# The Relationship Between Academic Self-Efficacy and Undergraduate Students' Perceptions of Electronic Assessment: A Mediation Analysis

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**Abstract.** Recently, in response to unstable global environmental factors, there has been a widespread shift towards online education. Drawing on Bandura's social learning theory, this study examines the mediating role of academic self-efficacy in the relationship between students' learning styles and their perceptions of electronic assessment. The research design utilized in this study involved a cross-sectional survey conducted via a web-based questionnaire administered to 342 undergraduate students enrolled in online courses at a private university in Jeddah, Saudi Arabia. The instruments employed included the student perceptions of electronic assessment scale, the academic self-efficacy scale and the student learning style scale, which assessed students' perceptions of e-assessment, their confidence in learning and completing e-assessment tasks, and their preferred learning styles, respectively. The findings revealed that students held neutral perceptions of electronic assessment and exhibited a moderate level of academic self-efficacy. The contributory learning style emerged as the most favored, while the avoidant style was the least preferred. Importantly, the results demonstrated statistically significant direct and indirect effects of learning styles on students' perceptions of electronic assessment, mediated by academic self-efficacy. This study has theoretical and practical implications, provides recommendations and highlights opportunities for future research in the field of online learning and electronic assessment.

**Keywords:** distance education; online learning; user interface design; computer-based assessment; learning styles; academic self-efficacy

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## 1. Introduction

In the face of accelerating changes in the educational landscape, the evolution of requisite skills and qualifications has become more pronounced than ever before (Zhao & Watterston, 2021). Accordingly, new trends have emerged to meet the demands of the evolving educational environment (Vergara et al., 2022). This scenario has precipitated a comprehensive reevaluation of educational curricula to ensure their relevance to the contemporary context and their efficient utilization of available technologies, most notably distance learning (Mthethwa-Kunene et al., 2022).

Assessment of student performance across a diverse array of educational environments has always been a pivotal process in education (Irons & Elkington, 2021). A student's academic self-efficacy has the potential to influence these assessments in the context of e-learning (Cormier & Langlois, 2022; Kuznetcova et al., 2023). Academic self-efficacy refers to students' beliefs regarding their ability to perform academic tasks related to the curriculum (Schunk & DiBenedetto, 2022). These beliefs influence students' choices of assessment tasks and the activities to be completed (Cheng, 2020), the effort they invest in the completion of those activities (Jiang et al., 2021), and the length of time for which they persist in the task of completing difficult work (Hsu et al., 2021).

Numerous studies have highlighted the crucial role played by the design and execution of electronic assessments in distance learning and digital education (Alotaibi, 2021; McCallum & Milner, 2020; Susantini et al., 2021). However, there is a growing body of evidence suggesting that the relationship between learning styles and perceptions of electronic assessment may be mediated by academic self-efficacy. The current study aims to investigate the mediating role of academic self-efficacy in the relationship between learning styles and perceptions of electronic assessment. By exploring this relationship, the study seeks to enhance our understanding of the factors influencing students' perceptions of electronic assessment in the context of distance learning. In addition, the study examines the preferences of undergraduate students in Saudi Arabia and analyzes the associations between their learning styles, academic self-efficacy and perceptions of electronic assessment.

The current research builds upon previous studies that have identified correlations between learning styles and academic outcomes, as well as the role of academic self-efficacy as a predictor of performance and its association with positive perceptions of the learning environment. By investigating the mediating role of self-efficacy, we aim to provide deeper insights into how learning styles influence students' perceptions of electronic assessment. This study has additional significance as it has been conducted in the aftermath of the COVID-19 pandemic, exploring an issue that has not been previously examined in this specific context.

The subsequent sections of this study are organized in the following way: the literature review section explores the pertinent literature and hypotheses developed in this study. Subsequently, an examination of the research

methodology, the process of data collection, and the outcomes is conducted, accompanied by a section of discussion. The study concludes by providing a summary of significant findings and a perspective on forthcoming developments.

