Ghana Journal of Education: Issues and Practices (GJE)
Vol. 8, December 2022, pp. 58 - 92

Students' Level of Academic Cognitive Engagement in the Learning of Economics

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Abstract
This study examined students' level of academic cognitive engagement in the learning of Economics. The study was a quantitative research that employed the descriptive cross-sectional survey design. In total, 422 Senior High School Economics students were selected for the study. The Academic Cognitive Engagement Scale (ACES) was used to gather data for the study. Descriptive statistics (frequencies, percentages, mean and standard deviation) and inferential statistics (One-Way MANOVA) were used to analyse the data. The study revealed that Economics students' level of academic cognitive engagement was high. Also, it was found that there were statistically significant differences in Economics students' level of academic cognitive engagement based on their school location. In addition, the study showed that there were statistically significant differences in Economics students' academic cognitive engagement based on school category. Therefore, it was recommended that teachers should continue to engage students in instructional activities that require students to use deep strategies. Additionally, teachers in rural schools should employ teaching strategies that would help students employ deep learning strategies in the learning of Economics. Lastly, in the organisation of Continuous Professional Development (CPD) programmes and seminars for teachers on how to sustain and improve the cognitive engagement level of students, equal attention should be given to all the students in the various school categories. The practical implications of the findings are discussed in the study.

Keywords: *Academic Engagement, Cognitive Engagement, Deep Strategy, Reliance, Surface Strategy*

Introduction

As our society progresses, it is imperative for the educational system to adapt in order to fulfil its changing needs. According to Bertel-Narvaez, Viloria-Escobar and Sánchez-Buitrago (2019),

educational institutions recognise the importance of delivering high-quality teaching, and providing professional development opportunities for students. These educational institutions strive to ensure that education is suitable, logical, interactive, enjoyable, and practical, as stated by Markopoulos, Einolander, Vanharanta, Kantola and Sivula (2019) (2019). Consequently, student engagement has emerged as a significant concern for teachers and institutions, leading to the recognition of the need to measure it as a valuable tool (Markopoulos et al., 2019). Different definitions have been provided for the multidimensional concept of students' academic engagement (Balwant, 2018). One such definition, presented by Guz and Tetiurka (2016), describes it as "the extent and manner of involvement manifested by learners in relation to academic activities" (p. 136). According to Bedenlier, Bond, Buntins, Zawacki-Richter and Kerres (2020), student engagement is characterised as the physical or mental energy and effort exerted by students within their academic setting. Hiver, Al-Hoorie, Vitta and Wu (2021) recently defined the concept of student academic engagement, stating that it encompasses both the quantity and quality of learners' active participation and involvement in a learning activity (p. 2). Zhou, Guan, Ahmed, Ahmed, Jobe and Hiramoni (2021) suggest that a heightened level of student engagement leads to profound learning, active participation, and a favourable reaction to challenges.

The conceptualization of students' engagement involves a comprehensive model that considers emotional, cognitive, and behavioural aspects (Bedenlier et al., 2020; Christenson et al., 2012; Doğan, 2014). These dimensions provide a holistic approach to studying engagement. Emotional or affective engagement focuses on students' interests and responses within the classroom (Skinner et al., 2009; Xie et al., 2019). The behavioural dimension encompasses classroom activities such as active participation and voluntary contributions (Doğan, 2015).

Cognitive engagement plays a crucial role in predicting classroom learning outcomes, as it involves the extent of students' psychological investment in the learning environment (Fredricks et al., 2005). In the study conducted by Rotgans and Schmidt (2011), cognitive engagement was defined as the willingness and ability of students to undertake the learning task at hand (p. 467). It encompasses a commitment to learning, and the capacity to strategically plan the learning process (Doğan, 2015). Moreover, cognitive engagement

entails students' effort to comprehend their learning and establish connections between the learned content and real-life problems over an extended period of time (Iqbal et al., 2022). All the research studies examined in this review provide evidence in supporting the notion that cognitive engagement involves students' capacity and willingness to comprehend the content taught in the classroom. The focus of the present study was specifically on the cognitive dimension of students' academic engagement. The rationale behind this choice is based on previous findings by Arthur and Akwetey (2021), and Chew and Cerbin (2021), which identified various cognitive obstacles that hinder effective learning, including students' mental mindset, inadequate prior knowledge, ineffective learning strategies, and limitations in mental effort. These challenges, as revealed by the studies, can lead to disengagement of students during the learning and instructional process. Consequently, the present study aimed at investigating the levels of academic cognitive engagement among Economics students in senior high schools.

Kong et al. (2003) conceptualised cognitive engagement into three dimensions: surface strategy, deep strategy, and reliance. They claimed that these domains encompass various learning strategies and approaches, such as memorisation techniques, test preparation methods, understanding question formats, summarising learned information, seeking guidance from teachers, making connections between new and existing knowledge, and integrating different learning methods. According to Kong et al., surface strategy involves memorisation, practicing for and handling of tests. Also, they defined deep strategy as the students' understanding of questions, summarising what is learnt and connecting new knowledge with previous ones. Lastly, reliance involves students' dependence on teachers for the understanding of the content delivered in the classroom. This current study focused on these three dimensions proposed by Kong et al. since the study of Economics involves an understanding of Economic concepts, models, and arithmetic. Economics students may employ a surface strategy in memorising concepts, or a deep strategy for understanding models and the mathematical aspect of it. Students may also rely on the teacher for the understanding of concepts, models and arithmetic dimensions of Economics.

According to Xie et al. (2019), cognitive engagement occurs when students exert mental effort while studying a particular subject. This engagement can be characterised by the use of both deep and superficial study methods during the learning process. Cognitive engagement involves various mental efforts, such as reflection, strategy implementation, and a willingness to fulfill the requirements for comprehending complex concepts and developing proficiency in challenging skills. These efforts contribute to the acquisition of new knowledge and the mastery of course material (Fredricks et al., 2004). Furthermore, cognitive engagement enhances problem-solving flexibility, and fosters a positive attitude towards encountering setbacks or failures (Fredricks et al., 2004).

Hiver et al. (2021) emphasized that students' disengagement poses a significant threat to their academic achievement. Recognising the critical role of students' academic engagement in their overall success (Carver et al., 2021; Khajavy, 2021), numerous studies have been conducted to investigate this area. Consequently, teachers in various instructional-learning contexts must prioritise the promotion of students' academic engagement (Wang & Ye, 2021). Generally, cognitive engagement appears to be linked to academic performance, although the nature of this relationship may vary depending on whether students employ deep or shallow learning strategies (Wang et al., 2015; Wara et al., 2018).

