

Assessing the influence of secure online safe exam browser (SEB) implementation on english language semester examinations

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ABSTRACT

This research examines the effects of implementing the Secure Online Safe Exam Browser (SEB) in English semester exams for undergraduate students in the Accounting program at Universitas Pembangunan Panca Budi (UNPAB). The study seeks to evaluate how SEB impacts students' perceptions regarding ease of use, performance, expectations, and social influence within the context of English language learning. A purposive sampling method was applied, focusing on active students from the 2021, 2022, and 2023 cohorts who used SEB in their English courses. Data were gathered via a structured questionnaire containing Likert-scale items to measure various independent variables alongside the dependent variable of semester exam performance. The results aim to shed light on SEB's effectiveness as a tool for enhancing English language assessment, thereby supporting improved academic outcomes in the Accounting program. This study underscores the importance of integrating technology into educational assessments and its potential to enrich students' learning experiences.

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1. INTRODUCTION

The advancement of information technology (IT) has impacted various aspects of life, including education. IT has facilitated the shift from traditional face-to-face learning to digital platforms, such as e-learning at Universitas Pembangunan Panca Budi (UNPAB), where the Safe Exam Browser (SEB) is implemented to uphold the security and integrity of online exams. SEB is a software application designed to prevent cheating in online exams by restricting access to unauthorized programs and websites. Studies have demonstrated SEB's effectiveness in establishing a secure, controlled exam environment that prevents unauthorized use of resources. Research by Reisenwitz, (2020), among others, has explored cheating risks in BYOD exams and compared proctored versus unproctored exams. Additionally, recent findings indicate that proctoring applications like SEB offer effective solutions for online exams, particularly during the COVID-19 pandemic. This study focuses on Accounting students at UNPAB to evaluate the impact of SEB on online exam performance.

Online learning encompasses educational processes conducted electronically through computers and networks. Alternative terms include e-learning, virtual learning, and web-based learning. According to Ucok-Sayrak & Brazelton, (2022), online learning enables students to participate without physical presence in a classroom. Alharbi et al., (2022) further describes e-

learning as the distribution of lessons over the internet or intranet, defining it as a learning approach primarily dependent on electronic media.

Numerous universities have adopted online learning, allowing students to engage in classes remotely. For example, Binus University has implemented an online learning system, Binusmaya, which provides virtual classrooms and group discussion features. Trisakti University uses Trisakti Electronic Learning (TELL), blending 70% online with 30% in-person learning. Internationally, institutions such as the University of Birmingham and the University of Georgia employ platforms like WebCT to facilitate online learning, providing tools like email, discussion forums, and presentation platforms. Research indicates that WebCT enhances learning and assessment processes while easing communication (Sylla et al., 2022).

The Safe Exam Browser (SEB) is specifically designed to ensure secure online exams by controlling access to restricted resources. Integrated with Learning Management Systems (LMS) like Moodle and ILIAS, SEB restricts access during exams to prevent cheating (Salah & Thabet, 2021). It achieves this by locking the system and controlling access to certain websites and applications. SEB does not connect to any central server or cloud service. The SEB server is being developed as an independent, open-source software component that can be installed on self-operated servers. SEB clients can then connect to these SEB server instances using individual configuration files. This connection is optional and must be configured individually in each case. The same applies to support and supervision capabilities in new SEB versions via video conferencing services such as Jitsi Meet (open source, installable on self-operated servers) or Zoom (commercial, cloud-based). These video conferencing connections must also be configured individually and are always disabled by default. If SEB clients are configured to connect to a video conferencing service or SEB server instance, this will be indicated to exam participants when starting the exam session, and video/audio supervision/support must be explicitly approved by each participant in a dialog box.

SEB consists of a kiosk application and a browser component, which run on the exam computer or tablet device. The kiosk application locks the exam computer, while the browser component communicates via the internet (or LAN) with the LMS quiz module running on the server. This setup provides a schematic illustration of online exams using the Safe Exam Browser and Learning Management System (LMS) or an electronic assessment suite. Additionally, third-party applications such as Eclipse, Matlab, Excel, or R may be allowed to run simultaneously. Both internal components of the Safe Exam Browser (SEB): the kiosk application and the browser component. The third component of the SEB examination environment is integrated within the supported Learning Management Systems (LMS). Optionally, one or more third-party applications may be permitted to run during the examination, initiated by the SEB kiosk application. The kiosk application locks the examination computer and launches the SEB browser alongside any optional third-party applications. This application is designed to control various operating system functions and is therefore highly specific to the system.