## 2. Literature Review and Hypothesis Development
### 2.1 E-learning in Saudi Arabia
Electronic learning refers to the use of information technology to disseminate knowledge for the purposes of education and training (Valverde-Berrocoso et al., 2020). Most educational institutions in Saudi Arabia have sought to introduce their students to digital technology to increase their interaction with technological development and to improve their ability to use such technology to meet their educational needs (Alabdulaziz, 2021; Aladsani et al., 2022; H. P. Singh et al., 2021). This interest in technology was evident even before the COVID-19 pandemic, as Saudi educational institutions seemed to emphasize the need to raise future generations that were able to take advantage of and participate in the development of modern technology in the context of their participation in national transformation programs associated with the Saudi Vision 2030 program (Alghamdi & Holland, 2020; Allmnakrah & Evers, 2020). The situation is no different from that faced by the Saudi Ministry of Education, which is the entity responsible for school education and which launched an electronic educational portal to facilitate the acquisition of information and ensure that the relevant parties were able to stay abreast of the latest achievements in the field of education (Aladsani et al., 2022; Alghamdi, 2022; AlNajdi, 2022).

### 2.2 Electronic Academic Assessment
The three basic components of the education system, whether in the context of traditional or distance education, are curricula, teaching methods, and assessment (Khasawneh, 2022). Assessment refers to the systematic and ongoing process of evaluating the degree to which specific educational objectives are being met within a given learning context (Adom et al., 2020). Simply utilizing assessment to collect evidence on student learning is insufficient (Maqableh & Alia, 2021). Educational institutions must also ensure that assessment is fully directed towards the achievement of teaching objectives (Daumiller et al., 2021), and they must employ assessment to gain a deeper understanding of their students' progress (Daniels et al., 2021). In their efforts to establish a nontraditional learning environment, many educational institutions have developed different electronic assessment systems that aim to make the learner more inspired, enthusiastic and engaged in a variety of different learning activities (Naidu, 2021; J. Singh et al., 2021). The emergence of solutions based on e-learning has revolutionized learning methods, thus pressuring educational institutions to transfer learning, teaching and assessment activities either fully or partially to the online context (Ebner et al., 2020; Hadjeris, 2021).

Because of the development of relevant technology, the demand for innovation regarding educational assessments has increased dramatically, and in this context, electronic assessment has become an alternative to traditional assessment (Maatuk et al., 2022). The application of computer-based assessment techniques in this context has a long history that can be traced back to 1920, when the first

testing machine was invented, which marked the beginning of the use of electronic assessment in education (Ye, 2022). Electronic assessment refers to end-to-end evaluation processes that use information and communication technology to administer an evaluation activity and record the corresponding responses (Mo et al., 2022). E-assessment is a partner to e-learning and works in parallel with various methods of teaching, learning, and assessment (Prendes-Espinosa et al., 2021). Well-prepared and effectively implemented e-assessment improves the effectiveness of learning and increases the motivation of the learner, which has a positive impact on their academic performance (Iglesias-Pradas et al., 2021).

Electronic academic assessment offers several advantages, including increased flexibility for both faculty members and students (Alotaibi, 2021), the ability to provide immediate feedback (Divjak et al., 2022), the capacity to deal with a large number of students (Howe, 2020), and a faster evaluation process (Kundu & Bej, 2021). However, electronic assessment also has certain disadvantages, including the requirement that students must have specific technological skills (St-Onge et al., 2022), the need for device availability (Bashitialshaaer et al., 2021), and issues related to academic dishonesty (Appiah-Adjei, 2022).

## 2.3 Learning Styles

Students' learning styles and their academic self-efficacy play crucial roles in the educational process (Amirian et al., 2023). Learning styles refer to students' preferences in how they perceive and process information, while academic self-efficacy relates to their beliefs in their own abilities to succeed academically (Schunk & DiBenedetto, 2022). Previous research has established a significant correlation between learning styles and various academic outcomes, including academic achievement, academic success and education quality (Aker & Şahin, 2021; Dikmen, 2020; Khan et al., 2022). Similarly, academic self-efficacy has been found to be a strong predictor of academic performance and has been associated with positive perceptions of the learning environment (Aldhahi et al., 2022; Tomás et al., 2020; Zysberg & Schwabsky, 2021).

