

# MERGING LANES: WHERE E-LEARNING DIVERSITY MEETS FUTURE TRENDS

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## **MERGING LANES: WHERE E-LEARNING DIVERSITY MEETS FUTURE TRENDS**

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## ANALYSIS OF PERFORMANCE AMONG PRE-DIPLOMA BUSINESS STUDENTS BASED ON ASSESSMENT COMPONENTS

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### ABSTRACT

*This study examined the continuous assessment performance of Pre-Diploma Commerce students through a quantitative case study approach. The continuous assessment comprised three components: a test on Arithmetic and Algebra, an individual assignment on the Application of Mathematics in Business and a group assignment on Basic Statistics contributing a total of 60% to the course assessment. 28 Pre-Diploma Commerce students participated in the study. Descriptive statistics, including mean and standard deviation, were used to analyse students' performance across the different assessment components, which covered distinct mathematical topics and skills. The findings revealed variations in students' performance across assessment types and content focus, reflecting differences in conceptual understanding and application skills. This study provides preliminary insights into students' achievement patterns in continuous assessment and highlights the importance of diversified assessment components in monitoring learning progress at the pre-diploma level.*

**Keywords:** *continuous assessment, pre-diploma students, mathematics performance, descriptive statistics, academic achievement*

### Introduction

Mathematics is a fundamental subject in pre-diploma programmes, particularly for commerce students who must apply mathematical concepts in business contexts. However, students at the pre-diploma level often struggle to master basic mathematical concepts due to weak foundational knowledge and limited prior exposure to abstract reasoning. These challenges may affect their performance, especially when different assessment components evaluate different types of skills and content areas. Continuous assessment plays an important role in monitoring students' learning progress throughout the semester. Unlike final examinations, continuous assessment allows educators to evaluate students' understanding through various forms of assessment, such as tests and assignments, which may focus on different topics and cognitive skills. In mathematics courses, assessment components often cover a range of topics, including arithmetic, algebra, applications in business, and basic statistics, each requiring distinct levels of conceptual understanding and application.

For Pre-Diploma Commerce programmes, understanding students' performance in continuous assessment is essential, as it provides early indicators of learning difficulties before the final

examination. Analysing coursework performance can help educators identify strengths and weaknesses in students' learning and evaluate the effectiveness of assessment strategies used in the course. Despite its importance, limited studies have focused specifically on continuous assessment performance among pre-diploma students, particularly within the context of mathematics education. Therefore, this study aims to analyse the continuous assessment performance of Pre-Diploma Commerce students through a case study approach. By examining students' achievement across different coursework components, this study seeks to provide preliminary insights into performance patterns that may inform teaching and assessment practices at the pre-diploma level. Continuous assessment has been widely adopted in higher education as an effective approach to monitor students' learning progress throughout a course. Unlike a single high-stakes final examination, continuous assessment allows educators to evaluate students' understanding through multiple assessment tasks conducted over time. Previous studies have suggested that continuous assessment supports learning by encouraging regular engagement with course content and providing opportunities for formative feedback (Hernández, 2012; Gibbs & Simpson, 2004). This approach is particularly important in mathematics education, where students often require continuous practice and reinforcement to develop conceptual understanding and procedural fluency.

In mathematics courses, different assessment components are often designed to evaluate different types of knowledge and skills. Test-based assessments typically focus on procedural knowledge and accuracy, while assignment-based assessments emphasise application, reasoning, and problem-solving skills (Brookhart, 2011). Studies have shown that students may demonstrate varying levels of performance depending on the nature of the assessment and the mathematical content being assessed (Smith & Walker, 2021). As a result, analysing students' performance across different coursework components can provide meaningful insights into their strengths and learning challenges. Group-based assessments have also gained attention in educational research, particularly for their potential to enhance learning through peer interaction and collaborative problem-solving.

