrictions to other applications and websites (M = 2.949, SD = 0.801), followed by orderly examination conduct and exam administration. The lowest mean was recorded for effectiveness of supervision (M = 2.257, SD = 0.919), followed by usability (M = 2.302, SD = 0.846). These results suggest that students most clearly recognized SEB's access-control function, while usability and perceived supervision effectiveness were comparatively weaker aspects of implementation.

Table 2. Descriptive Statistics for Perceived SEB Implementation (X)

No	Indicator	Mean	SD	Rank
1.	Usability	2.302	0.846	4
2.	Exam Administration	2.713	0.877	3
3.	Access restrictions to other applications/websites	2.949	0.801	1
4.	Orderly examination conduct	2.735	0.888	2
5.	Effectiveness of supervision	2.257	0.919	5
	Overall mean	**2.592**	**0.739**	—

Table 3 presents students' self-reported academic-integrity scores. The overall mean was 3.243 (SD = 0.636). Honesty during examinations had the highest mean (M = 3.456, SD = 0.665), followed by compliance with examination rules (M = 3.353, SD = 0.684). Rejection of cheating behavior had the lowest mean (M = 3.088, SD = 0.715), although it remained above the midpoint of the four-point scale. These findings indicate relatively high self-reported integrity across the measured examination behaviors, but they should not be interpreted as direct observations of actual cheating behavior.

Table 3. Descriptive Statistics for Self-Reported Academic Integrity (Y)

No	Indicator	Mean	SD	Rank
1.	Honesty during examinations	3.456	0.665	1
2.	Compliance with exam rules	3.353	0.684	2
3.	Responsibility for own results	3.162	0.791	3
4.	Independence in taking examinations	3.154	0.759	4
5.	Rejection of cheating behavior	3.088	0.715	5
	Overall mean	**3.243**	**0.636**	—

The Kolmogorov–Smirnov test of the standardized residuals produced a test statistic of 0.077 with p = .440 (Table 4). Because p > .05, the null hypothesis of normality was not rejected. The normal Q–Q plot also shows that most points follow the reference line, although some deviation is visible in the tails. Taken together, the available diagnostics do not indicate a statistically significant departure from residual normality.

Table 4. Normality Test Results

Variables	K–S Statistic (D)	p	Note
Standardized residuals	.077	.440	Normality not rejected