Considering the growing importance of e-learning and electronic assessment, it is essential to examine the relationship between students' perceptions of electronic assessment and their learning styles and academic self-efficacy. While previous studies have explored these relationships independently, limited research has investigated the mediating role of academic self-efficacy in the relationship between learning styles and perceptions of electronic assessment (Khine & Nielsen, 2022). By examining the mediator role of academic self-efficacy, this study aims to provide a deeper understanding of the underlying processes that influence students' perceptions of electronic assessment. Based on the preceding discussion, the researcher thus proposes the following hypothesis:

**Hypothesis 1**: There is a direct correlation between perceptions of electronic assessment and learning styles among undergraduate students in Saudi Arabia.

## 2.4 Academic Self-Efficacy

The academic self-efficacy variable has received a great deal of interest in academic literature, as it is one of the factors that can explain the academic performance of students (Alhadabi & Karpinski, 2020). Academic self-efficiency refers to students' beliefs regarding their ability to perform academic tasks related to the curriculum (Schunk & DiBenedetto, 2022; Schunk & Pajares, 2002). These beliefs influence students' choices of assessment tasks and the activities to be completed (Cheng, 2020), the effort they invest in the completion of those activities (Jiang et al., 2021), and the length of time for which they persist in the task of completing difficult work (Hsu et al., 2021). Schwinger et al. (2022) found that students tend to avoid assessment tasks that they believe are beyond their abilities and potential to complete. In addition, academic self-efficacy has been found to affect the mental perceptions that students form regarding the classroom assessment environment (AlAli & Al-Barakat, 2022). Existing research has indicated that students exhibiting high levels of academic self-efficacy have a tendency to develop advantageous perceptions of the classroom assessment environment, perceiving it as a conducive setting for learning and achieving mastery of the relevant subject matter. Conversely, students with lower levels of academic self-efficacy tend to view the classroom assessment environment as a competitive venture among peers rather than a platform for mastering the course content (Aldhahi et al., 2022; Algarni & Lortie-Forgues, 2022; Amri & Alasmari, 2021; Bürgermeister et al., 2021; Cappe et al., 2021; Chung et al., 2021; Elnadi & Gheith, 2021). All of the studies reviewed in this section thus support the following hypothesis:

**Hypothesis 2:** There is a direct relationship between perceptions of electronic assessment and academic self-efficacy among undergraduate students in Saudi Arabia.

According to social learning theory (Bandura, 2023), external stimuli affect behavior via the mediation of cognitive processes. When students act and engage in certain behaviors, they consider what they are doing, and their beliefs depend on the ways in which their behavior is affected by the environment. In other words, cognitive processes determine the specific stimuli that students perceive, the value of those stimuli, and the manner in which the students perceive and respond to the stimuli. Therefore, academic self-efficacy beliefs are also formed through indirect experiences that involve observing and reflecting on the experiences of others. Students develop their academic self-efficacy beliefs based on their social interactions and the verbal expressions of teachers and other students. Such interactions between students and their colleagues represent part of their learning styles, as suggested by Gilbertson et al. (2023). Accordingly, the researcher proposes the following hypothesis:

**Hypothesis 3:** The relationship between students' perceptions of electronic assessment and their learning styles is mediated by their academic self-efficacy.

Thus, this study presents its theoretical model based on the proposed hypotheses in Figure 1.
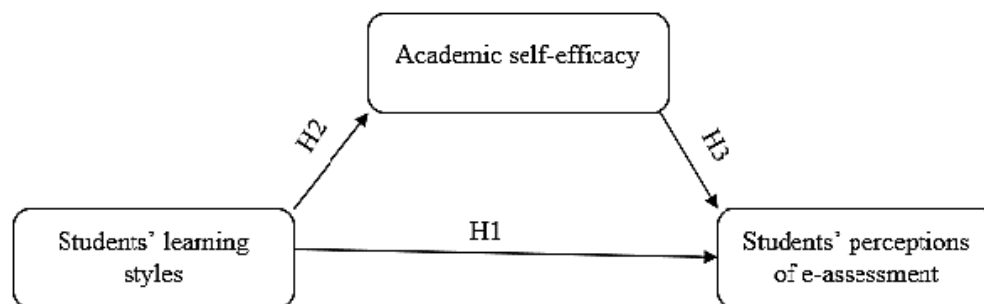


**Figure 1: The theoretical model**

## 3. Methods and Materials

The current study aimed to describe students' perceptions of electronic assessment and the relationships between those perceptions and their learning styles and academic self-efficacy in the wake of the COVID-19 pandemic. Therefore, the researcher used the cross-sectional descriptive approach, a method that allows for the analysis of data collected from a population, or a representative subset, at one specific point in time. This method was selected as appropriate considering the objectives of the study (Grimes & Schulz, 2002).