Conceptual Framework

Kong et al. (2003) proposed a three-dimensional cognitive academic engagement construct: surface strategy, deep strategy, and reliance. Surface strategy refers to a shallow or superficial approach to learning (Dinsmore & Alexander; Greene, 2015; Kong et al., 2003). When students adopt a surface strategy, they tend to focus on memorising facts, definitions, and formulas without fully grasping the underlying concepts (Green, 2015). Their main goal is to reproduce the information when needed, often for examinations or assessments, but they may lack a deep understanding of the subject matter. In the context of Economics, students employing a surface strategy might simply memorise economic theories, definitions of key terms, and basic economic principles without critically analysing the implications or understanding the real-world applications. This approach can lead to

limited retention and difficulty in applying the knowledge in more complex scenarios.

Deep strategy, on the other hand, involves a more profound and meaningful engagement with the subject material (Annansingh, 2019; Kong et al., 2003). Students who adopt a deep strategy seek to understand the underlying principles, connections, and applications of the concepts they are learning (Entwistle et al., 2014). They are more likely to critically analyse the information, ask questions and actively connect new knowledge with their existing understanding. In the learning of Economics, students employing a deep strategy would try to understand the rationale behind economic theories, explore real-world examples and case studies, and engage in discussions and debates about economic issues (Giddings & Lefebvre, 2023). This approach fosters a more comprehensive understanding of Economics, and enhances the ability to apply economic principles to various contexts.
Furthermore, reliance refers to the extent to which students rely on their teachers in the learning process (Kong et al., 2003). Low reliance indicates that students take ownership of their learning, actively seek out resources, and invest effort in understanding the subject matter independently (Lee & Hannafin, 2016). High reliance, on the other hand, suggests that students depend heavily on external factors like teachers' instructions or simply go through the motions without taking full responsibility for their learning. In the Economics class, students with low reliance will proactively seek additional reading materials, engage in extra research, and participate in extracurricular activities related to the subject. In contrast, those with high reliance may only engage with the content presented during class without delving deeper into the subject matter.

Eventually, understanding these three dimensions of cognitive engagement (surface strategy, deep strategy, and reliance) can help educators and policymakers design effective teaching strategies and support systems to promote deeper learning and critical thinking among SHS students in Economics. Encouraging students to adopt a deep strategy, and fostering self-reliance can lead to better academic outcomes and a more comprehensive understanding of Economics as a discipline. The researchers formulated a conceptual framework based on the three dimensions of academic cognitive engagement. Figure 1 shows the conceptual framework proposed to underpin the study.

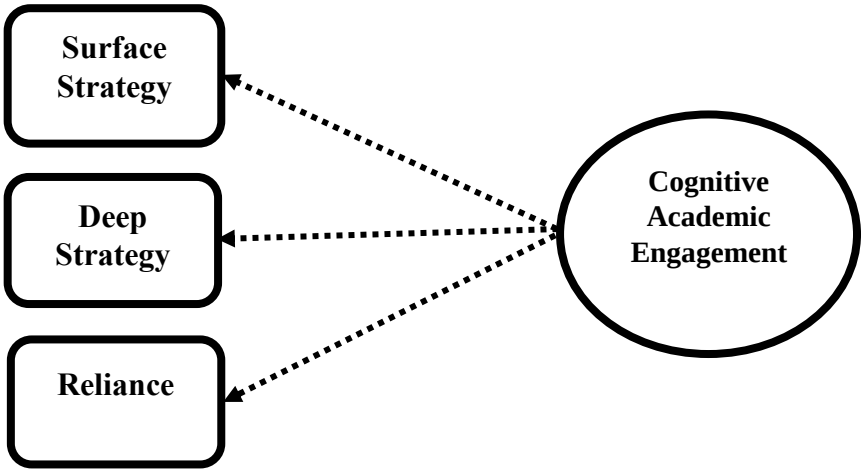

Figure 1: Conceptual Framework
Source: Authors' Construct

Empirical Literature

Many studies (e.g., Effah & Nkwantabisa, 2022; Wang & Ye, 2021; Zhang et al., 2022; Zheng, 2021) have explored the academic engagement level of students. For instance, Effah and Nkwantabisa studied the academic engagement of Accounting students. The study revealed that Accounting students had a higher score in dedication as compared to the other dimensions of academic engagement. The study involving Accounting students used different dimensions of academic engagement, different from the dimensions used in the current study. Again, other studies (e.g., Cornell et al., 2016; Delfino, 2019) revealed that students' cognitive engagement level was high. However, Ayub et al. (2017) found out that students' level of engagement in Mathematics was moderate.

Also, in contrast to these studies (e.g., Ayub et al., 2017; Cornell et al., 2016; Delfino, 2019), other studies (e.g., Estévez et al., 2021; Mahama et al., 2022; Shukor et al., 2014) revealed that students had low cognitive engagement level. However, the context and sample characteristics of these studies differ. For instance, Mahama et al. used College of Education students in Ghana while Estévez et al. sampled primary school students in Spain. Likewise, Brenneman (2016) found out that college students had low levels of engagement in classrooms. In a different study, Kew and Tasir (2021) revealed that more than half

of the students had a low cognitive engagement level.

Concerning the differences in students' academic engagement levels based on their school location, González and Glasserman-Morales (2020) opined that features of students' profiles (e.g., gender, age, school location, school category) could be factors that contributed to their engagement level. For example, Ayub et al. (2017) explored secondary school students' mathematics engagement levels. They found out that students in urban schools had higher cognitive engagement level as compared to students in rural schools. Rotgans and Schmidt (2011) asserted that cognitive engagement can be affected by a student's learning environment. This assertion confirms that of Gonzalez and Glasserman-Morales that students' school context may affect their academic engagement; therefore, there is the need for further studies to be conducted to augment the body of knowledge in this field.

