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Beyond Familiarity: The Impact of Student Expectations and Learning Strategies on Academic Performance

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Abstract

This study examines differences in students' performance on familiar examination questions and questions that had not been previously encountered. A comparative document-based design was adopted. Data consisted of responses from 353 undergraduate students in an examination. Performance was analyzed using two examination questions covering topics that had been taught during lectures. The results showed a huge difference in students' performance. Only 0.6% of students, compared to 40%, answered the question that had not been previously encountered correctly. A paired sample t-test revealed a statistically significant difference between the mean scores ($p < 0.05$). In addition, a weak positive correlation was observed between performance on the two items ($r = 0.125$). These findings suggest a strong influence of question familiarity on examination performance. It is recommended that educators employ instructional and assessment practices that enhance conceptual understanding and expose students to a wide range of problem types.

Keywords: Question Familiarity, Schema Theory, Assessment, Higher Education, Academic Performance

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INTRODUCTION

Examinations remain a cornerstone of educational systems worldwide, it serves as critical tools for evaluating student learning and academic achievement. However, examinations are also widely recognised as stressful, prompting students to adopt various preparation strategies, such as practising past questions, analysing question types, and predicting likely topics, to enhance their performance (Sayin, 2015). While such strategies may improve short-term readiness, they also shape students' expectations and learning behaviours. These strategies may not always align with the intended goals of assessment, such as the development of conceptual understanding and problem-solving skills. Emerging research indicates that the alignment or misalignment between students' expectations and actual test demands can significantly influence academic performance (Kim & Benek, 2020; Farooq et al., 2021). Students who often rely heavily on the pattern of past questions may achieve success when examinations follow the same patterns. However, this may limit their ability to engage with items when new questions are introduced. Hence, assessment practices must not only measure achievement but also guide students to engage with instructional content that enhances their ability to transfer their knowledge to different contexts.

In Ghana, many students enter the university after completing and passing the West African Senior Secondary Certificate Examination (WASSCE). During WASSCE, many students cultivate the habit of practising with examination questions. This strategy is a common and often effective way of preparing for WASCCE in Ghana. This examination-oriented approach, which emphasises recognition of familiar question types, frequently shapes students' study habits and assessment expectations. Consequently, some students carry these habits into higher education, where assessment demands often require conceptual understanding and the ability to apply the knowledge gained in answering questions. Most students find it difficult to adjust to the assessment demands due to the habit cultivated in the Senior High Schools. According to Sweiry, Crisp, Ahmed and Pollitt (2002), when examination questions deviate from expected formats, students may misinterpret them through pre-existing mental frameworks, leading to errors in comprehension and execution

Cognitive psychology defines these mental frameworks as schemas. Schemas, which were originally developed by Bartlett (1932) and Piaget (1952) is defined as organised structures of prior knowledge that influence how individuals perceive, interpret, and respond to information. In assessment, examination-related schemas can shape how students read and respond to test items. When learning is dominated by rote memorisation and pattern recognition, students may struggle with questions that require conceptual understanding or the application of knowledge to an unfamiliar context (Rouijel, Bouziane, & Zohri, 2019; Jamiai & Karfa, 2022). This is particularly evident in mathematics, where students are expected to apply concepts they learn to solve real-life problems. Over-

reliance on familiar question formats and practice can limit the development of critical thinking and problem-solving skills by reinforcing pattern recognition at the expense of reasoning (Sharif, Lee, Ab Rahman, Lee, 2021). Research suggests that integrating conceptual and procedural knowledge enhances students' ability to solve new question formats and transfer learning beyond examples that have been practised (Rittle-Johnson, Schneider, & Star, 2015). Similarly, research indicates that students who rely heavily on the patterns of examination questions may experience increased anxiety when confronted with new items, which can negatively affect performance (Barroso, Ganley, McGraw, Geer, Hart, & Daucourt, 2021). These studies highlight the importance of instructional and assessment strategies that prepare students not only for predictable examination formats but also for the application and transfer of knowledge in different contexts.

Previous studies have examined the effects of active learning, formative assessment, feedback, and learning strategies on academic performance (Abeysekera & Dawson, 2015; Brown & Race, 2019). Research on expectancy and achievement suggests that unmet expectations may heighten anxiety and reduce working memory capacity, thereby impairing performance (Zeinder & Matthews, 2005), whereas aligned expectations can enhance motivation and academic outcomes (Pekrun et al., 2017). In Ghana, there remains limited empirical evidence within higher education that specifically investigates how students' assessment expectations influence performance. This study, therefore, seeks to investigate how familiarity and unfamiliarity with examination question formats influence student performance in a university examination in Ghana.