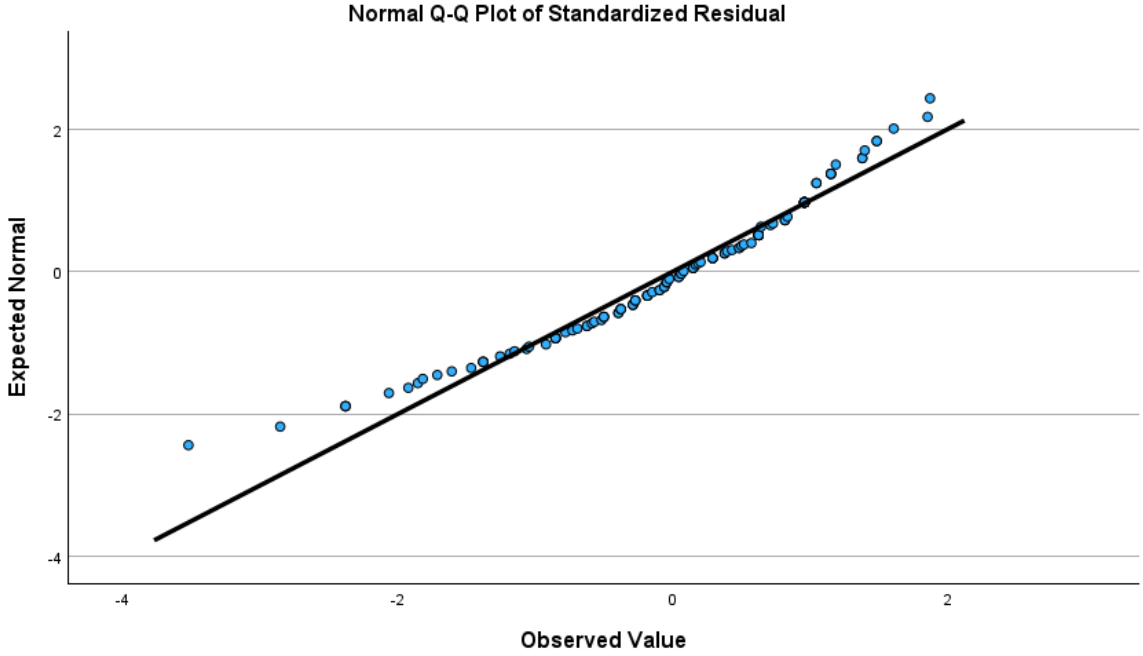


Figure 2. Normal Q–Q Plot of Standardized Residuals

The reliability analysis yielded Cronbach's alpha = .872 for the 15-item questionnaire (Table 5). This indicates good internal consistency for the questionnaire as analyzed. Because only one overall coefficient was available, the value should not be interpreted as separate reliability evidence for SEB implementation, academic integrity, and implementation challenges.

Table 5. Reliability Test Results

Measure	Cronbach's alpha	Interpretation
15-item questionnaire	.872	Good internal consistency

The deviation-from-linearity test produced p = .123 (Table 6). Because this value is greater than .05, there is insufficient evidence of a statistically significant deviation from linearity. The available analysis therefore supports treating the relationship between perceived SEB implementation and academic-integrity scores as approximately linear for the simple regression model.

Table 6. Linearity Test Results

Model	p for Deviation from Linearity	Interpretation
SEB implementation (X) vs. academic integrity (Y)	.123	Linear

Table 7. Regression Model Summary

Model	R	R^2	p	Interpretation
SEB (X) → Integrity (Y)	.589	.347	< .001	Significant positive association

Table 8. Regression ANOVA Results

Model	Sum of Squares	df	F	p	Note
Regression	639.557	1	71.169	< .001	Significant model
Residual	1204.178	134			
Total	1843.735	135			

The regression model was statistically significant, $F(1, 134) = 71.169$, $p < .001$ (Table 8). The model summary in Table 7 shows $R = .589$ and $R^2 = .347$. Thus, perceived SEB implementation accounted for 34.7% of the variance in students' self-reported academic-integrity scores in this sample, while 65.3% of the variance remained unexplained by this single-predictor model. This result supports a significant positive association between the two measured variables but does not establish that SEB caused changes in students' integrity.

Table 9. Frequencies of Reported Implementation Challenges

No.	Challenge	Frequency (n)	Percentage (%)	Rank
1	Internet connectivity issues	99	72.79	1
2	Device incompatibility	39	28.68	4
3	Difficulty using SEB	41	30.15	3
4	Technical application issues	88	64.71	2
5	Limited pre-examination guidance	29	21.32	5

Table 9 shows the frequency of implementation challenges reported by the 136 respondents. Internet connection issues were the most frequently reported challenge (n = 99; 72.79%), followed by technical issues with the application (n = 88; 64.71%). Difficulty using SEB (30.15%), incompatible devices (28.68%), and limited pre-exam guidance (21.32%) were reported less frequently. These results indicate that infrastructure and application reliability were more prominent concerns than guidance or device compatibility in this sample.

Discussion

The descriptive results indicate that students recognized SEB most clearly through its access-control function. Restrictions on other applications and websites received the highest implementation mean, whereas usability and effectiveness of supervision received the lowest means. This pattern is consistent with research showing that digital assessment quality depends not only on the existence of a technological restriction but also on how assessment conditions are designed, communicated, and experienced by users [6], [7], [12]. Experimental evidence on monitored examinations likewise suggests that restriction and monitoring can alter opportunities for misconduct, but they do not remove the need for sound assessment design and transparent implementation [13], [29]. Accordingly, SEB is best interpreted here as a mechanism for structuring the examination environment rather than as a substitute for teacher supervision or assessment quality.

The regression analysis showed a significant positive association between perceived SEB implementation and self-reported academic integrity. This finding is consistent with research indicating that opportunities, perceived detection, and examination conditions are relevant to cheating behavior in online assessments [9], [10], [11], [12], [13]. It also aligns with evidence that monitoring can deter some dishonest practices under controlled examination conditions [29], [31]. However, these studies also caution against assuming that a technological control completely prevents misconduct. The present association should therefore be understood as evidence that stronger perceived implementation co-occurs with higher reported integrity, not as proof that SEB directly caused students to become more honest.