The SEB browser loads and displays the LMS examination page using a predefined URL and does not present navigation elements such as the address bar or search field. The current Windows version of SEB utilizes the Mozilla Gecko rendering engine, either in the form of Firefox or XULRunner. SEB for macOS and iOS employs the WebKit rendering engine. The Learning Management System contains quiz modules utilized for online examinations. SEB relies on extensions or skins for quiz modules within the LMS or electronic examination suite. With these extensions, the LMS user interface is modified to contain only navigation for the examination (with no links to other pages outside the quiz) and lacks unwanted features such as messaging. An examination can also be configured to operate exclusively with SEB, rather than other browsers. This SEB LMS extension, which initially required separate installation for connection with SEB, has been integrated into the LMS in the latest versions of OpenOlat, Open edX, ILIAS, and Moodle.

Safe Exam Browser for Windows consists of the SEB kiosk application, which opens its own Windows desktop and blocks system commands such as keyboard shortcuts (e.g., ALT+F4) and right-click mouse actions. The second component is Firefox, which operates in XUL runtime mode. The XUL browser application of SEB running on Firefox connects to the LMS, utilizing a pre-configured starting URL. The SEB browser does not include an address bar or search fields, and navigation controls (back/forward, reload) can be disabled. In contrast to the Windows version, Safe Exam Browser for macOS and iOS is a monolithic application that employs a web browser framework rather than running in browser mode. It uses the WebKit engine, which is the foundation

for Safari and several open-source browsers. Additionally, SEB for macOS/iOS connects to the LMS in the same manner as the Windows version.

Safe Exam Browser enables secure examinations on unmanaged computers, such as students' laptops and tablets, as well as in managed environments across all three platforms: Windows, macOS, and iOS. Starting from version 2.0, SEB offers individual configurations for each examination protected by strong encryption against manipulation. Due to advanced authentication features, the examination system can verify that the unaltered specific version of SEB and the correct examination settings are utilized. This facilitates secure examinations, particularly on unmanaged computers like students' laptops and tablets. Safe Exam Browser version 2.0 and later versions are integrated versions that bring almost all the same features, examination system interface, compatible configuration files, and a highly similar user interface to all three platforms while still accommodating differences in operating systems and unique platform-specific features.

The adoption of Safe Exam Browser (SEB) in universities in Indonesia holds significant potential for enhancing the security of online examinations and ensuring academic integrity. However, the extent of SEB adoption depends on several factors, including the presence of a robust digital infrastructure, such as stable internet connectivity and sufficient computer resources. Universities that have policies prioritizing secure assessments and academic integrity are more likely to adopt SEB. Additionally, government support and alignment with accreditation standards emphasizing secure assessment practices may further encourage the implementation of SEB. Factors that facilitate adoption include adequate funding and compatibility with existing learning management systems. Conversely, barriers to adoption include limited financial resources, inadequate technological infrastructure, lack of technical expertise, and resistance from faculty and students accustomed to traditional examination methods. The successful implementation of SEB in Indonesian universities is contingent upon institutional readiness, resource availability, and a commitment to secure online assessment systems.

In English language instruction at University of Pembangunan Panca Budi, accounting students follow a structured curriculum that includes both theoretical and practical components. While SEB is not currently used in exams at this university, it holds potential for securing future assessments. Regarding technology acceptance, frameworks such as the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT) provide insights into factors influencing technology adoption (Lampo, 2022). These models emphasize perceived usefulness, ease of use, and social influence as key determinants in user acceptance of new technology.

2. RESEARCH METHOD

This research investigates the role of the Secure Online Safe Exam Browser (SEB) in enhancing English language learning for undergraduate Accounting students at Universitas Pembangunan Panca Budi. The study's population comprises active students from the 2021, 2022, and 2023 cohorts who utilized SEB in their English courses. The research variables include independent variables: (1) students' perceptions of SEB's ease of use, (2) SEB's performance, (3) expectations of SEB, and (4) the social impact of SEB use. The dependent variable is the students' performance in English semester examinations. A purposive sampling technique was employed to select the sample, where participants were chosen based on specific criteria relevant to the research objectives. Only active students from the specified cohorts who had used SEB in their English courses were included in the sample, ensuring the data collected was pertinent to analyzing the impact of SEB on students' performance in English exams.

Data collection involved administering a questionnaire both in-person and electronically, utilizing a Likert scale to quantify respondents' answers. Data analysis encompassed testing the questionnaire's validity and reliability, conducting classical assumption tests (normality, multicollinearity, and heteroscedasticity), and performing multiple linear regression and hypothesis testing via SPSS. The regression model is intended to analyze the influence of students' perceptions, SEB performance, expectations, and social impact on semester exam results.