Many studies (e.g., Casimiro, 2016; Delfino, 2019; Estévez et al., 2021; Li, 2021; Sesmiyanti, 2016) have explored cognitive engagement with different constructs in the field of Educational Psychology. Green et al. (2007) observed that academic engagement may vary from school subject to school subject. Therefore, it may be worthwhile to examine students' cognitive engagement in different fields (e.g., Accounting, Economics and Management). Cognitive engagement is a critical factor that needs to be explored in the learning of Economics in Ghana. Thus, this study explores students' level of academic cognitive engagement in the learning of Economics. Moreover, this work contributes to the extant body of literature in the following ways. First, the current study re-confirms an instrument for measuring Economics students' academic cognitive engagement level. Secondly, the study extends the literature on academic cognitive engagement to the field of Economics by examining differences in students' academic cognitive engagement levels based on school location and school category.

Purpose of the Study

The aim of this study was to explore students' level of cognitive engagement in learning Economics. Specifically, this descriptive cross-sectional study sought to:

1. examine Economics students' level of cognitive engagement in learning Economics.

2. determine whether there was any statistically significant difference in Economics students' level of cognitive engagement based on school location.
3. determine whether there was any statistically significant difference in Economics students' level of cognitive engagement based on school category.

Research Hypotheses

The study tested the following research hypotheses:

1. H0: There was no statistically significant differences in Economics students' levels of cognitive engagement in learning Economics based on school location.
2. H0: There was no statistically significant differences in Economics students' levels of cognitive engagement in learning Economics based on school category.

Methodology

Research design, population and sampling

The descriptive cross-sectional survey design was employed for the study. It was used to gather data from senior high school Economics students about their cognitive engagement level in the learning of Economics. This study took place in an unrestrained environment where Economics students willingly responded to the survey without manipulations (Yidana & Arthur, 2023; Yidana et al., 2022; Yidana et al., 2023).

The decision to employ this design was influenced by Brewer's (2009) claim that the descriptive cross-sectional survey design involves observing and collecting information from groups of individuals in their natural settings without manipulating any variables. Also, the design was used because the researchers were interested in studying certain characteristics and behaviour of a population (Bryman & Bell, 2015; Salant & Dillman, 2004). Salant and Dillman opined that a cross-sectional survey design is employed to examine the views of individuals on a phenomenon.

The population of the study comprised all senior high school Economics students in the Kumasi Metropolis of Ghana. The Metropolis had a total of 9,500 Economics students (GES, 2022). The sample size was determined by using a multi-stage sampling technique,

which involved a three-stage selection process. Initially, the Senior High Schools in the Kumasi Metropolis were classified into three strata: namely, Categories A, B and C schools, using the stratified sampling technique. These groupings were based on the Computerised School Selection and Placement System (CSSPS) [2022] stratification criteria. These groupings aimed at ensuring that schools within each category shared common attributes, such as the quality and quantity of their infrastructure (including school buildings, ICT labs, libraries, etc.), the availability of learning facilities, the staffing levels (both in terms of teacher quality and quantity), and academic performance (Nsiah-Peprah, 2004). Secondly, a sample of 10 senior high schools was randomly chosen from the 67 Senior High Schools in the Metropolis using the simple random sampling technique. The proportionate sampling technique was then employed to select 500 Economics students, following the sample size determination table proposed by Krejcie and Morgan (1970).

Instrumentation

The Student Engagement in the Mathematics Classroom Scale (SEMS) developed by Kong et al. (2003) was adapted to develop the Academic Cognitive Engagement-Scale (ACES) which was used for data collection. The SEMS comprises 52 items with three sub-scales, specifically, academic cognitive, affective and behavioural engagement. A five-point Likert scale, ranging from 1 (Strongly Disagree), 2 (Disagree), 3 (Neither agree nor disagree), 4 (Agree) to 5 (Strongly Agree). The first eighteen items (items 1-18) which measure student cognitive engagement (deep strategy = 7; surface strategy = 5; and reliance = 6) in the classroom were drawn from the SEMS and converted to statements on the ACES. A sample item for deep strategy is, "I would try to connect what I learn in Economics with what I encounter in real life or in other subjects". Under the surface strategy, a sample item is "In learning Economics, I prefer memorising all the necessary formulas rather than understanding the principles behind them". Lastly, a sample item for reliance is, "In learning Economics, no matter what the teacher says, I will follow accordingly". The Cronbach alpha value obtained for cognitive engagement in Kong et al.'s study was .849.

Instrument Validation

A preliminary Exploratory Factor Analysis (EFA) was performed on the ACES to confirm the three academic cognitive engagement factors. The EFA with Promax rotation yielded a Kaiser-Meyer-Olkin measure of sampling adequacy of .755, Bartlett's test of sphericity, $\chi 2 = 1377.218$, $p < .001$, indicated that the correlation among the generated factors was adequate for the test. Five factors were obtained with an extracted variance of 52.56%. Also, the content of the items was adjusted, and experts in the field of Economics education subsequently authenticated their validity. In this context, as proposed by Samuels (2017), it is recommended to employ Confirmatory Factor Analysis (CFA) to reaffirm the factors. Hence, the five factors were then subjected to a Confirmatory Factor Analysis (CFA) using Analysis of Moment Structures (AMOS) version 24.

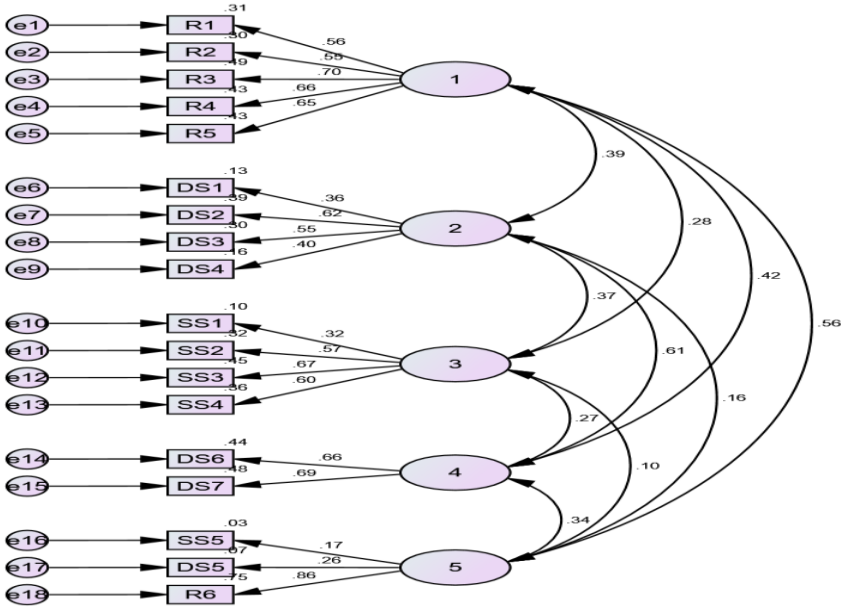

Figure 2: Five-factor academic cognitive engagement CFA model

Figure 3 presents the three-factor academic cognitive engagement CFA model along with the standardised factor loadings and factor covariances. Also, Table 1 presents the fit indices for the CFA model.

