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The Relationship Between Growth Mindset, Grit, and Academic Achievement: Does Goal Commitment Matter for College of Education Students?

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Abstract: *The current study comprised students from the Colleges of Education in Ghana, specifically those in their second and third years. The study period extended from January 2023 to October 2024. Two evaluations were conducted during the study period. In the initial evaluation, 425 year 1 students from 35 schools were assessed. In 2022, students in year 1 who participated in the initial assessment were involved upon their promotion to year 2. Students who took part in the classroom experiment were included. In the end, this approach produced a sample size of 631 second- and third-year students. Structured questionnaires were used for data collection, and the snowball sampling technique was applied to recruit participants. Structural equation modelling (SEM) is the analytical method used for data analysis. This approach is reliable for revealing the direct and indirect effects of the dependent and independent variables by clarifying their unique relationship. The results of the current study showed a positive correlation between students' academic performance and grit and a growth mindset. In order to have a positive impact on academic achievement, grit should be measured by the persistence of effort rather than the constancy of interest and conscientiousness. Understanding how grit improves academic performance is linked to goal commitment and a growth mindset. According to the findings, students' academic endeavours will be positively impacted by their perseverance, which is necessary to activate their growth mindset and commitment to goals.*

Keywords: grit, growth mindset, fixed mindset, goal commitment, academic achievement

INTRODUCTION

The process of learning is a multi-step endeavour that requires perseverance, particularly when confronted with challenges and setbacks (English & Gainsburg, 2015; Griffiths, 2017). Recent evidence indicates that grit is a crucial factor associated with academic achievement and student engagement, characterised by determination and enthusiasm in pursuing long-term goals (Von Culin et al., 2014; Kalen et al., 2019; Credé, 2018; Li & Li, 2021). In summary, learners who exert significant effort while maintaining enjoyment in their activities

demonstrate a greater ability to overcome challenges and achieve success. Despite the important role of grit in formal education and its relevance in Ghanaian culture, there is a lack of empirical research employing purposeful sampling techniques to investigate the mechanisms of grit among college of education students, especially within the context of Ghanaian education. This research examines two psychological factors—growth mindset and goal commitment—investigating whether students with strong commitment to educational objectives and growth mindset exhibit grit in academic learning.

Grit is associated with work environment, military turnover and performance, and classroom settings (Eskreis-Winkler et al., 2014; Johnson, 2017). In educational contexts, grit is associated with academic achievement indicators, including current grade point averages of students and prospective GPAs in high schools (Muenks et al., 2018; Lam & Zhou, 2019; Clark et al., 2020; Tang et al., 2021). The role of grit in academic success has been recently scrutinised, given the low to moderate correlations observed between these two variables and the perceived limited validity of grit when compared to self-regulation and conscientiousness (Alhadabi et al., 2023; Tang & Zhu, 2024; Katsarou & Chatzipanagiotou, 2025; Sun et al., 2025). A potential explanation for these results is that most existing studies have utilised an overall sum rating of grit by aggregating two facet-level scores.

Learners possessing a growth mindset are more inclined to perceive challenges and setbacks as opportunities for learning; consequently, they exhibit resilience and focus more on addressing issues during difficult times (Yeager & Dweck, 2012; 2020). This focus and commitment enhance academic achievement in school. Consequently, grit will act as a mediator between students' academic achievement, academic engagement, and growth mindset (Tang et al., 2019; Barbouta et al., 2020; Sadoughi & Hejazi, 2023; Zhao et al., 2023). These research findings indicate a strong correlation between growth mindsets and academic achievement. Initiatives have demonstrated that academic performance improves when students are encouraged to adopt a growth mindset (Rattan et al., 2015; Yeager et al., 2019; Paunesku et al., 2015). Consequently, the main concern of this association is that individuals with a growth mindset attribute their successes and failures to dedication and effort rather than innate ability. This study aims to investigate the extent to which grit mediates the relationship between growth mindset, goal commitment, and academic achievement, specifically Grade Point Average (GPA) and academic engagement.

MATERIALS AND METHOD

This research involved students from the Colleges of Education, specifically those in their second and third years. The study period extended from January 2023 to October 2024. Two assessments were conducted during the study period. In the initial assessment, 425 students from 35 schools were evaluated in year 1. The participants' ages varied from 19 to 25, with females constituting 54.8% of the study population. In 2021, students in year 1 who participated in the initial assessment were involved upon their promotion to year 2. Students who took part in the classroom experiment made up the participants. In the end, this method produced a

sample size of 631 second- and third-year students. In year two, 55.4% of participants were female, and in year three, 56.4% of participants were female. The majority of study participants were female. Although there were some missing data, the overall response rate was high. For years two and three, the percentage of missing data was roughly 1.4% and 1.7%, respectively. Structured questionnaires were used in the data collection process, and they took an average of about an hour to complete. The volunteers were fully informed about the questionnaires, and informed consent was acquired from the appropriate authorities. The sample was gathered, and participants were recruited using the snowball sampling technique.