The distinction between situational compliance and internalized academic integrity is central to this interpretation. Contemporary integrity scholarship emphasizes that honest academic behavior is shaped by ethical understanding, institutional expectations, peer norms, and the wider culture of learning [19], [20], [21], [22], [23], [26], [33]. Secondary-school evidence further suggests that students' prior academic-integrity literacy is uneven and that K-12 institutions require more systematic policies and instruction [24], [25]. Thus, a restricted browser may reduce opportunities to access unauthorized resources during an examination, while enduring honesty and responsibility still require explicit educational reinforcement. Technology should operate within, rather than replace, a broader culture of integrity.

The self-report nature of the dependent variable also requires careful interpretation. Systematic review evidence shows that estimates of online examination cheating can be sensitive to sampling, anonymity, question wording, and respondents' willingness to disclose undesirable behavior [11]. Studies of student perceptions similarly demonstrate that students do not always interpret academic-integrity rules or forms of misconduct in the same way [18], [19]. Recent measurement work has therefore emphasized construct clarity and psychometrically defensible instruments when studying misconduct [32], while program-level analyses show that self-reports are also influenced by perceived peer behavior and integrity culture [33]. The relatively high integrity scores in this study should consequently be read as reported integrity within the examination context rather than as verified absence of cheating.

The implementation challenges constitute an equally important component of the findings. Internet connectivity and technical application issues were the two most frequently reported problems. This is consistent with research on technology-based assessment showing that facilitating conditions, usability, user competence, and technical reliability are central to acceptance and successful implementation [1], [2], [3], [4], [5]. Studies of online assessment transitions and remote proctoring similarly document concerns about infrastructure, technical disruptions, anxiety, and unequal testing conditions [14], [15], [16], [28], [30]. In a secondary-school context, these issues are especially consequential because a security mechanism that interrupts access, produces device incompatibility, or creates uncertainty may undermine fairness even when its integrity objective is legitimate.

A practical implication is that schools should adopt a layered implementation model. Before high-stakes use, devices and networks should be checked, students should receive a trial session, contingency procedures should be established, and examination rules should be communicated in clear language. These recommendations are consistent with online-assessment frameworks that emphasize fairness, accessibility, information security, and positive student experience [6], as well as institutional approaches that combine assessment redesign, educator support, and integrity communication [15], [21], [26]. Integrity education should continue outside examination sessions, because instructional interventions can strengthen students' understanding of academic-integrity principles and ambiguous forms of misconduct [34].

The study also contributes by placing secure digital assessment in a secondary-school setting, a context that remains less represented in the literature than higher education. Research on K-12 academic-integrity literacy indicates that formal preparation before university is inconsistent across schools and countries [24], [25]. This makes the present context important: students are simultaneously learning academic norms and encountering increasingly technology-mediated assessment. Moreover, digital assistance ecosystems extend beyond the examination browser itself; students may encounter online file-sharing and homework-help resources whose acceptable use is not always obvious [35]. Schools therefore need policies that connect secure examination procedures with broader digital and academic literacy.

Future research should move beyond single-source questionnaire evidence by triangulating student reports with anonymized system logs, documented access violations, technical incident records, and where ethically appropriate, controlled comparisons of examination conditions. Randomized and quasi-experimental studies have demonstrated the value of designs that isolate the effects of monitoring or integrity interventions [13], [29], while recent work shows the importance of combining behavioral evidence with carefully validated misconduct measures [31], [32]. Multi-school and longitudinal studies would also allow researchers to test whether the association observed here remains stable across different subjects, infrastructures, school cultures, and student populations. Such designs would provide a stronger basis for evaluating the role of secure-browser technologies within a comprehensive academic-integrity strategy.

CONCLUSION

This study found a significant positive association between students' perceptions of SEB implementation and their self-reported academic integrity during digital examinations. The regression model produced R = .589 and R^2 = .347, indicating that perceived SEB implementation explained 34.7% of the variance in academic-integrity scores within this sample. Access restriction was the most prominent implementation feature, while internet connectivity and technical application issues were the most frequently reported challenges. The findings therefore support the use of SEB as a supporting tool for creating more controlled examination conditions, rather than as a standalone solution for academic integrity.