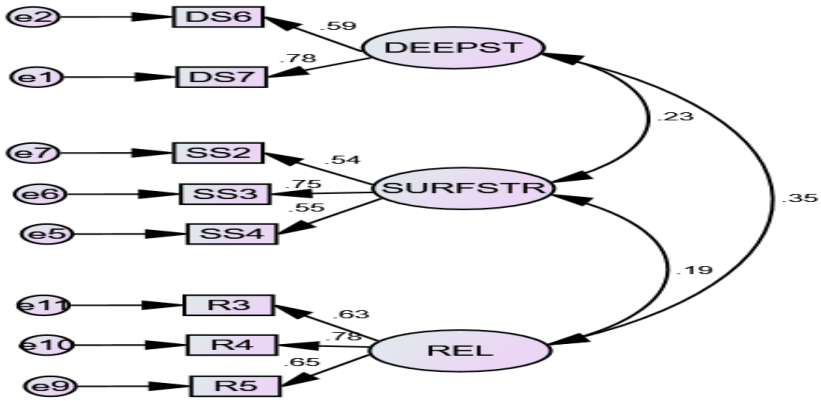

Figure 3: Three-factor academic cognitive engagement CFA model; arrows represent standardised factor loadings, and factor connectors represent collinearity between factors.
Note: DEEPST = Deep Strategy; SURFSTR = Surface Strategy and REL = Reliance

Figure 2 presents the five-factor cognitive engagement model. It can be seen in Figure 2 that some of the factor loadings are below the threshold of .50 and above; hence, the modification indices were used to prune the model. The pruning process helped in deleting the items with less factor loading and also to obtain good model fit indices. Figure 3 shows the three-factor academic cognitive engagement CFA model after the pruning process. Table 1 shows the goodness of fit indices for the three-factor cognitive engagement CFA model.

Table 1: Goodness of Fit Indices for Academic Cognitive Engagement Scale

Fit Indices	Estimates	Threshold	Reference
χ^2	24.517 (p = .106)	> .05	Hair et al. (2010)
CMIN/DF	1.442	≤ 2 or 3	Schreiber et al. (2006)
CFI	.987	≥ .90	Kline (2013)
NFI	.959	≥ .90	Kline (2013)
IFI	.987	≥ .90	Kline (2013)
TLI	.978	≥ .90	Kline (2013)
RMSEA	.032	≤ .08	Schreiber et al. (2006)
SRMR	.033	≤ .08	Kline (2016)

Note: χ^2 = Chi-square; CMIN/DF: Ratio of χ^2 to df; CFI = Comparative Fit Index; NFI = Normed Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; RMSEA= Root Mean Square Error of Approximation; SRMR = Standardised Root Mean Residual

The goodness of fit indices provides whether exact fit (χ^2 not significant) or approximate fit (SRMR ≤ .08) is tenable (Asparouhov & Muthen, 2018), to allow for the examination of the standardised regression weights (loading) and Average Variance Extracted (AVE) for assessing construct validity. All the indices, except for RMSEA, communicate that the ACES is approximately fit (SRMR ≤ .08) for the three-factor academic cognitive engagement construct. The item loadings, AVE and reliability are displayed in Table 2.

Table 2: Item Loadings, AVE and Composite Reliability for Economics Students' Academic Cognitive Engagement Scale

Factors/Constructs	Items	Factor Loading	AVE	CR	Cronbach alpha (α)	McDonald's ω
Deep Strategy	DS6	.781***	.477	.641	.627	.641
	DS7	.587***				
Surface Strategy	SS2	.536***	.384	.646	.635	.656
	SS3	.748***				
	SS4	.553***				
Reliance	R3	.626***	.478	.731	.725	.733
	R4	.784***				
	R5	.653***				
ACES					.660	.625

All the factor loadings exceeded the minimum threshold of .5 (Apostolakis & Stamouli, 2006; Hair et al., 2014; Hulland, 1999) and they were significant at $p < .001$. The AVEs of the constructs were quite lower than the .5 AVE criterion (Bagozzi et al., 1991; Fornell & Larcker, 1981, Holmes-Smith, 2001; Story et al., 2014). However, Malhotra and Dash (2011) opined that the AVE is often too strict, so convergent validity can be established through CR alone. Hence, convergent validity has been achieved. The composite reliability as shown by the Cronbach's alpha ($\alpha = .660$) and the McDonald omega ($\omega = .625$) was below the minimum threshold of .7 (Huck, 2012; Nunnally, 1978). Even if AVE is less than 0.5 but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981). Additionally, Hamid et al. (2017) asserted that values of composite reliability/Cronbach alpha between 0.60 and 0.70 are acceptable. As a result, the instrument (ACES) was deemed fit for purpose.

Discriminant Validity

The discriminant validity of the instrument was examined through the use of Fornell-Larcker and HTMT criteria. The study conducted both the Fornell-Larcker and HTMT ratio criteria for discriminant validity. Table 3 presents the Fornell-Larcker criterion for evaluating the discriminant validity of the measurement model.

Table 3: Fornell-Larcker Criterion for evaluating Discriminant Validity

	CR	AVE	MSV	MaxR (H)	Deep Strategy	Surface Strategy	Reliance
1. Deep Strategy	0.641	0.477	0.120	0.676	**0.691**		
2. Surface Strategy	0.646	0.384	0.053	0.679	0.229**	**0.620**	
3. Reliance	0.731	0.478	0.120	0.749	0.346***	0.185*	**0.691**

*$p < .05$; **$p < .01$; ***$p < .001$

The bolded values (0.691, 0.620 and 0.691) on the diagonals are the square roots of the AVE of the latent variables, and they are the highest in any row or column (Fornell & Larcker, 1981). Table 3 shows that the square root of the AVEs for the constructs is greater than its correlation. This implies that discriminant validity has been achieved from the Fornell-Larcker criterion. The HTMT ratio criterion was further conducted to confirm this result.