Problem Statement

Research indicates that the design of assessment tasks plays a significant role in shaping students' learning behaviours and expectations, influencing how they engage with content and allocate cognitive resources (Brookhart, 2018). When students are repeatedly exposed to predictable question formats, they become experts in practising procedures and are less prepared answer unfamiliar questions. Tasks with unfamiliar formats can impose higher processing demands on students' cognitive domain, making it difficult to apply previously learned knowledge effectively when they move beyond practised examples (Sweller, 2019; Rittle-Johnson, Schneider, & Star, 2015).

In mathematics, however, students are not only expected to recall procedures but also to apply learned concepts to non-routine problems that require critical and higher-order thinking skills. Unfortunately, preparation for examinations, such as the WASSCE, is often dominated by extensive practice and memorisation of past questions. This strategy helps students become familiar with likely examination questions and formats. It may also encourage the development of strong examination-related schemas. The problem becomes evident when students transition into higher education. These examination-oriented habits persist and continue to shape how they learn and prepare for examinations

in the university. As a result, when students encounter examination questions that deviate from expected formats, their performance may decline. This decline in performance may not be due to the demand of the question but anxiety, which may negatively affect their performance and problem-solving skills (Barroso et al., 2021).

Despite the role examinations play in higher education in Ghana, there remains limited empirical evidence which examines how familiarity and unfamiliarity with examination question formats affect student performance at the university level. Few studies have compared student performance on familiar and previously unseen examination question formats. This gap limits understanding of how assessment practices shape learning outcomes.

Purpose of the Study

The purpose of this study is to examine and compare students' performance on familiar and previously unseen examination questions.

Research Question

The research question that guided the study was: To what extent do familiar and previously unseen examination questions affect the performance of students?

Signifiance of the Study

The findings of this study are significant for instructional and assessment practices in higher education. The study also contributes to ongoing discussions about assessment practices that encourage conceptual understanding rather than rote memorisation. The results highlight the role of question format in students' performance. The study may inform mathematics educators and curriculum designers about the importance of integrating varied question formats during instruction, which will better prepare students for higher-order thinking and problem-solving. The study offers context-specific insights relevant to higher education in Ghana. Policy makers, assessment developers, and university lecturers may use the findings as a guide to inform the design of assessment tasks that support students' ability to transfer knowledge to solve problems in different contexts.

LITERATURE REVIEW

In many higher education contexts, where assessment outcomes carry high stakes, students tend to focus their efforts on what they believe is most likely to be examined. As a result, preparation for examination may prioritize familiar or past questions, sometimes at the expense of conceptual understanding. The exposure to particular forms of assessment repeatedly by students gradually forms expectations that shape their motivation, engagement, and study behaviours (Brookhart, 2017; Andrade & Brookhart, 2019). When instructional goals and assessment practices are well aligned, these expectations can support effective learning. However, when students' expectations do not align with assessment demands, they may have difficulties, especially in high-stakes environments.

One theory that explains the problems linked to students' expectations is cognitive dissonance theory. This theory posits that people experience discomfort when what they expect does not match what actually happens (Festinger, 1958). In an examination setting, this discomfort can arise when students anticipate particular question formats but encounter questions that are structured differently. Such a situation may cause learners to feel confused, anxious, or unsettled, even if they are academically good. While Festinger's theory provides a foundational explanation, recent studies explain this discomfort in terms of emotional and cognitive disruption during testing. Meta-analytic evidence demonstrates a consistent negative relationship between anxiety and academic performance in mathematics, suggesting that expectation mismatch can impair performance and reduce performance outcomes (Barroso et. al., 2021).

Another useful framework for understanding student respond to assessment is schema theory, originally developed by Bartlett (1932) and Piaget (1952). Schema theory explains how individuals make sense of new information based on their prior experiences. In educational settings, students gradually develop schemas through repeated exposure to similar instruction and assessment practices. Over time, this helps them recognise common patterns in questions and anticipate what is expected of them. In examination, many students form assessment-related schemas through regular practice with past questions. These schemas often guide how students read and solve questions. However, when an examination introduces different formats that do not fit the previous patterns of questions, students may struggle to interpret the question correctly. In such situations, they may find it difficult to identify the correct method to use, even when they have learnt the concept being assessed. Although schema theory provides a helpful explanation for these responses, recent research suggests that over-reliance on familiar structures can limit students' ability to apply learned concepts to unfamiliar questions, particularly in mathematics (Rittle-Johnson, Schneider & Star, 2015).