Research indicates that group assignments may lead to higher achievement due to shared understanding and peer support, although they may not always reflect individual mastery equally (Johnson & Johnson, 2009). In contrast, individual assessments are more likely to capture students' independent understanding of mathematical concepts. These differences highlight the importance of examining multiple assessment components rather than relying on a single measure of achievement. For pre-diploma students, especially those enrolled in Commerce programmes, mathematics learning often presents additional challenges due to weak foundational knowledge and limited prior exposure to abstract concepts.

Studies have reported that pre-university students frequently struggle with algebraic manipulation and basic mathematical reasoning, which may affect their performance in test-based assessments (Tambychik & Meerah, 2010). However, application-based tasks and contextualised

assignments may help students better engage with mathematical content by relating it to real-world business situations. Despite extensive research on continuous assessment and mathematics learning, limited studies have focused specifically on analysing continuous assessment performance among pre-diploma students within a single cohort. In particular, there is a lack of descriptive case studies that examine students' achievement across different coursework components covering distinct mathematical topics. Therefore, this study addresses this gap by providing a focused analysis of continuous assessment performance among Pre-Diploma Commerce students, offering preliminary insights into assessment-based achievement patterns at the pre-diploma level.

### **Methodology**

This study employed a quantitative descriptive case study design to analyse the continuous assessment performance of Pre-Diploma Commerce students in a mathematics course. A case study approach was adopted to allow an in-depth examination of assessment outcomes within a specific cohort, without the intention of making broad generalisations. The participants in this study were 28 Pre-Diploma Commerce students from a higher education institution. A census sampling approach was used, whereby all students enrolled in the course were included in the study. The cohort represented students with diverse academic backgrounds typically found at the pre-diploma level.

The course assessment structure comprised continuous assessment and a final examination. However, this study focused solely on the continuous assessment components, which contributed 60% of the total course assessment. The continuous assessment included a test on Arithmetic and Algebra, an individual assignment on Mathematics in Business and a group assignment on Basic Statistics. Each component assessed different mathematical topics and skills, including procedural knowledge, application of concepts, and basic statistical understanding. The final examination, which covered the topics of Equations and Functions, Business Mathematics, Basic Statistics and Sequences was excluded from the analysis as the results were not available at the time of data collection. Data were collected from students' coursework records obtained during the semester. The scores for the test, individual assignment, and group assignment were compiled and anonymised prior to analysis to ensure confidentiality. Only numerical scores related to continuous assessment were included in the dataset.

Data analysis was conducted using descriptive statistical methods. Measures such as mean, standard deviation, minimum, and maximum scores were used to summarise students' performance for each assessment component. The analysis aimed to provide an overview of performance patterns across different types of continuous assessment rather than to conduct inferential comparisons.

### **Results and Discussion**

The analysis of continuous assessment performance among the 28 Pre-Diploma Commerce students revealed differences across the three coursework components. Table 1 presents the descriptive statistics for students' performance in the continuous assessment components: the test, individual assignment, and group assignment. The statistics include the mean, standard deviation, minimum, and maximum scores, providing an overview of students' achievement and the distribution of scores in each component.

Table 1: Descriptive Statistics of Test, Individual Assignment, and Group Assignment Scores

	Test	Individual Assignment	Group Assignment
<b>Mean</b>	78.5	97.5	89.8
<b>Minimum</b>	26.3	85.0	80.0
<b>Maximum</b>	96.3	100.0	100.0
<b>Standard Deviation</b>	18.4	3.7	7.5

The mean score for the test, which covered Chapter 1 (Arithmetic and Algebra), was 78.5, with a minimum of 26.3 and a maximum of 96.3. The test's standard deviation was 18.4, indicating relatively wide variation in students' performance on this component. For the individual assignment on Chapter 3 (Introduction to the Application of Mathematics in Business), the mean score was notably higher at 97.5, with a minimum of 85.0 and a maximum of 100.0. The standard deviation was only 3.7, suggesting that students performed consistently well in this assessment, with relatively little variation in scores. The group assignment on Chapter 4 (Introduction to Basic Statistics) showed a mean score of 89.8, a minimum of 80.0, and a maximum of 100.0, with a standard deviation of 7.5. This indicates that, while students generally performed well on the group assignment, there was slightly greater variability in scores than on the individual assignment. Overall, the results suggest that students performed best in the individual assignment, followed by the group assignment, with the test showing the greatest variation in performance. These findings highlight differences in achievement patterns across assessment types and the skills required for each coursework component.