Schools should combine SEB with reliable infrastructure, device and compatibility checks, technical support, clear pre-exam guidance, teacher supervision, and sustained integrity education. Future studies should use multi-school samples, longitudinal or quasi-experimental designs, and objective indicators such as system logs or documented cheating incidents to complement self-report data and strengthen causal interpretation.

LIMITATIONS

This study has several limitations. First, the sample was drawn purposively from 136 Grade 10 students in one secondary school, which limits generalizability to other schools, age groups, and institutional settings. Second, SEB implementation and academic integrity were measured using self-report items, so socially desirable responding may have inflated integrity scores and the study did not directly observe cheating behavior. Third, the design was non-experimental and based on a short examination experience, so the regression results cannot establish causality or long-term changes in ethical behavior. Fourth, technical conditions such as internet stability and device compatibility were reported by respondents but were not experimentally controlled, and the study did not independently audit the detailed SEB configuration. Finally, the available statistical output reports overall questionnaire reliability and a limited set of regression diagnostics; construct-specific reliability, homoscedasticity, influential-case diagnostics, and the original item-level coding used to summarize challenge frequencies were not available for the present analysis. These limitations should be considered when interpreting the findings.

AUTHOR INFORMATION

Corresponding Author
Suwidiyanti – Sekolah Menengah Atas Muhammadiyah 2 Sidoarjo (Indonesia).
Email: dianlee1@gmail.com
ORCID: orcid.org/0009-0001-1568-819X

Authors
Silwana Mumthaza – Sekolah Menengah Atas Muhammadiyah 2 Sidoarjo (Indonesia).
orcid.org/0009-0002-8820-7059
Email: silwanamumthaza@gmail.com
Burhan Rahmat Auladi – Sekolah Menengah Atas Muhammadiyah 2 Sidoarjo (Indonesia).
Email: burhanrahmat@gmail.com
orcid.org/0009-0000-8461-5763
Alful Musrifah – Sekolah Menengah Atas Muhammadiyah 2 Sidoarjo (Indonesia).
Email: alfulsmamda75@gmail.com
orcid.org/0009-0005-7199-3788

AUTHOR CONTRIBUTION

All authors contributed to the study conception, design, investigation, data interpretation, and manuscript preparation. All authors reviewed and approved the final manuscript and accept responsibility for its content.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

The authors used ChatGPT to assist with organizing complex concepts and DeepL to improve grammar, style, and readability. The authors independently wrote, reviewed, and verified all scientific content, analyses, interpretations, and conclusions and assume full responsibility for the final manuscript.

REFERENCES

[1] A. Fink, C. Spoden, and A. Frey, “Determinants of higher education teachers’ intention to use technology-based exams,” Educ. Inf. Technol., vol. 28, pp. 6485–6513, 2023. Available: https://doi.org/10.1007/s10639-022-11435-4

[2] K. R. Pillai, P. Upadhyaya, A. V. Prakash, et al., “End-user satisfaction of technology-enabled assessment in higher education: A coping theory perspective,” Educ. Inf. Technol., vol. 26, pp. 3677–3698, 2021. Available: https://doi.org/10.1007/s10639-020-10401-2

[3] R. Babo, R. Fitas, and J. Suhonen, “WebAVALIA: analysis of students’ opinions and experiences using an e-assessment tool in collaborative learning,” Educ. Inf. Technol., vol. 29, pp. 10677–10705, 2024. Available: https://doi.org/10.1007/s10639-023-12220-7

[4] G. Yavuz Temel, J. Barenthien, and T. Padubrin, "Using Jupyter Notebooks as digital assessment tools: An empirical examination of student teachers' attitudes and skills towards digital assessment," Educ. Inf. Technol., vol. 30, pp. 18621–18650, 2025. Available: https://doi.org/10.1007/s10639-025-13507-7

[5] M. Estaji, Z. Banitalebi, and G. T. L. Brown, "The key competencies and components of teacher assessment literacy in digital environments: A scoping review," Teach. Teach. Educ., vol. 141, Art. no. 104497, 2024. Available: https://doi.org/10.1016/j.tate.2024.104497

[6] E. Huber, L. Harris, S. Wright, et al., "Towards a framework for designing and evaluating online assessments in business education," Assess. Eval. High. Educ., vol. 49, no. 1, pp. 102–116, 2024. Available: https://doi.org/10.1080/02602938.2023.2183487

