A Multiple Mediation Analysis of the Effect of Prior Performance on Academic Achievement Through Student Teachers' Motivational Orientations

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Abstract: The study investigated the mediational effect of student teachers' motivational orientations on the relationship between prior performance and academic achievement. This cross-sectional correlation study employed a survey approach in the collection of quantitative data. Stratified and Systematic sampling approaches were used in selecting 500 student teachers for the study. The results indicated that students ranked extrinsic motivation, value for task or course materials, and self-efficacy for learning as high motivators for learning. The independent samples t-tests for differences in means of first- and second-year students' reported motivational orientations showed a statistically significant difference in their use of extrinsic motivation, control of learning beliefs, and task value as learning strategies. First-year students' reported means were higher than that of the second-year students. The results from the study, taken as a set, indicated that student teachers' motivational orientations significantly mediated the relationship between prior performance (entry aggregates) and academic achievement (GPA). Approximately 16.7% of the change in the effect of prior performance on academic achievement was due to the presence of the motivation variables. Overall, prior performance plus student teachers motivational orientations explained about 42% of the variations in their academic achievement.

Keywords: Mediational Analysis, Student Teachers' Motivational Orientation, Colleges of Education

1. Introduction

In keeping with global trends and the demand for a more diversified curriculum in teacher training, coupled with the perennial show of poor performance among Ghanaian basic schools students both nationally and internally, much of which is often attributed to the teacher, Ghana has initiated a reform programme to train her teachers with the aim of developing professional teachers who are well-equipped with knowledge, skills, and the disposition to learn and affect their students to meet the needs of the quality education in the 21st century. The reforms are to help student teachers acquire the necessary skills to provide more authentic instructional contexts and activities that would help their students to learn how to learn and become independent lifelong learners so that they can face political, social, and economic uncertainties better than traditional knowledge-based curricula would empower them. Teachers are to extend their

expertise to prepare more diverse students for the challenges of the workplace and life beyond school [37]. Indicative of Dewey's opinion, outlined in 'The Child and the Curriculum', that the teachers mediate between the needs of the child and the demands of the curriculum, Dewey cited in [18], it is imperative that teachers are prepared to create learning environments that can be 'variously affording, inviting or potentiating and in potentiating learning environments teachers explain, orchestrate, commentate on, model and reify learning responses' [15].

For teachers to be able to help their students imbibe learning dispositions such as tendencies towards persisting, questioning, collaborating in their learning, it is believed that they need to have demonstrated such characteristics as effective learners - thus, it is expected of student teachers to be active agents in their learning during and after training. They need to be reflective in nature, think critically about all the available information to them in other to make sound

judgments about their own learning (i.e., they should be multi-perspective thinkers), innovative, caring, committed and uphold ethical values needed in their profession [67, 27, 18, 29].

Two important conditions for practice frame the interactions between teachers, learners, and curriculum content [18]. These are first, the fact that teaching is a profession with certain moral as well as technical expectations, and second, the fact that education must serve the purposes of democracy. This is so, because, on daily bases, teachers are faced with multifaceted situations, and make decisions that rely on many different kinds of knowledge and judgment that can involve high-stakes results for students' future [13]. Bransford and colleagues point further that for teachers to make good decisions, they must be aware of the myriad of ways in which student learning could be explained in the framework of development, learning differences, language and cultural effects, and individual dispositions, wellbeing, and attitudes to learning.

Current research proving how significant teaching is to children's learning and probabilities of life has strengthened the importance of developing a strong profession of teaching (see for example Hattie, 2003). Even though conventional wisdom was based for many years on a conclusion widely attributed to the Coleman Report in 1966 – that is, schools make little difference beyond the influences of socioeconomic background – newer evidence based on different data and analytic methods suggest that schools do make a noticeable impact to what children learn and that teachers are an important part of what matters [60, 20, 18, 29, 55]. From this point of view, it is important for teachers to understand their roles and responsibilities as professionals in schools that must prepare all students for equitable participation in a democratic society.

Self-regulation of learning is a self-directive process through which learners transform their mental abilities into task-related academic skills and to get proactively involved in their personal, behavioural, motivational, and cognitive learning engagements in order to accomplish important and valuable academic goals [68]. Self-regulation of cognition and behaviour is an important aspect of student learning and academic performance in the classroom context [25]. It seeks to explain how people improve their performance using systematic procedures of learning. As an organizing concept, self-regulation of learning describes how learners control their thoughts, feelings, and actions in order to achieve academically [68]. Concomitantly, self-regulation can be seen as an activity that learners consciously engage in to draw up learning intentions and achievement goals, plan the next steps for learning; manage examination anxiety and other forms of stress which can be debilitating to academic performance in order to reach their optimal achievement [42, 68, 25].