### 3.1 Procedure and Participants

The study population consisted of undergraduate students in a single private university in the city of Jeddah in the Kingdom of Saudi Arabia during the 2021-2022 academic year. To select the study participants, a non-random, convenience sampling method was applied. The inclusion criteria for this study were: participants must be undergraduate students enrolled in online courses at the selected private university during the academic year 2021-2022. The exclusion criteria were students not enrolled in online courses or students attending other institutions. This technique was chosen due to its practicality and efficiency in reaching out to a large number of students across different departments in a short span of time. The participants were invited to participate in the study, and their involvement was entirely voluntary. The research ethics board of the University of Business and Technology (UBT) approved the study. According to their assessment, the study did not violate any provisions of UBT's Research Ethics Code. In addition, informed consent was obtained from each participant in this study before the study was carried out.

An online survey was created, and an invitation link was sent to the selected private university in the city of Jeddah, Saudi Arabia. The researcher asked the university to share the survey link with undergraduate students who were enrolled in online courses to ask them to respond to a voluntary and anonymous questionnaire. The researcher received 342 valid responses (33.9% of these responses were from males, while 66.1% from females), which represented an acceptable sample size with a confidence level of 95% and a 5% margin of error (Verma & Verma, 2020).

## 3.2 Measures

To achieve the objectives of the study, three instruments were used: the student perceptions of electronic assessment scale, the academic self-efficacy scale and the student learning styles scale.

### 3.2.1 Student Perceptions of the Electronic Assessment Scale.

The researcher designed a survey containing 14 statements pertaining to the students' perspectives on e-assessment. These items were scored on a five-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree), with a high score indicating that the respondent has a highly positive perception of e-assessment and a low score indicating the opposite. In order to ensure the instrument's relevancy and precision, a meticulous validation process was undertaken, which included peer review and face validity assessment. This ensured the quality and relevance of the survey items, thereby enhancing the reliability of the responses.

### 3.2.2 Academic Self-Efficacy Scale.

This scale has been well-established in academic research and has demonstrated consistently robust validity and reliability. It was adopted from the Motivated Strategies for Learning Questionnaire developed by Pintrich et al. (2016). The researcher borrowed seven items measuring students' beliefs regarding their confidence in their abilities and capabilities to learn and to complete the electronic assessment tasks successfully in the context of the distance education system; these items were scored on a five-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree), with a high score indicating that the respondent has a high level of students' academic self-efficacy and a low score indicating the opposite.

### 3.2.3 Student Learning Style Scale. This scale, which allows for the differentiation of six distinct learning styles, is a comprehensive instrument, and its multidimensionality allows for the capture of a nuanced understanding of students' learning preferences. It was adopted from Riechmann and Grasha (1974).

## 3.3 Model Fit

Confirmatory factor analyses (CFAs) were conducted to assess the discriminant validity and convergent validity of the study constructs. The CFA results regarding the research model ($\chi2/df$ = 2.12, RMSEA = 0.06, GFI = 0.99, CFI = 0.99) indicated an acceptable level of model fit (Shi et al., 2020).

## 3.4 Statistical Analysis of the Data

To answer the study questions, statistical software, specifically SPSS 28.0 and EQS 6.4, was utilized. These tools were used to extract the relevant arithmetical means, standard deviations and Pearson correlation coefficients to describe the study variables and to conduct path analysis, a statistical technique that allowed the examination of the directed dependencies among a set of variables. This method facilitated a comprehensive understanding of the interrelationships among the variables and supported the research objectives.