Discriminant validity using the Heterotrait-Monotrait (HTMT) Criterion

This section shows the results of the HTMT ratio criteria for discriminant validity. Table 4 displays the HTMT criterion for evaluating the discriminant validity of the measurement model.

Table 4: Heterotrait-Monotrait (HTMT Ratio) Criterion for evaluating Discriminant Validity

	1	2	3
1. Deep Strategy			
2. Surface Strategy	0.279		
3. Reliance	0.592	0.234	

Note: 1 = Deep Strategy; 2 = Surface Strategy; 3 = Reliance and the shaded diagonals are the inter-construct correlations of the constructs of the academic cognitive engagement scale used in the study (Kline, 2011).

From Table 4, it is apparent that the HTMT ratio for the constructs is less than .85. According to Hair et al. (2019), the HTMT ratio should be less than .90 for conceptually similar constructs and .85 for conceptually different constructs. The thresholds .85 and .90 are for strict and liberal discriminant validity respectively (Henseler et al., 2015). Hence, it is evident that discriminant validity has been achieved from this HTMT criterion.

Procedure for data collection

For the duration of the study, five research assistants were employed, and they were given comprehensive training on the instrument's administration and research ethics. Each research assistant was assigned to four schools to ensure smooth data collection and adherence to research standards. The research assistants visited all the schools included in the sample to administer the designated instrument to the Economics students. The students were allotted a specific timeframe of 25 to 30 minutes to respond to the questionnaire. Subsequently, the research assistants diligently reviewed each completed instrument for accuracy and completeness. As a result, a total of 422 fully completed questionnaires were successfully collected from the Economics students, out of the 500 questionnaires that were initially distributed. The return rate for the questionnaire was 84.4%.

Data processing and analysis

The collected data passed through a thorough screening to identify and remove incomplete and void questionnaires. Subsequently, the data were coded and entered into Statistical Product for Service Solution (SPSS) version 28 for further processing. Mean and standard deviations were then utilised to assess the level of academic cognitive engagement among Economics students. Also, the research hypotheses were analysed using One-Way Multivariate Analysis of Variance (MANOVA). The scale mean score interpretation is provided as follows:

1.00-1.49 = Very low
1.50-2.49 = Low

2.50-3.49 = Moderate
3.50-4.49 = High
4.50-5.00 = Very High

Results

The following section presents a comprehensive analysis of the results, focusing on the research objectives that were formulated to guide the study.

Economics Students' Level of Academic Cognitive Engagement

This research objective was meant to examine Economics students' levels of cognitive engagement. The results of Economics students' levels of cognitive engagement in learning Economics are summarised in Table 5.

Table 5: Economics Students' Academic Cognitive Engagement

S/N	Dimensions of Cognitive Engagement	*M*	*SD*	Interpretation
1	Deep Strategy (DS)	3.92	1.01	High
2	Surface Strategy (SS)	3.74	1.16	High
3	Reliance (R)	3.49	1.15	Moderate
	Level of Cognitive Engagement	3.72	1.11	High

Scale M: 1.00-1.49 (Very Low); 1.50-2.49 (Low); 2.50-3.49 (Moderate); 3.50-4.49 (High); 4.50-5.00 (Very High).

The results from Table 5 show that the cognitive engagement level of the Economics students was high (M = 3.72, SD = 1.11). Concerning deep strategy, the highest mean was recorded on students' ability to use their time to study topics discussed in class (M = 3.92, SD = .97), and their willingness to ask questions that would help them to understand the core of Economics (M = 3.92, SD = 1.06). Thus, this result suggested that deep strategy was the highest cognitive engagement among the rest. At a significance level of .05, a repeated-measures ANOVA was performed to validate this observation. Table 6 shows the results of the repeated-measures ANOVA.

Table 6: Tests of Within-Subjects Effects for Academic Cognitive Engagement Dimensions

Source		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Cognitive Engagement	Sphericity Assumed	39.269	2	19.635	30.476	<.001	.068
	Greenhouse-Geisser	39.269	1.990	19.732	30.476	<.001	.068
	Huynh-Feldt	39.269	2.000	19.639	30.476	<.001	.068
	Lower-bound	39.269	1.000	39.269	30.476	<.001	.068
Error(Cognitive Engagement)	Sphericity Assumed	542.472	842	.644			
	Greenhouse-Geisser	542.472	837.860	.647			
	Huynh-Feldt	542.472	841.830	.644			
	Lower-bound	542.472	421.000	1.289			

The preliminary Mauchly's test for sphericity did not show any violation, with $\chi 2$ (2) = 2.080, p = .353. As a result, the assumption of sphericity was upheld, indicating that the disparities in the cognitive engagement factors hold statistical significance F (2) = 30.476, p < .001, η_p^2 = .068. Further substantiating this observation, the partial eta squared value (η_p^2 = .068) suggests a small difference, in line with Cohen's (1988) effect size guidelines. In Table 7, the Bonferroni pairwise comparison result supports the ranking of the academic cognitive engagement dimensions.

Table 7: Bonferroni Pairwise Comparison of Academic Cognitive Engagement Dimensions

(I) Cognitive Engagement	(J) Cognitive Engagement	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference LLCI	ULCI
1	2	.182*	.055	.003	.050	.313
	3	.430*	.054	<.001	.300	.559
2	1	-.182*	.055	.003	-.313	-.050
	3	.248*	.057	<.001	.111	.385
3	1	-.430*	.054	<.001	-.559	-.300
	2	-.248*	.057	<.001	-.385	-.111

Note: 1 = Deep Strategy; 2 = Surface Strategy; 3 = Reliance

It can be observed from Table 7 that deep strategy (1) is statistically higher than both surface strategy (2) and reliance (3) cognitive engagement. Also, a significant difference is observed between surface strategy engagement and reliance engagement. This result implies that Economics students' deep strategy engagement is higher than their surface strategy and reliance engagement.

Also, the researchers were curious about finding the levels of cognitive engagement among Economics students; hence, a further analysis was done. The questionnaire was 5-point; thus, strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and strongly agree = 5. The items were transformed and after that: low, moderate, high and very high levels were computed using frequencies and percentages against score ranges of 8-16, 17-24, 25-32, and 33-40. Table 8 shows the results on the levels of cognitive engagement among Economics students.