It follows, therefore, that, in order to be successful as professional teachers, and be seen as an important part of what matters in making a noticeable impact to what children learn [40, 60, 20, 18, 55], student teachers as learners, must-

have essential attributes and dispositions that are readily needed for effective teaching since what the teacher knows, do, and care about that is the most influential in the teaching and learning equation. Learning teachers must be seen to be caring [67], be reflective, which involves the participant being a critique of practice, the values which are implicit in that practice, the personal, social, institutional and broad policy contexts in which practice takes place, and the implications of these for improvement of that practice [12].

Teachers need to engage in reflective practice "based on a particular notion of professionalism in which teachers have a responsibility for the education of students which goes beyond the instrumental, encompassing responsibilities to educate for citizenship and to imbue in their students a positive disposition towards lifelong learning" [19]. In this regard, it is the knowledge, beliefs and values of the teacher that are brought to bear in creating an effective learning environment for pupils and that makes the teacher a critical influence in education [54] and that, as [14] notes, concentration on initial teacher education "… would seem to provide the best means to create a new generation of teachers who will ensure the successful implementation of inclusive policies and practices" (p. 35). But in the view of [58], few international studies have been carried out to examine student teachers' motivational orientations and readiness for teaching learners with diverse backgrounds and abilities.

Teacher educators and researchers believe that teachers' capacity to support learners who are self-regulated through learning is tied to teachers' own self-regulation [34]. If teachers are incapable of self-regulating their own learning and illogical about their own beliefs and practices, it will be difficult for them to develop these capabilities among their students [34, 43, 28, 51] since they must acquire a deep understanding of cognitive and motivational principles of teaching, learning [41] and assessment in order to help their students to acquire the needed skills of learning [56]. The ways in which teachers achieve, maintain and develop their identity, their sense of self, which includes motives [44, 8] in and through a career, are of vital significance in understanding the actions and commitments of teachers in their work, which could influence the way they are trained.

The literature on teacher quality ratifies the logical conclusion that poor quality of students ' learning has a strong positive association with poor quality of teachers ' teaching, in that 'teachers often give what they have'. In most cases, and especially in Ghana, effective student learning and academic performance are mired by weaknesses in teachers' pedagogical content knowledge and disposition for professional practice [24, 1], notwithstanding the fact that research findings on the effect of content knowledge on teacher effectiveness are mixed and that on the impact of teacher dispositions is almost non-existing. Teacher education has been recognised as a part of the problem and remediation. Improved access to basic education through the introduction of capitation grants and the school feeding programmes means an increase in pupil enrolment, which has brought about a huge demand for more teachers and the

priority has been to find ways of increasing the numbers appointed by recruiting more trainees onto established courses, by creating new route into teaching or by a combination of both strategies with the hope of increasing access as well as improving quality of teaching and learning in order to train citizens who are well balanced intellectually, emotionally, spiritually and physically [61].

With this observation, and based on the recommendations made by the Presidential Committee on the Review of Education Reform in Ghana that the objective of teacher education should be the training and development of the right type of teachers who are competent, committed and dedicated [53], policies were initiated in making Colleges of Education (CoE) tertiary with the aim of training teachers who are capable of applying, extending and synthesizing various forms of knowledge; developing attitudes, values and dispositions that create a conducive environment for quality teaching and learning in schools; facilitating learning and motivating individual learners to fully realise their potential and adequately preparing the learner to participate fully in the national development [53].

Research suggests that advanced (i.e. university) students' motivations and learning conceptions are different (e.g., [25 62]) and as such the onus now rests on the student-teacher to be more proactive in learning and take charge of his or her own performance instead of expecting college academics to solely give them knowledge and skills [35]. They need to possess the ability to engage in reflection and conscious deliberation of tasks relating to teaching and learning in college and the impact that would have on their academic achievement.

Again, Lewin and Stuart (2003) believe that any effective system of teacher education thrives on the recognition and building on the characteristics and motivation that student teachers bring to the initial training programme. They assert that drawing on trainees' entry behaviour is necessary, because, these entry behaviour can serve as the starting points in drawing up curricula that address trainees' needs and competences. In the same vein, Duckworth et al. (2009) assert that learners draw on previous experience to build a repertoire of beliefs and strategies that enhance learning, however, available research conducted in Ghana by Lewin and Stuart (2003) revealed that "most trainee teachers achieved relatively low results at the end of their secondary school career, leaving them underqualified for higher education; teacher training colleges, it seems, take the next tranche down from the universities" (p. 45). In that same study, the great majority of the students indicated that they would rather have gone to university instead of teacher training college. This clearly gives an indication as to the level of motivation and self-preparedness which teacher trainees enter Colleges of Education (CoE).