## 4. Results

The study presents statistical analysis and correlations between students' perceptions of electronic assessment, their self-efficacy and preferred learning styles. Mean values indicate a neutral perception towards electronic assessment (M = 2.85) and an average level of academic self-efficacy (M = 2.91). When examining learning styles, the contributory style was favored most (M = 3.92), followed by competitive (M = 3.72), independent (M = 3.55), collaborative (M = 3.53), dependent (M = 3.49), with the avoidant style being the least preferred (M = 3.35).

A correlation analysis provided significant positive relationships between the perceptions of electronic assessment and both learning styles and self-efficacy. This supported the initial two hypotheses of the study. Specifically, there was a strong positive correlation between perceptions of electronic assessment and self-efficacy (r = 0.79). Correlations between perceptions of electronic assessment and different learning styles ranged from 0.25 to 0.48. Comparing academic self-efficacy with various learning styles revealed correlation coefficients between 0.23 and 0.45. Lastly, intercorrelations among the six learning styles fell between 0.57 and 0.85. These correlation statistics are consolidated in Table 1.

**Table 1: Descriptive statistics and correlation matrix for the study variables**

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1) E-assessment | 2.85 | 0.87 | | | | | | | |
| 2) Self-efficacy | 2.91 | 1.09 | .79** | | | | | | |
| 3) Competitive | 3.72 | 0.71 | .44** | .44** | | | | | |
| 4) Collaborative | 3.53 | 0.67 | .48** | .45** | .82** | | | | |
| 5) Avoidant | 3.35 | 0.61 | .37** | .30** | .57** | .68** | | | |
| 6) Contributory | 3.92 | 0.70 | .25** | .23** | .72** | .71** | .64** | | |
| 7) Dependent | 3.49 | 0.65 | .43** | .39** | .74** | .72** | .67** | .72** | |
| 8) Independent | 3.55 | 0.63 | .47** | .45** | .72** | .69** | .67** | .69** | .85** |

**\*\* Correlation is significant at the 0.01 level (2-tailed)**

Additional analysis explored the impact of learning styles on perceptions of electronic assessment through direct and indirect effects. The competitive learning style had a significant direct positive effect on electronic assessment perception. Indirectly, both the competitive and independent styles positively influenced the perceptions, mediated by academic self-efficacy. In contrast, the collaborative style negatively influenced perceptions through self-efficacy mediation. In total, learning styles explained 30.2% of variance in self-efficacy directly and 64.8% of variance in perceptions of electronic assessment when considering both direct and indirect effects.

To further explore these relationships, a path analysis using structural equation modeling (SEM) was executed. This model tested direct relationships between learning styles and electronic assessment perceptions, electronic assessment perceptions and self-efficacy, and the mediating effect of self-efficacy between learning styles and electronic assessment perceptions. The SEM analysis revealed a significant direct correlation between learning styles and electronic assessment

perceptions (β = 0.25, p < 0.001), as well as between electronic assessment perceptions and self-efficacy (β = 0.35, p < 0.001), corroborating the first two hypotheses. Moreover, self-efficacy was confirmed as a significant mediator in the relationship between learning styles and electronic assessment perceptions. Specifically, significant indirect effects were found for competitive (β = 0.12, p < 0.05) and independent learning styles (β = 0.09, p < 0.05). The mediating effect of self-efficacy was insignificant for collaborative, dependent, contributory and avoidant learning styles.

## 5. Discussion

This study aimed to explore the correlations among electronic assessment perceptions, preferred learning styles and academic self-efficacy among undergraduate students. The findings of this study provide valuable insights that can guide the design and execution of electronic assessments in higher education. In contrast to prior research (Cardino & Ortega-Dela Cruz, 2020; Dash et al., 2020; Yearwood & Brathwaite, 2021), which commonly identified the collaborative learning style as the most popular among students, the current study revealed that the contributory learning style was the most preferred. The observed inconsistency could be attributed to the distinct attributes of the participants, who were selected from a Saudi Arabian private academic institution. This emphasizes the importance of accounting for cultural, social and educational backgrounds while analyzing the outcomes, as suggested by Zhao et al. (2021). This finding aligns with the perspective of educational theorists who argue for the importance of context in shaping learning experiences and preferences (Lehrl et al., 2020; Osher et al., 2020).