Table 8: Levels of Students' Academic Cognitive Engagement

Level	Score Range	Frequency	Percentage
Low	8-16	4	.9
Moderate	17-24	55	13.0
High	25-32	252	59.7
Very High	33-40	111	26.3
Total	4	422	100.0

From Table 8, over half of the students (n = 252, 59.7%; range = 25-32) demonstrated a high level of academic cognitive engagement, while more than a quarter of the number (n = 111, 26.3%; range = 33-40) exhibited a very high level of cognitive engagement. In contrast, a negligible percentage of students (n = 4, .9%; range = 8-16) displayed a low level of academic cognitive engagement. These results indicate that a significant majority of the Economics students were highly engaged cognitively.

Difference in Economics Students' Academic Cognitive Engagement

The initial research hypothesis aimed at ascertaining whether there existed a statistically significant disparity in academic cognitive engagement among Economics students based on their school location.

Following the determination of the correlation among the cognitive engagement domains, the MANOVA test was conducted. This step was essential as MANOVA is more effective when dependent variables are correlated, as explained in (Tabachnick & Fidell, 2019). The correlation results among the dependent variables (deep strategy, surface strategy and reliance) are indicated in Table 9.

Table 9: Correlation Matrix for Dimensions of Academic Cognitive Engagement

Dimensions of Academic Cognitive Engagement	Deep Strategy	Surface Strategy	Reliance
Deep Strategy (DS)	1		
Surface Strategy (SS)	.176**	1	
Reliance (R)	.232**	.155**	1

** Correlation is significant at .01 level (2-tailed).

Table 9 shows that the correlations among the dependent variables are significant. Thus, MANOVA was used to determine the differences in Economics students' academic cognitive engagement levels based on school location and school category. Table 10 shows the descriptive statistics for Economics students' academic cognitive engagement based on school location and school category.

Table 10: Descriptive Statistics for the Academic Cognitive Engagement Dimensions Based on School Location and School Category

Dimensions of Academic Cognitive Engagement	Variable	*M*	*SD*
	School Location		
Deep Strategy	Rural	3.68	.94
	Urban	3.99	.83
Surface Strategy	Rural	3.59	.88
	Urban	3.78	.88
Reliance	Rural	3.44	.90
	Urban	3.51	.93
	School Category		
Deep Strategy	School A	3.94	.80
	School B	4.09	.86
	School C	3.63	.97
Surface Strategy	School A	3.72	.91
	School B	3.93	.80
	School C	3.54	.89
Reliance	School A	3.47	.90

School B	3.56	.99
School C	3.45	.89

In Table 10, it appears that Economics students who are in urban areas have high deep strategy (*M* = 3.99, *SD* = .83), surface strategy (*M* = 3.78, *SD* = .88) and reliance engagement (*M* = 3.51, *SD* = .93) as compared to those in rural areas. Also, it seems that Economics students who are in category B schools have higher deep strategy (*M* = 4.09, *SD* = .86), surface strategy (*M* = 3.93, *SD* = .80) and reliance engagement (*M* = 3.56, *SD* = .99) than those in categories A and C schools.
Table 11 presents the results of differences in Economics students' academic cognitive engagement based on their school location.

Table 11: Differences in Students' Academic Cognitive Engagement Based on School Location

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared (η_p^2)
School Location	Pillai's Trace	.026	3.660	3.000	418.000	.013	.026
	Wilks' Lambda	.974	3.660	3.000	418.000	.013	.026
	Hotelling's Trace	.026	3.660	3.000	418.000	.013	.026
	Roy's Largest Root	.026	3.660	3.000	418.000	.013	.026

Source: Fieldwork (2021)

The evaluation of homogeneity of variance-covariance matrices was performed using Box's M test. The results of Box's M test showed no statistically significant differences, with M = 4.329, F (6, 149570.509) = .712, p = .640. Thus, the assumption of variance-covariance matrices was deemed to be met. Subsequently, the Wilk's Lambda (Λ_W) test was employed to assess statistical significance. Table 11 shows that there is a statistically significant difference in Economics students' academic cognitive engagement based on their school location, F (3, 418.000) = 3.660, p = .013; Λ_W = .974, η_p^2 = .026. This result suggests a significant dependence of Economics students' academic cognitive engagement in the learning of Economics on their school location. Table 12 presents the univariate results.

Table 12: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected	DS	6.710	1	6.710	9.144	.003	.021
Model	SS	2.603	1	2.603	3.352	.068	.008
	R	.309	1	.309	.363	.547	.001
Intercept	DS	4089.556	1	4089.556	5572.881	<.001	.930
	SS	3780.629	1	3780.629	4868.960	<.001	.921
	R	3359.765	1	3359.765	3948.385	<.001	.904
School	DS	6.710	1	6.710	9.144	.003	.021
Location	SS	2.603	1	2.603	3.352	.068	.008
	R	.309	1	.309	.363	.547	.001
Error	DS	308.209	420	.734			
	SS	326.120	420	.776			
	R	357.387	420	.851			
Total	DS	6805.500	422				
	SS	6231.889	422				
	R	5503.889	422				
Corrected	DS	314.919	421				
Total	SS	328.723	421				
	R	357.696	421				

Note: DS = Deep Strategy; SS = Surface Strategy and R = Reliance, Bonferroni adjustment $p < .017$

The corrected model for deep strategy, F (1, 420) = 9.144, p = .003 was statistically significant. On the contrary, the corrected models for surface strategy, F (1, 420) = 3.352, p = .068; and reliance, F(1, 420) = .363, p = .547 were not statistically significant. Hence, a significant difference was found in Economics students' deep strategy engagement based on their school location. The null hypothesis is rejected, suggesting that there is a statistically significant difference in Economics students' academic cognitive engagement based on their school location. Hence, Economics students who were in urban areas had high deep strategy engagement as compared to those in rural areas.

Differences in Students' Academic Cognitive Engagement based on School Category

The research hypothesis determined whether there was any statistically significant difference in students' academic cognitive engagement based on school category. Table 13 shows the results of differences in students' cognitive engagement based on school

category.