Research indicates that students frequently rely on strategies such as rote memorisation, repetition, and recognition of familiar patterns expecially in examinations (Bjork, Dunlosky, & Kornell,

2013; Morehead et al., 2016). While such strategies can enhance performance on predictable tasks, students may feel confident during preparation but will struggle when tasks demand higher-order thinking, interpreatation or transfer. Studies in assessment research reinforce this concern, demonstrating that predictable assessment formats may unintentionally encourage surface-level learning unless instructional and assessment designs deliberately promote deeper engagement with content (Brookhart, 2017; Andrade & Brookhart, 2019). Instructional approaches that incorporate varied problem types, formative assessment, and meaningful feedback have been shown to better support conceptual understanding and adaptive learning behaviours (Brown & Race, 2019).

Performance differences between familiar and unfamiliar questions are often explained using the distinction between procedural fluency and conceptual understanding, as learners who rely primarily on procedural knowledge may struggle to transfer learning to new problem formats (National Research Council, 2001). When students repeatedly practice particular examples, they may develop strong procedural skills that are closely tied to familiar examination formats. Research shows that conceptual and procedural knowledge interact dynamically during problem-solving and that success on routine tasks does not necessarily translate to non-routine tasks (Rittle-Johnson, Schneider, & Star, 2015). In mathematics, non-routine problems are widely recognised as important for assessing conceptual understanding, as they require interpretation, strategy selection, and reasoning beyond memorisation (Gavaz, 2021)

In Ghana, many students entering the university come from secondary school environments where high-stakes examinations, such as WASCCE is closely associated with memorising responses to past questions and reproducing taught procedures. While these practices can be effective in predictable assessment systems, they may conflict with expectations of higher education, where independent learning, critical thinking, and conceptual understanding are emphasised. When university assessments introduce unfamiliar question formats, students may struggle to adapt, often resulting in frustration, anxiety, and underperformance.

METHOD

The research methodology used in this study was quantitative in nature. A comparative document-based research approach was adopted to examine differences in students' performance on familiar and unfamiliar questions. Document-based research involves the systematic examination of archival records and educational records (Cohen, Manion, & Morrison, 2018). The data was secondary data derived from existing examination scripts, which allowed the researcher to examine the difference in performance.

Data were drawn from a university end-of-semester examination administered to Level 300 undergraduate students. These students were enrolled in a Numerical Methods course in the Department of Mathematics Education. In total, 353 students sat for the examination. All students responded to the same examination paper under the same conditions. The dataset consisted of students' written responses and scores on the two selected questions. The questions assessed content in numerical analysis, but the extent to which students had been exposed to the question formats differed. The researcher compared performance across the two question types by individuals. The two questions were purposively selected based on their level of familiarity.

Question 1a was categorised as a previously unseen question. In this study, the term previously unseen refers to a novel examination item format rather than a concept that has not been taught. The question required students to apply the Central Divided Difference method to longitudinal data derived from Usain Bolt's 100-metre sprint times to estimate the rate of change after five years and determine an error bound. Although the content had been taught, the structure and context of the question had not been encountered during lectures. Question 1b was categorised as a familiar question. It involved estimating the velocity of a rocket using cubic Lagrangian interpolation based on a table of time-velocity data. Students had been exposed to a similar structure of questions during lectures.

Students' responses were analysed using content analysis and count frequencies. For Question 1a, responses were coded into three categories, that, "Did not attempt", "Tried to model", and "Used the model". For Question 1b, responses were coded as "Did not attempt", "Attempted question", and "Correct solution". Frequencies and percentages were used to describe the performance for each question. In addition to coding, the total score for each students were used for statistical analysis. Descriptive statistics were used to summarise performance on each question. A paired sample t-test was conducted to determine whether there was a statistically significant difference between students' mean scores on the two questions.