The findings of the study provide evidence for Hypothesis 1, revealing a significant and positive association between students' learning styles and their perceptions of electronic assessment, which is consistent with prior research (Binnahedh, 2022; Udeozor et al., 2022; van Rooyen, 2020). This finding underscores the significance of considering learning styles when creating electronic assessments, in line with the principles of differentiated instruction (Abdulrahim & Mabrouk, 2020; Marosan et al., 2022; Poirier & Ally, 2020). In addition, the second hypothesis is confirmed by the results of the study, which reveal a strong positive association between students' electronic assessment perceptions and their academic self-efficacy. This aligns with Bandura (2023) self-efficacy theory, which posits that an individual's belief in their capabilities significantly impacts their perceptions and behaviors. It indicates that increasing students' academic self-efficacy might lead to more positive perceptions and experiences with electronic assessments.

The research confirms the third hypothesis by providing evidence for the intermediary function of academic self-efficacy in the correlation between learning styles and attitudes towards electronic assessment. The mediation observed in this study was found to be significant only for competitive and independent learning styles. Interestingly, this mediation was only significant for competitive and independent learning styles, reflecting the findings of prior studies on the impact of individual learning styles on academic self-efficacy (e.g., D'Souza et al., 2023; Leow et al., 2021). However, the non-observed mediation

effect across all learning styles suggests the complexity of these relationships and implies the existence of other potential influencing factors, such as past experiences with electronic assessments. Therefore, a holistic approach should be taken when designing electronic assessments, considering multiple interacting factors that might impact students' perceptions (Hoang et al., 2022; Megahed & Ghoneim, 2022; Rajabalee & Santally, 2021; W. Zhang et al., 2021). These findings suggest that integrating a range of learning styles and promoting academic self-efficacy would be advantageous for the development and execution of electronic assessments.

## 5.1 Theoretical Implications

The results obtained from this study carry various significant theoretical implications. First, the findings indicate that the contributory learning style was favored by the Saudi Arabian undergraduate students who participated in the study. This observation contributes to the existing knowledge on the influence of cultural context on learning styles, as posited by Zhao et al. (2021). The deviation from the collaborative style points to a nuanced understanding of learning style preferences in different geographical and cultural contexts. Second, the observed significant correlations between students' perceptions of electronic assessment, their preferred learning styles and their academic self-efficacy offer empirical evidence to support existing theories. For instance, Bandura's (2023) self-efficacy theory emphasizes the role of self-efficacy beliefs in shaping students' perceptions of their academic tasks and environments, extending the applicability of Bandura's theory into the realm of digital education. Third, the results contribute to the body of knowledge around the mediating role of academic self-efficacy in the relationship between learning styles and perceptions of electronic assessment. However, the lack of a significant mediating effect across all learning styles suggests that other theoretical factors could be at play. This observation opens opportunities for further exploration of additional mediators or variables, such as cognitive, emotional or environmental factors, thereby advancing the theoretical landscape of learning styles and electronic assessment perceptions.

## 5.2 Practical Implications

The practical implications derived from this study offer significant insights for stakeholders in higher education settings, particularly those who are actively involved in the design and implementation of electronic assessments. A key finding of the study emphasized the preference for the contributory learning style among Saudi Arabian undergraduate students. This presents a call to action for educators and instructional designers, suggesting that they must consider these styles in their development of online assessments. As K. Zhang et al. (2021) noted, adaptation to various learning styles can lead to improved student engagement and academic outcomes. Therefore, tailoring assessments to accommodate the contributory learning style prevalent in this cultural context could enhance the receptivity and acceptance of electronic assessments.

The study also underscored the critical role of academic self-efficacy in shaping students' perceptions of electronic assessments. Consistent with Bandura's (2023) self-efficacy theory, students who believe in their academic abilities are likely to have more positive perceptions of their academic tasks. Hence, practitioners

should consider initiatives that reinforce students' academic self-efficacy, such as providing positive and constructive feedback (Adams et al., 2020), fostering a collaborative learning environment (Gan et al., 2022), and setting achievable goals (Musa, 2020). Implementing these measures could help cultivate more positive perceptions of electronic assessments.

