PREFACE

The SIG CS@e-Learning committee sincerely appreciates the dedication and contributions of the educators from Jabatan Sains Komputer & Matematik (JSKM), UiTM Penang Branch, in bringing the 9th edition to fruition. This edition received 30 scholarly articles, all of which met the required criteria and were accepted. Authors are encouraged to further refine their research with additional insights and discussions for potential publication in high-impact journals indexed by SCOPUS, WOS, or ERA.

The theme for the ninth volume, "Beyond Boundaries: The Multidimensional Horizons of E-Learning," reflects the continuous evolution of digital learning. Over the past few decades, e-learning has proven to be a transformative force in education, demonstrating exceptional adaptability and effectiveness. The widespread use of mobile technology has expanded its reach, making e-learning an essential component not only in higher education and vocational training but also in primary and secondary education. Emerging trends such as artificial intelligence (AI), micro-credentials, big data, virtual and augmented reality, blended learning, cloud-based platforms, gamification, mobile learning, the Internet of Things (IoT), and online video are reshaping the digital learning landscape.

SIG CS@e-Learning remains dedicated to fostering academic excellence through impactful publications. With continuous commitment and innovation, we aspire for JSKM to attain recognition in esteemed academic journals, further advancing the frontiers of e-learning.

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CORRELATION BETWEEN FORMATIVE ASSESSMENTS AND FINAL EXAMINATION PERFORMANCE IN A STATISTICS COURSE

*Siti Balqis Mahlan[1], Muniroh Hamat[2], Maisurah Shamsuddin[3] and Norazah Umar[4]
sitibalqis026@uitm.edu.my[1], muniroh@uitm.edu.my[2], maisurah025@uitm.edu.my[3], norazah191@uitm.edu.my

[1,2,3,4]Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding author*

ABSTRACT

This study investigates the correlation between formative assessments and final examination performance in a statistics course. The assessments include quizzes, tests, and group assignments, with the final exam serving as the dependent variable. A Pearson correlation analysis was conducted on a sample of 26 students. The findings reveal that Group Assignment has the highest correlation with the Final Exam ($r = 0.597$, $p < 0.05$), followed by Test ($r = 0.554$, $p < 0.05$), while Quiz shows no significant correlation ($r = 0.345$, $p = 0.085$ ($p > 0.05$)). Although Group Assignment exhibits the strongest correlation, its group-based nature may not accurately reflect individual student performance. In contrast, Test, conducted individually, emerges as a more reliable predictor of final exam outcomes despite its slightly lower correlation. Descriptive statistics indicate that Group Assignment has the highest mean score (84.885) while Quiz has the highest variability (SD = 17.6947). These results highlight the importance of considering assessment structure when evaluating student performance. The study provides insights for educators on optimizing formative assessments to enhance students' preparedness for summative evaluations.

Keywords: formative assessment, final examination, correlation, statistics, performance

Introduction

Assessment plays a crucial role in evaluating student learning and predicting academic success. Formative assessments, such as quizzes, tests, and group assignments, are designed to provide feedback and improve learning outcomes before the final summative assessment. However, the extent to which these formative assessments correlate with final exam performance remains an essential question in educational research. This study aims to examine the relationships between different formative assessment components and final exam performance in a statistics course. Educators can make informed decisions on assessment design to improve student learning by identifying which assessment types best predict final exam outcomes. In higher education, assessments serve not only as tools for measuring academic achievement but also as instruments for reinforcing learning. Studies have shown that well-structured formative assessments help students engage more actively with the course material and develop critical thinking skills. Quizzes, for example, are often used as low-stakes assessments to encourage regular revision and self-evaluation. Tests, on the other hand, provide a more comprehensive evaluation of students' understanding of key concepts, while group assignments foster collaboration and

application of knowledge to real-world problems. Despite their intended benefits, different types of formative assessments may impact student performance in varying ways. Quizzes may primarily assess short-term memory rather than deep understanding, while group assignments might not accurately reflect individual competency due to the collaborative nature of the task. In contrast, individually administered tests may serve as a better indicator of a student's grasp of the subject matter. Understanding the correlation between these assessments and final exam performance can help educators refine their instructional strategies and optimize assessment practices for better student outcomes. Moreover, the effectiveness of formative assessments in predicting final exam performance may depend on factors such as student motivation, study habits, and the alignment between assessment content and exam questions. This study seeks to bridge this gap by examining the correlation between different types of formative assessments and final examination scores, providing valuable insights for curriculum developers and educators looking to enhance student achievement through strategic assessment design.