[7] P. Dawson, K. Nicola-Richmond, and H. Partridge, "Beyond open book versus closed book: a taxonomy of restrictions in online examinations," Assess. Eval. High. Educ., vol. 49, no. 2, pp. 262–274, 2024. Available: https://doi.org/10.1080/02602938.2023.2209298

[8] H. R. Slack and M. Priestley, "Online learning and assessment during the Covid-19 pandemic: exploring the impact on undergraduate student well-being," Assess. Eval. High. Educ., vol. 48, no. 3, pp. 333–349, 2023. Available: https://doi.org/10.1080/02602938.2022.2076804

[9] M. Henderson, J. Chung, R. Awdry, et al., "Factors associated with online examination cheating," Assess. Eval. High. Educ., vol. 48, no. 7, pp. 980–994, 2023. Available: https://doi.org/10.1080/02602938.2022.2144802

[10] P. Alin, A. Arendt, and S. Gurell, "Addressing cheating in virtual proctored examinations: toward a framework of relevant mitigation strategies," Assess. Eval. High. Educ., vol. 48, no. 3, pp. 262–275, 2023. Available: https://doi.org/10.1080/02602938.2022.2075317

[11] P. M. Newton and K. Essex, "How common is cheating in online exams and did it increase during the COVID-19 pandemic? A systematic review," J. Acad. Ethics, vol. 22, pp. 323–343, 2024. Available: https://doi.org/10.1007/s10805-023-09485-5

[12] S. Han, S. Nikou, and W. Y. Ayele, "Digital proctoring in higher education: a systematic literature review," Int. J. Educ. Manag., vol. 38, no. 1, pp. 265–285, 2024. Available: https://doi.org/10.1108/IJEM-12-2022-0522

[13] S. Mukherjee, B. Rohles, V. Distler, G. Lenzini, and V. Koenig, "The effects of privacy-non-invasive interventions on cheating prevention and user experience in unproctored online assessments: An empirical study," Comput. Educ., vol. 207, Art. no. 104925, 2023. Available: https://doi.org/10.1016/j.compedu.2023.104925

[14] A. Reedy, D. Pfitzner, L. Rook, et al., "Responding to the COVID-19 emergency: student and academic staff perceptions of academic integrity in the transition to online exams at three Australian universities," Int. J. Educ. Integr., vol. 17, Art. no. 9, 2021. Available: https://doi.org/10.1007/s40979-021-00075-9

[15] Z. R. Khan, S. Sivasubramaniam, P. Anand, et al., "'e'-thinking teaching and assessment to uphold academic integrity: lessons learned from emergency distance learning," Int. J. Educ. Integr., vol. 17, Art. no. 17, 2021. Available: https://doi.org/10.1007/s40979-021-00079-5

[16] S. Y. Almossa and S. M. Alzahrani, "Lessons on maintaining assessment integrity during COVID-19," Int. J. Educ. Integr., vol. 18, Art. no. 19, 2022. Available: https://doi.org/10.1007/s40979-022-00112-1

[17] K. Sevnarayan and K. B. Maphoto, "Exploring the dark side of online distance learning: cheating behaviours, contributing factors, and strategies to enhance the integrity of online assessment," J. Acad. Ethics, vol. 22, pp. 51–70, 2024. Available: https://doi.org/10.1007/s10805-023-09501-8

[18] C. Campbell and L. Waddington, "Academic integrity strategies: student insights," J. Acad. Ethics, vol. 22, pp. 33–50, 2024. Available: https://doi.org/10.1007/s10805-024-09510-1

[19] G. Kadayam Guruswami, S. Mumtaz, A. Gopakumar, E. Khan, F. Abdullah, and S. K. Parahoo, "Academic integrity perceptions among health-professions' students: A cross-sectional study in the Middle East," J. Acad. Ethics, vol. 21, pp. 231–249, 2023. Available: https://doi.org/10.1007/s10805-022-09452-6

[20] A. Mejía and M. F. Garcés-Flórez, "What do we mean by academic integrity?" Int. J. Educ. Integr., vol. 21, Art. no. 1, 2025. Available: https://doi.org/10.1007/s40979-024-00176-1