The problem of missing data was addressed by using Little's (1988) missing completely at random (MCAR) test. According to the test results, each variable's data was not entirely missing at random. In order to align the important variables of those who stopped participating based on their responses, attrition tests were also carried out. There was no difference between the study participants and the non-participating students in years 1, 2, and 3. It is recorded how many students took part in the study and how many stopped answering the questionnaires. To overcome the difficulties posed by missing data, the maximum likelihood estimation method was used. Compared to boys, girls are more engaged, persistent in their efforts, and have higher GPAs ($x2= 5.01$, $p<0.05$). Please see Table 1 for more details. Structural equation modelling (SEM) is the technique used for data analysis. By emphasising the direct and indirect effects of independent and dependent variables, this method successfully clarifies their unique relationship.

Table 1 Maximum Likelihood Estimation: Results for test of means

	X^2	T-stat.	P-value
Year 1	0.01		0.95
Growth Mindset (COE-GRM)		1.18	0.22
Academic engagement (COE-ENG)		1.53	0.11
GPA (COE-GPA)		1.8	0.06
Year 2			
Goal commitment (COE-GCM)		1.22	0.21
Academic engagement (COE-ENG)		0.06	0.94
GPA (COE-GPA)		1.63	0.09
Consistency of interest (COE-CSI)		-0.41	0.66
Socio Economic status (COE-SOES)		1.44	0.14
academic persistence (COE-ACPR)		1.64	0.09
Conscientiousness (COE-CON)		0.34	0.71
Year 3			
Perseverance of effort (COE-PEF)		2.02	<0.05
Academic engagement (COE-ENG)		2.26	<0.05
GPA (COE-GPA)		5.07	<0.01

Measure of variables

Growth mindset

Student growth mindset evaluations were conducted utilising six (6) items derived from the measurements established by Blackwell et al. (2007). An existing study assert that altering an individual's intelligence is improbable, highlighting the persistence and conscientiousness of human abilities that appear resistant to change (Blackwell et al., 2007). On a scale of 1 to 5, where 5 represents total agreement and 1 represents total disagreement, the students were asked to indicate their consent to the questions. After successfully loading, two items were removed from additional data analysis. To demonstrate a growth mindset as opposed to a fixed mindset, the four (4) that were left for analysis were inverted. As a result, questions with high scores suggested that students had a growth mindset. With a Cronbach alpha coefficient of 0.67, the four items demonstrated adequate reliability in the fitness test.

Grit

The eight items used by Duckworth and Quinn (2009) to measure that construct served as the basis for the grit measurements. Grit was measured using two latent variables: perseverance (COE-PEF) and consistency of interest (COE-CSI). Both latent variables were evaluated by four items. A scale of 1 to 5, where 5 denoted total agreement and 1 denoted total disagreement, was used to evaluate the items. With a Cronbach's alpha of 0.77 for perseverance of effort and 0.69 for consistency of interest, the items showed satisfactory loading.

Goal commitment in the context of education

The Personal Project Analysis Inventory's Little (1983) measurement was applied. The measures were designed to evaluate students' individual learning objectives within the classroom. First, the participants were asked to describe their individual educational objectives. Their objectives were evaluated, and the goals were specified in relation to their behaviours or attitudes (Flunger et al., 2016). The overall construct of goal commitment was evaluated using three items and a 7-point Likert scale, where point 7 means "very much" and point 1 means "not at all." The construct's Cronbach's alpha was 0.75.

Academic achievement and engagement

Salmela-Aro and Upaday's (2012) work served as the basis for the measurement items for these constructs. Dedication, energy, and absorption were each represented by a single item because academic engagement was specifically measured by latent variables. As a result, three (3) items were used in total to evaluate academic engagement. Using a seven-point Likert scale, where seven represents a high level of commitment and one represents no commitment at all, three items were used to evaluate the overall construct of goal commitment. The construct's Cronbach alpha was found to be 0.94. On the other hand, grade point averages and academic assessments served as the basis for evaluating students' academic performance.

Moderating and control variables

Socio-economic status, academic persistence, conscientiousness, and gender were assessed through self-report items. During the investigation, academic achievement (GPA) and

engagement were incorporated as control or moderating variables. Participants' socio-economic status was evaluated by having students rate their parents or guardians' financial status on a scale of 1 to 5, with 5 indicating good and 1 indicating bad. Three items on a 7-point Likert scale (7 = Very true, 1 = Not true at all) were used to measure academic persistence (Niemivirta, 2020). Two items on a five-point Likert scale (5 = completely agree, 1 = completely disagree) were used to measure conscientiousness. The three constructs had respective Cronbach alpha values of 0.79, 0.78, and 0.90.