The data used in the study were existing responses and scores from examination scripts; hence, no direct interaction with students occurred. All student identities were anonymised before and during analysis. Codes were used to identify each script, and the data were used solely for research purposes. The researcher sought permission to access and analyse the examination scripts through the appropriate departmental procedures. Also, standard ethical principles relating to confidentiality and responsible data handling were observed.

RESULTS AND FINDINGS

This section presents the analysis of the data gathered. Table 1 presents the responses of students to question 1a.

Table 1. Frequencies on Question 1a

Question 1a	Frequency	Percent
Did not attempt	294	83.3
Tried to model	57	16.1
Used the model	2	0.6
Total	**353**	**100.0**

Table 1 presents the frequency and percentage distribution of students' responses to Question 1a, which required the application of a provided numerical method to real-world data. The results indicate that the majority of students (83.3%) did not attempt the question at all. This high rate of non-response suggests a lack of familiarity with the question format. Additionally, 16.1% of the students attempted to model the question, indicating a tendency to construct a polynomial model whenever they encounter tabular data. Notably, only two students (0.6%) were able to apply the provided model correctly, highlighting a significant gap between the question's demand and students' readiness to engage with an unfamiliar question format.

Table 2 presents the students' responses to question 1b. Students solved a similar question, which had different values in class.

Table 2. Frequencies on Question 1b

Question 1b	Frequency	Percent
Did not attempt	92	26.1
Attempted question	119	33.7
Correct solution	142	40.2
Total	**353**	**100.0**

Table 2 presents the frequency and percentage distribution of students' responses to Question 1b, which was a familiar question type that students had encountered during lectures. The data reveal that a substantial proportion of students (73.9%) attempted to solve the question. Of these, 40.2% provided correct solutions. The proportion of students who attempted and obtained a correct solution to Question 1b indicates that students are more confident in engaging a question they have encountered than one they have not. Unlike Question 1a, the results in Table 2 indicate a higher success rate for

Question 1b. The results suggest that prior exposure to a question type significantly enhances students' confidence and problem-solving. Furthermore, 33.7% of students attempted but did not arrive at a correct solution, an indication that familiarity could aid engagement. Notably, only 26.1% did not attempt the question, far lower than the 83.3% non-response rate for Question 1a.

Results of Paired Sample t-Test

This section presents both descriptive and inferential statistics of students' performance on the two questions. Table 3 presents the descriptive statistics of students' performance.

Table 3. Descriptive Statistics

Question	Mean	N	Std. Deviation	Std. Error Mean
1a	0.54	353	1.316	0.070
1b	5.03	353	4.239	0.226

As shown in Table 3, the mean score for Question 1b (5.03) is significantly higher than that for Question 1a (0.54), out of a total of 10. This indicates that students perform substantially better on the familiar question (1b) than on the unfamiliar one (1a). The standard deviation also reveals greater variability in scores for Question 1b (4.239), suggesting a wider range of performance levels compared to Question1a (1.316).

To determine whether the difference in means was statistically significant, a paired sample t-test was conducted. The results are shown in Table 4.

Table 4. Descriptive Statistics

Question	N	Correlation	Sig.
1a - 1b	353	0.125	0.019

Table 4 presents the results of a correlation analysis between the two questions. Table 4 shows a weak positive correlation (0.125) between questions 1a and 1b. The analysis revealed a weak positive correlation between performance on the two questions (r=0.125, p-0.019), indicating that students who performed well on one question tended, to a limited extent, to perform well on the other. However, the small magnitude of the correlation suggests that performance on the previously unseen question 1a was a poor predictor of performance on the familiar question 1b. This finding indicates that success on the familiar question did not strongly depend on students' ability to solve the unfamiliar question.

Table 5 presents the results of the paired sample t-test. This test was used to establish whether there was a significant difference between each student's performance on questions 1a and 1b.

Table 5. Paired Differences

	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Scores	4.493	4.279	0.228	-4.941	-4.045	19.729	352	0.001

The paired samples t-test revealed a statistically significant difference in students' performance between Question 1a and Question1b, with a mean difference of 4.493, a t-value of 19.729 df=352), and a p-value of less than 0.05. These findings indicate that students performed better on the familiar question than on the unfamiliar one.