These notwithstanding, the field of teacher education has recently received a call to shift from teacher preparation programmes which centred around teachers' knowledge of their content area, classroom management skills and/or ability to pass external examinations, to an examination of

their beliefs, motivation, and self-regulatory factors associated with teaching and learning [21, 50]. Lewin and Stuart (2003) suggest that student teachers' ideals need to be nurtured and rewarded if they are to act as lifelong motivators. Dembo (2001) also proposed that learning to teach content area is not enough; rather, future teachers also need to learn how to learn and how to self-regulate their learning process. Further, he asserted that the curricula for student-teacher preparation programmes should introduce self-regulated learning (SRL) strategies into the theory and research of human learning. If student teachers are expected to display intrinsic interest in academic tasks associated with their teaching programmes since they have willingly chosen that path as their future career; if it is expected that intrinsic interest will be associated with student teachers' motivational beliefs and self-regulation of learning, then there is the need to know more about how teacher trainees go about their learning and the strategies they employ to get their academic task completed.
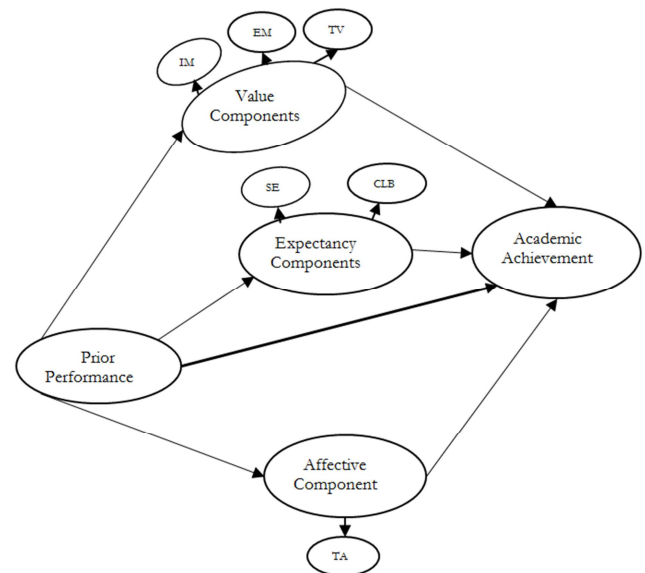

Figure 1. *Hypothesised model of prior performance, motivational orientation and academic achievement.*

IM=intrinsic motivation, CLB=control of learning beliefs, TA=test anxiety, TV=task value, SEL=self-efficacy for learning, and EM=extrinsic motivation.

Research findings in relation to motivational processes indicate that learners who self-regulate report of high self-efficacy [68, 69, 33], self-attributions, and intrinsic task interest [68, 66, 63], even though, outsiders may think that these learners are self-starters who display extraordinary effort and persistence during learning. In terms of their behavioural processes, learners who are involved in self-regulated motivation have the following attributes: a) they select, structure, and create environments that optimise learning; b) they seek help and advice, information, and places where they are most likely to learn; c) they self-instruct during acquisition and self-reinforced during performance enactments [59]. This study is therefore framed

by the following hypothesised model of the mediation effect of the motivational component of the self-regulation learning strategies on the relationship between prior academic performance (*entry aggregates*) and academic achievement (*college CGPA*) of student teachers.

In order to contribute empirical data to inform policy and address the gaps in the literature, the motivational orientations of student teachers were the main concerns of this study. Identification of the motivational strategies adopted by the student teachers in relation to their academic levels would provide a concrete profile of the motivated strategies for learning of the future teachers. This information would be useful and meaningful to course and curriculum designers and developers as well as academic staff of relevant departments in colleges of education to give appropriate assistance and guidance to student teachers in their motivated strategies for learning process when necessary.

In line with the study's main purposes, I focused on one research question and one hypothesis:

Research Question

What are the motivational orientations of student teachers in colleges of education in Ghana?

Hypothesis

H_0: There is no mediational effect of student teachers' motivational orientations on the relationship between their prior performance and academic achievement in college.

H_1: There is mediational effect of student teachers' motivational orientations on the relationship between their prior performance and academic achievement in college.

2. Method

2.1. Design and Measures

This correlational study employed a survey method approach in the collection of quantitative data based on the assumption that student teachers' performance might be attributed to their level of motivation and development of motivational dispositions in colleges. The study sought to find out the correlation between student teachers' motivational orientations and their academic performance through the use of a questionnaire which is rooted in Zimmerman, Pintrich, Winne and Hadwin's models of self-regulation learning, and Vallerand's hierarchical model of intrinsic and extrinsic motivation. An extant data in the form of students' Grade Point Averages (GPAs) was also collected. The survey instrument was made up of two parts. Part one of the instrument sought information on students' identification numbers for the purpose of extracting their GPAs. Part two of the questionnaire was made up of 32 items of the modified Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich, Garcia and Mckeachie (1993) which is seen to have demonstrated good psychometric properties which could be adapted to tap the motivational orientation strategies for learning attributes of adult learners such as student teachers in colleges of education in Ghana. For this new instrument, made up of six subscales (i.e., intrinsic motivation, control of learning beliefs, test anxiety, task value, self-efficacy for learning, and extrinsic motivation), respondents indicated their extent of relatedness to each of the statements on a seven-point Likert scale ranging from *not at all true of me*, 1 to *very true of me*, 7.