FINDINGS AND DISCUSSION

A description of the study's variables and associated indicators can be found in Table 2. It also displays the variables' descriptive statistics, such as the scale of measurement, standard (SD) deviation and mean.

Table 2 Descriptive statistics and Variables' description

Indicator	Latent variables	Mean	SD	Scale
COE-GRM	Growth mindset	3.11	0.87	1–5
COE-GCM	Goal commitment	5.78	0.94	1–7
COE-CSI	Consistency of interest	3.18	0.73	1–5
COE-PEF	Perseverance	3.32	0.78	1–5
COE-CON	conscientiousness	3.19	0.65	1–5
COE-ACPR	Academic perseverance	4.56	1.4	1–7
COE-SOES	Socio Economic status	3.98	0.97	1–5
COE-GEN	Gender	1.44	0.49	1–2
Year2GPA	Year 2 Student GPA	8.17	0.85	5–10
Year2COE-ENG	Year 2 student engagement	4.24	1.48	1–7
Year3GPA	Year 3 Student GPA	8.22	1	5–10
Year3COE-ENG	Year 3 student engagement	4.31	1.47	1–7

The results of the correlation between the variables are shown in Table 3. According to the table, every variable shows a positive correlation with a growth mindset; however, the only factors that show a significant correlation with a growth mindset are academic perseverance, academic achievement (Year 2GPA and Year 3GPA), and perseverance of effort.

Table 3 Correlation results

	COE-GRM	COE-GCM	COE-CSI	COE-PEF	COE-CON	COE-ACPR	COE-SOES	COE-GEN	Year2GPA	Year2COE-ENG	Year3GPA	Year3COE-ENG
COE-GRM	1											
COE-GCM	0.07	1										
COE-CSI	0.08	0.07	1									
COE-PEF	0.14**	0.30**	0.08	1								
COE-CON	0.04	0.13	0.47**	0.29**	1							
COE-ACPR	0.12**	0.11	0.51**	0.38**	0.44**	1						
COE-SOES	0.04	0.27**	0.05	0.27**	0.04	0.13**	1					
COE-GEN	0.01	-0.01	0.03	-0.02	0.01	0.07	0.09**	1				
Year2GPA	0.31***	0.17**	0.04	0.28**	0.13**	0.30**	0.05	-0.21**	1			
Year2COE-ENG	0.08	0.31**	0.06	0.45**	0.18**	0.19**	0.12**	-0.01	0.19**	1		
Year3GPA	0.29***	0.12*	0.05	0.36**	0.17**	0.33**	0.09**	-0.20**	0.85**	0.19**	1	
Year3COE-ENG	0.03	0.25**	0.10*	0.43**	0.16**	0.23**	0.17**	-0.05	0.17**	0.50**	0.25**	1

Note: ***, **, and * indicate 1%, 5% and 10% significance levels.

The estimates from the structural equation modelling analysis are shown in Table 4. The results show that both the growth mindset's direct impact on consistency of interest and its effect on students' engagement and perseverance of effort in relation to academic achievement are negligible. As indicated by their grade point average (coefficient = 0.20, $p < 0.05$), students' academic achievement is clearly positively impacted by a growth mindset. Both variables were positively and significantly impacted by the indirect effect of growth mindset on academic achievement (GPA: coefficient = 0.05, p-value < 0.05; COE-ENG: coefficient = 0.05, p-value < 0.05). Due to indirect effects, the relationship between grit (consistency of interest) and academic achievement and a growth mindset is found to be negligible. GPA (coefficient = -0.01, p-value > 0.1) and students' engagement (COE-ENG) (coefficient = 0.01, p-value > 0.1), the two variables used to measure academic achievement, have no significant relationship with growth mindset (COE-GRM) or consistency of interest (COE-CSI). According to the analysis, persistence of effort is a significant mediator between academic achievement and growth mindset, with positive results (COE-GPA: coefficient = 0.05, p-value = 0.05; COE-ENG: coefficient = 0.05, p-value = 0.05). Regardless of GPA and students' engagement levels, the analysis of conscientiousness as a measure of grit shows that the relationship between conscientiousness and growth mindset does not significantly affect academic achievement (COE-GPA: coefficient = 0.01, p-value > 0.1; COE-ENG: coefficient = 0.01, p-value > 0.1). Academic achievement as determined by GPA is positively correlated with growth mindset and grit, but not with engagement. To comprehend the variations in students' growth mindsets, the dedication to educationally related objectives was critically examined. Together with grit, the effects of goal commitment on educational needs were examined to ascertain how they affected academic performance.