Recent studies have explored the relationship between formative assessments and final exam performance in statistics courses. Morales et al. (2022) found that while passing or failing the final exam could be predicted using continuous assessment performance, precise grade forecasting was not possible. King (2023) reported a significant correlation between online formative assessment usage and exam performance in accounting. Kim et al. (2022) discovered that homework and in-class assignments predicted midterm exam grades, while homework and midterm exams predicted final exam performance in psychology courses. These studies highlight the potential of formative assessments in predicting and improving student performance, while also emphasizing the need for further research on their effectiveness across different disciplines and institutions. While some research indicates a moderate positive correlation between continuous assessment and final scores (Mgejwa, 2023), others suggest that precise grade prediction is challenging (María Morales et al., 2022). Factors such as assessment plan effectiveness may influence this correlation (Mgejwa, 2023). A model incorporating continuous assessment practices, teaching effectiveness, and students' personal studies has shown significant predictive strength for final grades (Agbonkpolo et al., 2020). Myombe & Mushi (2022) found strong positive correlations between CA scores and national exam results in Tanzania for multiple subjects, including biology, chemistry, physics, mathematics, and English. These findings emphasize the importance of continuous assessment in the learning process and its potential for predicting overall academic performance. However, the strength of this relationship may vary across different educational levels and subjects. Further research is needed to fully understand the complex interplay between continuous assessment and final exam outcomes across diverse educational settings.

Another research has explored the correlation between group assignments and final exam marks in higher education. A 2020 study of medical students found a moderate positive correlation (r=0.366) between peer assessment scores for group projects and final exam marks (Jamalludin Ab Rahman et al., 2020). However, earlier studies have shown mixed results. One study found no significant correlation between group and individual assessment marks (Plastow et al., 2010), while another reported varying correlations across different subjects, ranging from -0.033 to 0.228 (Adeeb et al., 2007). The use of peer assessment in group work has been investigated, with findings suggesting students take the process seriously and differentiate between group members' contributions (Johnston & Miles, 2004). These studies highlight the complexity of assessing group work and its relationship to individual performance, emphasizing the need for careful consideration when incorporating group assessments into overall grading schemes. Given the varying findings on the relationship between formative assessments and final exam performance, this study aims to contribute further insights into this area, specifically within the context of a statistics course. By analyzing the correlation between quizzes, tests, and group assignments with final exam scores, this research seeks to provide a clearer understanding of how different assessment components influence student achievement. The findings will not only inform educators on the effectiveness of their assessment strategies but also guide curriculum developers in designing assessment structures that better support student learning and success.

Methodology

This study employed a quantitative research design using Pearson correlation analysis to determine the relationship between formative assessments and final exam performance. Correlation analysis was chosen to measure the strength and direction of the relationships between different formative assessments and final examination scores. The sample consisted of 26 students enrolled in a statistics course. As this study is based on a case study approach, the sample size is limited to a single group of students from one class. The independent variables were scores from quizzes, tests, and group assignments, while the final exam score served as the dependent variable. Data were analyzed using SPSS software to determine correlation coefficients and statistical significance.

Figure 1 shows the bar chart of mean for Final Exam, Quiz, Test and Group Assignment. Descriptive statistics were computed to summarize student performance across different assessments. The results indicate that the mean score for the final exam was 72.962 (SD = 10.8027), while the coursework mean was 39.023 (SD = 4.9187). Among the formative assessments, Group Assignment had the highest mean score (84.885, SD = 9.1097), whereas Quiz exhibited the highest variability (SD = 17.6947), suggesting inconsistencies in student performance. These descriptive insights provide a

clearer understanding of student achievement across different assessment types, supporting the correlation analysis findings.