DISCUSSION AND CONCLUSION

The findings of this study indicate that students' expectations and familiarity with examination formats play a significant role in their academic performance and decision-making. Although Question 1a was straightforward, a large proportion of students chose not to attempt it. On the other hand, a lot of students were confident to attempt Question 1b, despite the fact that it was more demanding. This pattern shows that students' willingness to attempt an examination question was influenced by their prior exposure to the question format. This is consistent with the schema theory, which explains how repeated exposure to particular task formats leads students to develop mental frameworks that guide their interpretation of assessment demands (Bartlett, 1932; Piaget, 1952). When examination questions align with these established schemas, students can readily recognise solution pathways and proceed with confidence. However, when questions deviate from familiar formats, students may struggle to interpret task demands.

Sweiry et al. (2002) stated that students' expectations formed through repeated exposure to certain assessment patterns influence how they approach examination tasks. The findings of this study extend this by demonstrating that schema-driven avoidance can occur even when the unfamiliar questions are not more difficult. This suggests that some students find it difficult to transfer learned concepts beyond what they have practised, particularly in high-stakes examinations. Additionally, studies have shown that predictable examination formats tend to shape students' learning behaviours, often encouraging performance-oriented strategies focused on reproducing familiar procedures rather than engaging in conceptual reasoning (Brookhart, 2017; Andrade & Brookhart, 2019). In this study, students' preference for familiar Question 1b is a reflection of such conditioning. While familiarity may

facilitate performance and engagement, it may also hide gaps in conceptual understanding and limit students' ability to apply knowledge in unfamiliar assessment items.

Furthermore, affective factors such as test anxiety and a mismatch in expectation provide an additional lens to interpret the avoidance of Question 1a. When students encounter unfamiliar question formats, their anxiety may increase, which could interfere with effective problem-solving skills. Meta-analytic evidence has demonstrated that there is a negative relationship between mathematics anxiety and achievement, indicating that affective factors play a role in shaping performance (Barroso et al., 2021). In this study, the greater willingness of students to attempt the familiar but more demanding Question 1b suggests that familiarity may have reduced students' anxiety. On the other hand, students' reluctance to attempt Question 1a may reflect avoidance behaviour driven by uncertainty and fear of failure, rather than an accurate assessment of task difficulty.

Also, the findings draw attention to the limitations of surface-level learning strategies. Research has shown that surface learning approaches can create an illusion of competence that breaks down when learners are required to apply knowledge (Bjork et al., 2013; Morehead et.al., 2016). In this study, students who were comfortable attempting interpolation tasks struggled to answer questions on divided difference. This could be attributed to the fact that the question on divided difference required students to apply their knowledge in a question with an unfamiliar structure. The results point to a broader challenge in higher education, where success in earlier high-stakes examinations (WASCCE) is often associated with memorisation of past questions. When such habits are carried into the university, students may struggle to adapt to the assessment practices that prioritise conceptual understanding and problem-solving. Addressing this challenge requires a shift in both instructional and assessment priorities. Rather than training students to anticipate specific questions, educators may need to emphasise conceptual understanding and expose learners to a variety of problem types. Such practices have been shown to support deeper learning and improve students' ability to transfer knowledge to unfamiliar contexts (Andrade & Brookhart, 2019).

In conclusion, the contrasting responses to Questions 1a and 1b reflect a complex interaction between assessment design, learning strategies, cognitive schemas, and affective factors such as anxiety. While familiarity can enhance confidence and reduce anxiety, excessive dependence on familiar formats may limit intellectual growth and hinder the development of transferable problem-solving skills.

Limitations and Delimitations

This study was delimited to the analysis of existing end-of-semester examination scripts. These documents were selected because they offered direct and authentic evidence of students' academic

performance under examination conditions. By focusing on examination data, the study prioritised ecological validity and avoided the potential influence of researcher intervention. However, this delimitation also means that the analysis focused on outcomes only, rather than the affective processes that may have shaped students' behaviour during the examination.

Also, the study was limited in scope, and the analysis focused on familiar and previously unseen question formats. As a result, the findings may not be generalizable to other disciplines where instructional practices and assessment differ. Despite these limitations, the use of authentic examination data strengthens the validity of the study. It also provides a strong basis for understanding how question familiarity relates to student performance in real assessment settings.

Implications

The findings of this study have important implications for instructional practice and assessment design in higher education. In particular, they highlight the need to align teaching, learning, and assessment. Educators are encouraged to use a variety of question types during lectures and tutorials to build students' confidence in tackling unfamiliar problems. Instructional practices should place greater emphasis on conceptual understanding and higher-order thinking.

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