Interestingly, this study also illuminated the importance of cultural context in learning styles. Recognizing that the preference for a contributory learning style among Saudi Arabian students may differ from other cultural groups, it is essential for multicultural educational settings to consider and cater to these cultural nuances (Zhao et al., 2021). By doing so, they can foster an inclusive learning environment that respects and addresses diverse learning preferences. Furthermore, the study suggested that other influential factors could be mediating the relationship between learning styles and perceptions of electronic assessments, given that academic self-efficacy did not have a significant mediating effect across all learning styles. In line with this, educators should be mindful of other potential influential factors, such as emotional and cognitive factors, when interpreting students' perceptions of electronic assessments.

Finally, the findings of this study should be incorporated into professional development programs for educators. By understanding the relationship between learning styles, academic self-efficacy and perceptions of electronic assessments, educators can adopt strategies that cater to diverse learning styles and promote academic self-efficacy (Baroudi & Shaya, 2022). Ultimately, this could enhance the efficacy of electronic assessments, leading to improved learning experiences and outcomes for students.

## 5.3 Limitations and Future Studies

This study indeed offers valuable insights into the relationship between learning styles, academic self-efficacy and perceptions of electronic assessments. However, there are a few limitations that should be recognized and addressed in future research. The first limitation applies to the study's participant demographics. Aside from gender, this study did not gather any further demographic details about the participants. This is noteworthy because demographic variables such as age, cultural background or educational level can significantly influence learning styles, academic self-efficacy and perceptions of electronic assessments (Alavudeen et al., 2021). Additionally, the study's sample demonstrated a gender imbalance. Future studies should aim to gather a more representative sample, including an even gender distribution, and explore how various sociodemographic factors influence the theoretical model.

The second limitation concerns the cross-sectional nature of this study. While cross-sectional studies can provide a snapshot of a particular point in time, they are less equipped to infer causality or examine how relationships between variables change over time (Maier et al., 2023). Thus, future research should consider employing a longitudinal design, which would enable tracking changes in perceptions of electronic assessments, academic self-efficacy and learning styles over a period of time, thereby helping to uncover causal relationships.

Thirdly, this study might have been subject to common method bias, considering the sole reliance on students' self-reported assessments (Jordan & Troth, 2020).

Such bias might potentially inflate the relationships among the variables of interest. Hence, future research should consider the inclusion of multiple methods or sources to collect data, such as combining self-assessments with teacher evaluations, thereby improving the robustness and validity of the findings.

Finally, the study could be expanded to include other potential mediators or moderators in the relationship between learning styles and perceptions of electronic assessments. For example, emotional intelligence or cognitive factors could be influential in this regard. The exploration of these additional factors may provide a more holistic understanding of the complex dynamics that underlie students' perceptions of electronic assessments.

## 6. Conclusion

In conclusion, this study provides noteworthy insights into the complex relationships among undergraduate students' perceptions of electronic assessment, their preferred learning styles and academic self-efficacy. The study's findings underscored that academic self-efficacy plays a significant mediating role in these relationships, with certain learning styles affecting students' confidence and beliefs about their capabilities, which in turn influenced their perceptions of electronic assessment. Significantly, these findings not only supported the initial study hypotheses but also extended existing knowledge in the field. It highlighted the direct and indirect effects of learning styles on perceptions of electronic assessment, with self-efficacy as a critical mediator, illuminating how these factors work in tandem to shape student experiences.

This research, however, is not without limitations, notably regarding participant demographics and the study design. Addressing these in future research will add more validity and robustness to the findings. Furthermore, integrating other potential mediating or moderating variables into the model could provide an even more comprehensive picture of the dynamics at play. Nonetheless, the present study contributes to the growing body of literature on electronic assessment and offers both theoretical and practical implications. It extends our understanding of the complex interactions among learning styles, academic self-efficacy and perceptions of electronic assessment, thereby providing valuable insights for educators, instructional designers and policymakers. As we navigate an increasingly digitized educational landscape, studies like these are vital in ensuring that pedagogical practices evolve to meet the diverse needs and preferences of learners effectively.

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