Table 13: Differences in Students' Academic Cognitive Engagement Based on School Category

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared (η_p^2)
School Category	Pillai's Trace	.050	3.547	6.000	836.000	.002	.025
	Wilks' Lambda	.950	3.576	6.000	834.000	.002	.025
	Hotelling's Trace	.052	3.605	6.000	832.000	.002	.025
	Roy's Largest Root	.050	6.911	3.000	418.000	<.001	.047

Source: Fieldwork (2021)

The assessment of homogeneity of variance-covariance matrices was carried out using Box's M test. The results of Box's M test revealed statistical significance (M = 15.832, F [12, 296248.886] = 1.303, p = .209), indicating that the assumption of variance-covariance matrices was not violated. Consequently, the Wilk's Lambda (Λ_W) test was employed to determine statistical significance. Table 13 shows that there are statistically significant differences in Economics students' academic cognitive engagement based on school category, F (6, 834.000) = 3.576, p = .002; Λ_W = .950, η_p^2 = .025. Table 14 presents the univariate results.

Table 14: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared (η_p^2)
Corrected Model	DS	10.575	2	5.287	7.279	<.001	.034
	SS	7.459	2	3.730	4.864	.008	.023
	R	.851	2	.425	.499	.607	.002
Intercept	DS	5330.448	1	5330.448	7338.579	<.001	.946
	SS	4902.413	1	4902.413	6393.855	<.001	.938
	R	4313.797	1	4313.797	5065.169	<.001	.924
School Category	DS	10.575	2	5.287	7.279	<.001	.034
	SS	7.459	2	3.730	4.864	.008	.023
	R	.851	2	.425	.499	.607	.002
Error	DS	304.345	419	.726			
	SS	321.263	419	.767			
	R	356.845	419	.852			
Total	DS	6805.500	422				

	SS	6231.889	422
	R	5503.889	422
Corrected Total	DS	314.919	421
	SS	328.723	421
	R	357.696	421

Source: Fieldwork (2021) *Bonferroni adjustment $p < .017$

The corrected models for deep strategy, F (2, 419) = 7.279, p < .001; and surface strategy, F (2, 419) = 4.864, p = .008 were statistically significant. However, the corrected model for reliance, F (2, 419) = .499, p = .607 was not statistically significant. Thus, significant differences were found in Economics students' deep strategy and surface strategy engagement based on their school category. Hence, the null hypothesis is not sustained, indicating that there are statistically significant differences in Economics students' academic cognitive engagement based on school category. Specifically, the differences were found in deep strategy and surface strategy engagement.

In order to investigate the disparities in academic cognitive engagement among Economics students based on their school category, a post-hoc analysis was performed. A summary of the post-hoc analysis is presented in Table 15.

Table 15: Multiple Comparison of Difference in Students' Academic Cognitive Engagement based on School Category

Dependent Variable	(I) School Category	(J) School Category	Mean Difference (I-J)	Std. Error	Sig.
Deep Strategy	School Category A	School Category B	-.1562	.09714	.243
		School Category C	.3128*	.11094	.014
	School Category B	School Category A	.1562	.09714	.243
		School Category C	.4690*	.12364	<.001
	School Category C	School Category A	-.3128*	.11094	.014
		School Category B	-.4690*	.12364	<.001
Surface Strategy	School Category A	School Category B	-.2104	.09981	.089
		School Category C	.1781	.11398	.263
	School Category B	School Category A	.2104	.09981	.089
		School Category C	.3884*	.12703	.007
	School Category C	School Category A	-.1781	.11398	.263
		School Category B	-.3884*	.12703	.007
Reliance	School Category A	School Category B	-.0960	.10519	.633
		School Category C	.0140	.12013	.993

School Category B	School Category A	.0960	.10519	.633
	School Category C	.1099	.13388	.690
School Category C	School Category A	-.0140	.12013	.993
	School Category B	-.1099	.13388	.690

In Table 15, the Turkey's HSD post-hoc test indicates that there are statistically significant differences in Economics students' deep strategy between students who are in Category A and Category C schools. This result means that Economics students who are in Category A schools have higher deep strategy engagement level as compared to those in Category C schools. Also, it can be observed from Table 15 that there are statistically significant differences in Economics students' deep strategy among students who are in Categories B and C schools. This result implies that Economics students who are in Category B schools have higher deep strategy engagement level than those in Category C schools. Moreover, the results of the study show that there is a statistically significant difference in surface strategy between students who are in Category B and Category C schools. This result suggests that Economics students who are in Category B schools have higher surface strategy engagement level than those in Category C schools. However, no significant difference was found in reliance based on school category.

Discussion

The study examined the academic cognitive engagement level of Economics students in the learning of Economics. The first objective sought to examine Economics students' level of academic cognitive engagement in the learning of Economics. The study revealed that Economics students' had a high level of academic cognitive engagement in the learning of Economics. The finding tallies with recent studies (e.g., Delfino, 2019; Effah & Nkwantabisa, 2022) which identified that students had high cognitive engagement level. However, this finding is contrary to that of Shukor et al. (2014) and Mahama et al. (2022) who found that students had a low cognitive engagement level. This inconsistency may be due to the different context of the current study, and also the different instruments that were adopted for the study. Also, it is important to note the possible bias in comparing the current study's findings and those of Mahama et al. because the latter focused on College of Education students, and also measured academic engagement as a one-dimensional construct. Similarly, Brenneman (2016) found out that college students had low levels of

engagement in classrooms.

Additionally, the study revealed that more than half the number of the students had a high level of academic cognitive engagement in the learning of Economics. This result suggests that the majority of the students involved in the study possessed a high level of academic cognitive engagement. The findings of the study validate that of Cornell et al. (2016) who revealed that the majority of the students possessed high levels of engagement. On the contrary, Kew and Tasir (2021), and Shukor et al. (2014) found out that more than half the number of the students had low cognitive engagement level. Again, this finding refutes previous findings of Mahama et al. (2022) who found out that the majority of students possessed a low level of academic engagement. Rotgans and Schmidt (2011) asserted that students with a higher level of cognitive engagement were the individuals with more knowledge, autonomy, and self-determination. Therefore, it can be presumed that these students had mastered much more knowledge, and were autonomous learners, thereby enabling them to have a higher level of cognitive engagement in the learning of Economics. For the students who had a low cognitive engagement level, teachers should act to determine the alternative methods to augment students' cognitive engagement level.