On reflection, goal commitment had a positive direct effect on grit variables, but consistency of interest had a negligible effect. Goal commitment's direct impact on academic performance,

however, did not show any appreciable influence on students' engagement or GPA. Goal commitment has a positively significant indirect impact on academic achievement. This implies that when backed by persistence, goal commitment could result in academic success. According to the individual intervening effects of the grit measure, the effect of goal commitment on academic achievement is negligible. This is because goal commitment is mediated by conscientiousness and consistency of interest. The positive relationship between academic achievement and goal commitment is mediated by persistence of effort. Academic achievement, specifically GPA and students' engagement, is positively connected with goal commitment and the overall impact of grit. In addition, male students are more committed to their goals and have a growth mindset than female students, both of which are associated with better academic performance. Students' socioeconomic status has a positive impact on their perseverance, GPA, growth mindset, and dedication to goals.

Table 4 Assessing the direct, indirect, and totaleffects using structural equation modelling (SEM)

	COE-CSI	COE-PEF	COE-GPA	COE-ENG
Growth Mindset				
DE	0.09(0.07)	0.13(0.06)	0.20***(0.04)	0.04(0.06)
INDE			0.05**(0.02)	0.05**(0.03)
COE-GRM -> COE-CSI			-0.01(0.01)	0.01(0.02)
COE-GRM -> COE-PEF			0.02**(0.01)	0.04**(0.02)
COE-GRM -> CON			0.01(0.00)	0.01(0.00)
Total effect			0.26***(0.04)	0.1(0.06)
Goal Commitment				
DE	0.09(0.06)	0.28***(0.06)	0.01(0.05)	0.012(0.08)
INDE			0.08***(0.02)	10***(0.02)
COE-GCM -> COE-CSI			-0.02(0.01)	0.03(0.02)
COE-GCM -> COE-PEF			0.06***(0.01)	0.08***(0.02)
COE-GCM -> CON			0.03(0.01)	-0.2(0.00)
Total effect			0.08*(0.04)	0.22***(0.08)
Controls				
COE-SOES	0.2(03)	0.21**(0.03)	0.02*(0.1)	0.05(0.04)
COE-GEN	0.03(0.03)	0.02(0.03)	-0.02*(0.01)	-0.05(0.03)
Year2GPA	0.01(0.04)	0.015**(0.03)	0.81**(0.01)	0.02(0.04)
Year2COE-ENG	0.02(0.05)	0.35**(0.04)	-0.02(0.01)	0.31**(0.04)

Note: ***, **, and * indicate 1%, 5% and 10% significance levels. DE denotes direct effect, INDE denotes indirect effect.

CONCLUSION

This study discovered a proportionate link between students' academic success, grit, and a growth mindset. Since grit improves academic performance, it should be evaluated on the persistence of effort rather than the constancy of interest and conscientiousness. Understanding how grit contributes to academic success is linked to goal commitment and growth mindset. According to the findings, students' academic endeavours will be positively impacted by their ability to persevere in order to activate their growth mindset and commitment to goals.

This study identified a modest yet atypical impact of grit and perseverance on the academic achievement of college of education students in Ghanaian schools. Recent findings on grit among students in Germany (Schmidt et al., 2017; Danner & Rammstedt, 2020; Wolff et al., 2020) and the United States (Muno & Hope, 2022; Lam & Zhou, 2022; 2019; Morell et al., 2021) indicate that prior motivation-related variables and academic achievement frequently exhibit negative correlations with grit. However, these results are not definitive and may vary depending on the context. A recent study obtained an adolescent sample from the U.S. and found that grit positively impacts academic achievement (Tang et al., 2019). This study's context in Ghana aligns with that of Finland (Hill, 2005), where the concept of sisu is highly esteemed and well-established. Youth raised in Ghana may demonstrate a greater recognition of the significance of perseverance and a reduced tendency to oppose it compared to their counterparts in other developing countries. Ghanaian students are likely to translate their values and perseverance into academic success, thereby improving their educational outcomes (Ampofo & Osei-Owusu, 2015; Ahinful et al., 2019).

Because of the potential role that it could play in fostering positive student development, grit has garnered a significant amount of interest among various academics and educators. Furthermore, the role of grit in academic performance has come under scrutiny as a result of the limited and contradictory scientific evidence that has been gathered. This has prompted researchers to call for additional studies that cover a wide range of contexts, developmental stages, and measures of academic success. In addition to highlighting the importance of grit in improving students' academic performance, the findings also highlighted the need for additional research on grit in a variety of settings and fields of study.

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