The findings of this study reveal notable differences in students' performance across the three continuous assessment components. The individual assignment on the application of mathematics in business had the highest mean score (97.5) and the lowest variability, suggesting that students performed consistently well when applying mathematical concepts in a contextualised, practical setting. This result aligns with previous research indicating that application-based tasks and contextualised assignments can enhance students' engagement and achievement, particularly for learners with weaker foundational skills (Tambychik & Meerah, 2010; Smith & Walker, 2021). The high performance in the individual assignment also highlights the potential benefit of allowing students to work independently with clear instructions and real-world scenarios.

The group assignment on basic statistics produced a slightly lower mean score (89.8) and greater variability ( $SD = 7.5$ ) than the individual assignment. This suggests that while collaborative tasks may support learning through peer interaction and shared problem-solving, differences in group dynamics and individual contribution may influence overall scores. These findings are consistent with prior studies emphasizing that group assessments can enhance learning but may not always reflect each student's independent understanding of the subject matter (Mohamad, 2023; Johnson & Johnson, 2009). In contrast, the test on arithmetic and algebra showed the lowest mean score (78.5) and the highest variability ( $SD = 18.4$ ), indicating that students struggled more with this assessment component. This aligns with the existing literature, which highlights that procedural and test-based assessments often challenge pre-diploma students, particularly in topics requiring foundational mathematical skills and timely problem-solving under exam conditions (Brookhart, 2011; Hernández, 2012). The wide variation in test scores suggests differences in individual preparedness and mastery of basic concepts, underscoring the importance of continuous practice and reinforcement in mathematics learning.

Overall, the results demonstrate that students' performance is influenced by both the type of assessment and the cognitive skills required. Application-based and collaborative assessments appear to support higher achievement and more consistent performance, while traditional tests may reveal learning gaps and variability in students' understanding. These findings reinforce the importance of implementing diverse assessment strategies in pre-diploma mathematics courses to capture a more comprehensive picture of students' learning outcomes and to provide formative feedback for improvement (Gibbs & Simpson, 2004; Brookhart, 2011).

## **Conclusion**

This study examined the continuous assessment performance of Pre-Diploma Commerce students using a quantitative, descriptive case study approach, focusing on coursework components that accounted for 60% of the total course assessment: the test, individual assignment, and group assignment. The findings revealed clear variations in students' performance across assessment components, indicating that the type of assessment and the nature of the mathematical skills being evaluated play important roles in shaping achievement patterns. The individual assignment, which emphasised the application of mathematics in business contexts, recorded the highest mean score with minimal variability, suggesting that contextualised and application-based tasks are particularly effective in supporting consistent performance among pre-diploma students. This outcome highlights the importance of designing assessments that connect mathematical concepts to real-world situations, especially for students who may struggle with abstract reasoning. The group assignment on basic statistics also demonstrated relatively strong performance, reflecting the potential benefits of collaborative learning through peer interaction and shared problem-solving; however, the observed variability in scores suggests that group

dynamics and individual contribution may influence outcomes. In contrast, the test component, which focused on arithmetic and algebra, exhibited the lowest mean score and the widest variation in performance, underscoring persistent challenges in foundational mathematical skills and differences in students' preparedness and test-taking abilities. These findings emphasise the value of continuous assessment as a diagnostic tool, enabling educators to identify learning gaps early and provide timely support before the final examination. Although this study offers useful preliminary insights into assessment-based performance patterns, it is limited by its focus on a single cohort and the exclusion of final examination results, which restricts broader generalisation of the findings. Future research may extend this work by incorporating final examination performance, examining relationships between coursework and summative assessment, and involving larger or multiple cohorts to strengthen the robustness of the conclusions. Nevertheless, the present study contributes meaningful evidence to the understanding of continuous assessment practices in pre-diploma mathematics education and supports the use of diverse assessment strategies to enhance student learning and academic development.

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