[21] C. A. Kier and C. Ives, "Recommendations for a balanced approach to supporting academic integrity: perspectives from a survey of students, faculty, and tutors," Int. J. Educ. Integr., vol. 18, Art. no. 22, 2022. Available: https://doi.org/10.1007/s40979-022-00116-x

[22] M. Davis, "Examining and improving inclusive practice in institutional academic integrity policies, procedures, teaching and support," Int. J. Educ. Integr., vol. 18, Art. no. 14, 2022. Available: https://doi.org/10.1007/s40979-022-00108-x

[23] D. DiPaulo, "Do preservice teachers cheat in college, too? A quantitative study of academic integrity among preservice teachers," Int. J. Educ. Integr., vol. 18, Art. no. 2, 2022. Available: https://doi.org/10.1007/s40979-021-00097-3

[24] Z. Hossain, "University freshmen recollect their academic integrity literacy experience during their K-12 years: results of an empirical study," Int. J. Educ. Integr., vol. 18, Art. no. 4, 2022. Available: https://doi.org/10.1007/s40979-021-00096-4

[25] Z. Hossain, Ö. Çelik, and C. Hertel, "Academic integrity and copyright literacy policy and instruction in K-12 schools: a global study from the perspective of school library professionals," Int. J. Educ. Integr., vol. 20, Art. no. 4, 2024. Available: https://doi.org/10.1007/s40979-024-00150-x

[26] Z. R. Khan, J. Priya, and C. Tuffnell, "Culture of integrity—institutional response to integrity during COVID-19," Int. J. Educ. Integr., vol. 18, Art. no. 27, 2022. Available: https://doi.org/10.1007/s40979-022-00118-9

[27] Y. Eshet, P. Steinberger, and K. Grinautsky, "Does statistics anxiety impact academic dishonesty? Academic challenges in the age of distance learning," Int. J. Educ. Integr., vol. 18, Art. no. 23, 2022. Available: https://doi.org/10.1007/s40979-022-00117-w

[28] A. Pokorny, C. J. Ballen, A. G. Drake, et al., "'Out of my control': science undergraduates report mental health concerns and inconsistent conditions when using remote proctoring software," Int. J. Educ. Integr., vol. 19, Art. no. 22, 2023. Available: https://doi.org/10.1007/s40979-023-00141-4

[29] M. Alguacil, N. Herranz-Zarzoso, J. C. Pernías, et al., "Academic dishonesty and monitoring in online exams: a randomized field experiment," J. Comput. High. Educ., vol. 36, pp. 835–851, 2024. Available: https://doi.org/10.1007/s12528-023-09378-x

[30] C. Mutimukwe, O. Viberg, C. McGrath, et al., "Privacy in online proctoring systems in higher education: stakeholders' perceptions, awareness and responsibility," J. Comput. High. Educ., vol. 38, pp. 732–761, 2026. Available: https://doi.org/10.1007/s12528-025-09461-5

[31] P. Pongchaikul, P. Vivithanaporn, N. Somboon, et al., "Remote online-exam dishonesty in medical school during COVID-19 pandemic: A real-world case with a multi-method approach," J. Acad. Ethics, vol. 23, pp. 1097–1106, 2025. Available: https://doi.org/10.1007/s10805-024-09571-2

[32] D. A. Rettinger, H. Tatum, A. H. Perry, et al., "MIAMI: development and validation of a revised measure of academic misconduct," Int. J. Educ. Integr., vol. 20, Art. no. 19, 2024. Available: https://doi.org/10.1007/s40979-024-00167-2

[33] K. A. Packalen and K. Rowbotham, "Clues to fostering a program culture of academic integrity: findings from a multidimensional regression model," Int. J. Educ. Integr., vol. 20, Art. no. 14, 2024. Available: https://doi.org/10.1007/s40979-024-00163-6

[34] M. P. Goddiksen, A. Allard, A. C. V. Armond, et al., "Integrity games: an online teaching tool on academic integrity for undergraduate students," Int. J. Educ. Integr., vol. 20, Art. no. 7, 2024. Available: https://doi.org/10.1007/s40979-024-00154-7

[35] C. Slade, G. J. Curtis, and S. Thomson, "Understanding how and why students use academic file-sharing and homework-help websites: implications for academic integrity," High. Educ. Res. Dev., vol. 43, no. 7, pp. 1586–1601, 2024. Available: https://doi.org/10.1080/07294360.2024.2349290