3. RESULTS AND DISCUSSIONS

In this study, the author collected research data by distributing questionnaires to research respondents, specifically active students from the Accounting program, comprising cohorts from 2021, 2022, and 2023. The sample size was determined using Slovin's formula as follows:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{1004}{1 + 1004 (0,05)^2}$$

$$n = 286,03$$

$$n = 286 \text{ samples}$$

Thus, $n = 286$ samples were selected. Based on Slovin's formula, the author determined the sample size of 286 respondents from a total of 1,004 active students in the Accounting program. The questionnaire was distributed both in person and via Google Forms, resulting in a total of 290 respondents: 151 completed the questionnaire in person, while 139 responded via Google Forms. However, the author only utilized 286 responses in accordance with the predetermined sample size based on Slovin's formula. The summary of the distribution is presented in the following table:

Table 1. Data collection results

Description	Quantity	Percentage (%)
Questionnaires distributed	151	52.06
Questionnaires collected from Google Forms	139	47.94
Total questionnaires obtained	290	100
Questionnaires not used	4	1.37
Questionnaires processed	286	98.63

Students' perceptions of the ease of using the Safe Exam Browser and its impact on supporting English language semester exams yielded a t-statistic value of 1.181. With a significance level of 0.05 and degrees of freedom (DF) calculated as $DF = N - 2$, or $312 = 314 - 2$, the t-table value obtained is 1.968. Since the t-table value exceeds the t-statistic, this indicates that students' perceptions of SEB's ease of use do not have a significant impact on supporting English language exams. Consequently, the first hypothesis, which states that "Students' perceptions of the ease of using Safe Exam Browser positively impact English language semester exams," is not supported. This may be attributed to students' unfamiliarity with SEB and the system's insufficient user support, as not all students possess the necessary technical skills to install SEB independently. Additionally, SEB's setup complexity and restrictive nature may create discomfort among students who may feel constrained by its exam-locking mechanism.

The performance of the Safe Exam Browser showed a t-statistic value of 10.361, with a t-table value of 1.968. Since the t-statistic is greater than the t-table value, SEB's performance significantly supports English language semester exams, thus validating the second hypothesis: "The performance of Safe Exam Browser positively impacts English language semester exams." This finding aligns with Fadly et al., (2023), who found that the effective performance of the ARTS vehicle positively influenced its adoption due to its efficiency and convenience. Similarly, SEB supports exam processes by saving students time and eliminating travel needs, allowing real-time updates from instructors and enhancing exam efficiency.

Students' expectations regarding the Safe Exam Browser's use in English language exams produced a t-statistic of -1.223, with a t-table result of 1.968. Since the t-table value is higher than the t-statistic, students' expectations do not significantly impact SEB's support for English exams, and thus, the third hypothesis is not supported. This outcome corresponds with Fadly et al., (2023), who observed that expectations did not substantially affect the ARTS vehicle's adoption, possibly because the system did not vary significantly from traditional public transport. In this study, it is suggested that SEB's complex user interface might not meet students' expectations for ease of use, leading to confusion during exam setup.

The social impact of using the Safe Exam Browser had a t-statistic value of 6.119, with a t-table result of 1.968. Since the t-statistic exceeds the t-table value, the social influence of SEB significantly supports English language exams, validating the fourth hypothesis: "The social impact on the use of Safe Exam Browser positively impacts English language semester exams." This is consistent with Fadly et al., (2023), who found that social influences, such as encouragement from colleagues and supervisors, significantly impacted the acceptance of non-fluoroscopy-guided positioning. In this context, social influences from instructors, teaching assistants, peers, and the university environment play a vital role in students' use of SEB, as they contribute to a fair, secure exam process free from cheating.

Table 2. Hypothesis testing results

Hypothesis	Description
H1: Students' views on the ease of using Safe Exam Browser have a positive impact on supporting English language semester exams	Not supported by the data
H2: The performance of Safe Exam Browser has a positive impact on supporting English language semester exams	Supported by the data
H3: Expectations regarding the use of Safe Exam Browser have a positive impact on supporting English language semester exams	Not supported by the data
H4: The social impact on the use of Safe Exam Browser has a positive impact on supporting English language semester exams	Supported by the data

4. CONCLUSION

This study tested four hypotheses, with the data supporting two and not supporting the other two. Based on the analysis, the following conclusions are drawn: (1) Students' perceptions of the ease of using the Safe Exam Browser do not positively impact support for English language semester exams. (2) The performance of the Safe Exam Browser positively impacts support for English language semester exams. (3) Students' expectations regarding SEB use do not positively impact support for English language semester exams. (4) The social influence of SEB use positively impacts support for English language semester exams.

Recommendations for future research include: (1) Expanding the scope of the study to cover multiple universities, allowing generalization of the findings to all Accounting students in Indonesia; (2) Investigating faculty responses to SEB use in online exams, with a focus on how SEB ensures exam integrity and prevents dishonest practices.

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