The findings of the study suggest that the extent to which students try intellectual tasks or how much mental effort they use in the learning activities provided, for instance, the effort students put into completing a task using knowledge and cognitive strategy is high (Chapman, 2003). This is because the learning of Economics heavily relies on the students' cognitive domain, particularly, the linguistic and mathematical aspects of Economics. Also, students' level of deep strategy was higher as compared to other dimensions of academic cognitive engagement because evoking deep learning would be beneficial to the quality of learning outcome (Kong et al., 2003).

The first research hypothesis determined whether there were any statistically significant differences in Economics students' academic cognitive engagement based on their school location. The study revealed that there were significant differences in Economics students' academic cognitive engagement based on their school location. This finding validates that of Ayub et al. (2017) who found out that there was a significant difference in cognitive engagement between students who were in rural and urban schools. Specifically, the

study discovered that there were statistically significant differences in deep strategy cognitive engagement between rural and urban school students. This result confirms the descriptive results that indicate that urban school students have higher deep strategy cognitive engagement as compared to those in rural schools. This suggests that students from different geographic backgrounds may approach learning and problem-solving in distinct ways. Surprisingly, no significant differences were found in surface strategy and reliance cognitive engagement based on location of school. The absence of significant differences in surface strategy and reliance cognitive engagement based on school location implies that these cognitive engagement dimensions might be more universally influenced by other factors, such as curriculum design, teaching methods, or individual learning preferences, rather than being tied to rural or urban environments.

Finally, the last research hypothesis ascertained whether there were any statistically significant differences in Economics students' academic cognitive engagement based on school category. The findings of the study indicated that there were statistically significant differences in Economics students' academic cognitive engagement based on school category. This finding confirms the assertion of González and Glasserman-Morales (2020) that students' profile such as school category can affect their engagement level. Again, at the univariate level, the findings showed clearly that there were significant differences in Economics students' deep strategy and surface strategy engagements based on school category. One unanticipated finding was that no significant difference was found in reliance based on school category.

Specifically, the study revealed that Economics students who were in Category A schools had a higher deep strategy engagement level as compared to those in Category C schools. Also, it was discovered that Economics students who were in Category B schools had higher deep strategy engagement level than those in Category C schools. One possible reason for this finding could be the difference in academic resources and teaching methodologies between schools in different categories. Category A and Category B schools might have access to better educational facilities, more experienced teachers, and a curriculum that emphasises critical thinking and deep engagement with the subject matter. This enhanced learning environment could encourage Economics students in these schools to adopt a deeper strategic approach to their studies. On the contrary, Category C schools

might face limitations in terms of resources and teaching quality, which could lead to a less conducive learning environment for fostering deep strategy engagement among Economics students. This discrepancy in educational opportunities could contribute to the observed differences in deep strategy engagement levels between the school categories. Moreover, the study found that Economics students who were in Category B schools had higher surface strategy engagement level than those in Category C schools. However, no significant difference was found in reliance based on school location.

Conclusions and Recommendations

The study revealed that Economics students' academic cognitive engagement level was high. The current study contributes to academic engagement studies, specifically academic cognitive engagement with a focus on Economics students in senior high schools in Ghana. It can be concluded that students can maximize their effort in deploying deep strategy, surface strategy and reliance in the learning of Economics. Again, it can be concluded that Economics students' level of deep strategy engagement will depend on whether the student is from a rural or urban school. Conversely, Economics students' level of surface strategy and reliance engagements are not dependent on the location of the school.

Additionally, school category influences students' deep strategy and surface strategy engagements. It can be concluded that Category A and Category B schools seem to provide environments that foster deeper learning approaches in Economics, while Category C schools might lack certain factors that support such engagement. However, Economics students' reliance engagement is not susceptible to school category. Hence, irrespective of the school category, students will have the same level of reliance engagement. Firstly, it is recommended that further research should be carried out to establish the influence of Economics students' academic cognitive engagement on their academic success. Additionally, it is recommended that teachers should continue to engage students in instructional activities that require students to use deep strategies. Also, teachers in rural schools should employ teaching strategies that help students to use deep learning strategies in the learning of Economics. Moreover, in the organisation of Continuous Professional Development (CPD) programmes and seminars for teachers on how to sustain and improve the cognitive

engagement level of students, equal attention should be given to all teachers in the various school categories (A, B and C SHSs). Further studies should explore the role of peer interactions and social networks in shaping the cognitive engagement of Economics students. Lastly, future studies should investigate how cultural factors, such as cultural norms, values, and expectations, influence the cognitive engagement of Economics students.

Implications of the Study for Practice

1. Teachers and educators should be aware of the differences in cognitive engagement approaches between rural and urban students. They can adapt their teaching methods to better suit the learning preferences and needs of students from diverse geographical backgrounds. Also, collaboration between rural and urban schools could be encouraged to share best practices and experiences in enhancing cognitive engagement. This could facilitate the exchange of ideas and strategies that have proven effective in different educational contexts.
2. Teachers in Category A and Category B schools should continue employing instructional strategies that promote deep learning, and encourage active engagement with Economics content. These strategies could include collaborative projects, case studies, discussions, and real-world applications to enhance students' understanding of the subject matter. In addition, teachers in Category C schools should be supported with professional development opportunities to help them incorporate more effective teaching methods that foster deep strategy engagement among Economics students.
3. Heads of SHS, and educators should work together to create a positive learning environment that encourages curiosity, critical thinking and independent exploration of Economics concepts in all categories of schools.

Policy Implications of the Study

1. Educational policymakers (e.g., Ministry of Education [MoE], Ghana Education Service [GES] and National Council for Curriculum and Assessment [NaCCA]) should consider implementing targeted interventions to enhance deep strategy cognitive engagement among rural students. This might involve

providing additional resources, teacher training, and curriculum adjustments that foster critical thinking, problem-solving, and deeper understanding of academic concepts.

2. MoE, GES and Non-Governmental Organisations (NGOs) should focus on identifying and understanding the factors present in Category A and Category B schools that contribute to higher deep strategy engagement levels. These factors could be used as models for implementing effective teaching practices in Category C schools, potentially leading to improved cognitive engagement among Economics students.
3. It is crucial for policymakers (MoE and GES) to address the disparities in educational resources between rural and urban schools. Efforts to bridge the gap in infrastructure, technology, and access to extracurricular activities could contribute to more equitable cognitive engagement outcomes.

Conflict of Interest

The authors state that there are no potential conflicts of interest to disclose.

Funding Statement

The authors received no direct funding for this research.

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