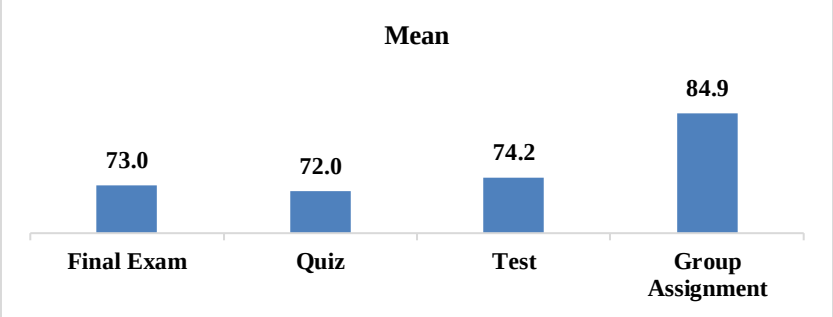

Figure 1: Mean for Each Assessment

Analysis and Findings

The correlation analysis reveals interesting insights into the relationship between formative assessments and final examination performance. Based on Table 1, the Pearson correlation results indicate that Group Assignment has the highest correlation with the Final Exam ($r = 0.597$, $p < 0.05$), followed by Test ($r = 0.554$, $p < 0.05$). Quiz, however, does not show a significant correlation with Final Exam performance ($r = 0.345$, $p = 0.085$ ($p > 0.05$)).

Table 1: Correlation Between Formative Assessments and Final Exam Scores

		Final_Exam	Quiz	Test	Group_Assignment
Final_Exam	Pearson Correlation	1	.345	.554**	.597**
	Sig. (2-tailed)		.085	.003	.001
	N	26	26	26	26
Quiz	Pearson Correlation	.345	1	.309	.134
	Sig. (2-tailed)	.085		.125	.513
	N	26	26	26	26
Test	Pearson Correlation	.554**	.309	1	.437*
	Sig. (2-tailed)	.003	.125		.026
	N	26	26	26	26
Group_Assignment	Pearson Correlation	.597**	.134	.437*	1
	Sig. (2-tailed)	.001	.513	.026	
	N	26	26	26	26

Although Group Assignment has the highest correlation, it is important to consider the nature of this assessment. Since it is completed in groups, students may benefit from peer contributions, which could inflate their individual scores. Collaboration in group assignments may help students reinforce their understanding, but it does not necessarily reflect their independent knowledge and exam readiness. On the other hand, Test is conducted individually, making it a more reliable indicator of a student's true understanding of the subject. Despite its slightly lower correlation than Group Assignment, Test remains a more relevant predictor of Final Exam performance as it assesses individual competency without external influences. Furthermore, Quiz exhibits the weakest correlation and is not statistically significant. One possible explanation for this is the content alignment between quizzes and the final exam. While quizzes covered Binomial, Poisson, Normal Distribution, and Sampling Distribution, only Normal Distribution and Sampling Distribution were tested in the final exam. The inclusion of topics not assessed in the final exam may have diluted the predictive power of quiz scores, explaining the weaker correlation observed.

In summary, while Group Assignment shows the strongest correlation with Final Exam, Test is a more meaningful predictor of student performance due to its individual nature. Additionally, the lower correlation of quizzes suggests that topic alignment between formative and summative assessments plays a critical role in determining their effectiveness as predictors of final exam performance. These findings highlight the importance of structuring formative assessments to accurately reflect students' knowledge and preparedness for summative evaluations.

Conclusion

This study examined the correlation between formative assessments and final exam performance in a statistics course. The results indicate that while Group Assignment has the highest correlation with final exam scores, Test serves as a more reliable predictor of individual performance. The findings suggest that assessment structure plays a crucial role in evaluating student learning. Educators should consider designing formative assessments that better align with summative assessments to enhance student preparedness. Future research could explore additional variables, such as student engagement and learning strategies, to further understand the factors influencing academic performance.

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SIG CS@e-Learning
Unit Penerbitan
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Kolej Pengajian Pengkomputeran, Informatik & Matematik
Universiti Teknologi MARA Cawangan Pulau Pinang

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