Intrinsic motivation ([IM]*, Cronbach's α=0.86).* A four-item scale to measure student teachers' intrinsic motivation was developed based on the socio-cognitive theory (SCT). The IM subscale contains items about student teachers' preference for course materials which give them the opportunity to explore and maximise their potentials. Example items are 'On this programme, I prefer course materials that really challenge me so I can learn new things' and 'The most satisfying thing for me in this programme is trying to understand the contents of the courses as thoroughly as possible'.

Control of learning beliefs ([CLB]*, Cronbach's α=0.87).* The four-item scale developed and tested for the context of Ghana colleges of education was used to measure students' beliefs that their ability to manage and control their learning will result in positive outcomes. When learners believe they have control over their learning situation, they are more likely to take on courses and persevere with challenging tasks, compared with those who perceive that they have little control (National Research Council, 2012). An example item is 'It is my own fault if I do not learn the material in this programme'.

Test anxiety ([TA], *Cronbach's α=0.78)* was measured with a five-item subscale that contains statements that sought to assess student teachers' predisposition to fear for tests and examinations which can adversely affect their academic performance in colleges of education. Example items are 'When I take a test I think about how poorly I am doing compared with other students' and 'I feel my heart beating fast when I take an examination'.

Task value ([TV]*, Cronbach's α=0.86).* The six-item subscale was developed to measure the importance and the value student teachers attach to their programme and the courses they study. The scale was to assess students' judgements about the usefulness of course materials and tasks for achieving their career goals. Example items are 'I think I will be able to use what I learn in this programme in other courses later in my career' and 'It is important for me to learn the course material in this programme'.

Self-efficacy for learning ([SEL], *Cronbach's α=0.90*). The scale to measure SEL developed by Pinttrich et al. (1993) to assess expectancy for success and self-efficacy for performance among college students, was adjusted to fit the present environment of colleges of education in Ghana. Eight items were used to measure student teachers' appraisal of their ability to master and accomplish tasks. Some of the items on the scale are 'I am certain I can understand the most difficult material presented in the readings for this programme' and 'I am certain I can master the skills being taught in courses in this programme'.

Extrinsic motivation ([EM], *Cronbach's α=0.76*). The five-

item scale was developed to measure how student teachers are concerned about issues that are not related directly to the tasks they perform, but on how tangible motivators such as grades, and praises from parents and peers may affect their performance. Example items are 'Getting good grades in this programme is the most satisfying thing for me right now' and 'If I can, I want to get better grades in courses than most of the other students'.

2.2. Sample

As regards sample for the study, 500 student teachers comprising 250 first- and 250 second-year students were selected using stratified and systematic random sampling procedures from 10 colleges of education across Ghana. Of the 500 participants, 54% were males and 46% females. In terms of the participants' entry aggregates, a very large majority (81%) gained admission to college with aggregates 24 to 36. Fifteen percent entered with aggregate 18 to 23, 3% gained admission with aggregates 12 to 17, and just 1% gained admission with aggregates 6 to 11.

2.3. Analysis

In order to explain by what means a causal effect occurs between students' prior performance, their motivated self-regulation and academic achievement in colleges of education, a mediation analysis, an examination of "the process by which some variables exert influence on others through intervening or mediator variables" [47] was employed within this study. For example, research evidence suggests that intrinsic motivation, test anxiety, and self-efficacy for learning all predict academic achievement. I think, however, that, if I am able to claim that they exert their influence or effects through prior academic performance, it would be more informative and useful for practice. Bearing in mind that there is the likelihood of the presence of collinearity – the correlations among mediators, which could affect the multiple-mediation-model in the same way as in simple multiple regression, and compromise the significance of particular indirect effects. I am not by any means saying that investigating specific indirect is dependent on a significant total indirect effect as it is wholly possible to identify specific indirect effects even when there is no significant overall indirect effect [see 26, 48].

Fundamentally, the analysis converts raw rating scale responses, entry aggregates and the GPAs of participants into linear units of measurements. Because both the individual and total indirect effects were of theoretical interest, they were investigated. In this regard, I followed Preacher and Hayes' (2008) suggestion and investigated multiple interactions among the variables in the study in two stages:

1. Investigated the total indirect effect (the sum of all the indirect effects of mediators) or whether the set of mediators transmitted the effect of predictor (s) (e.g., Prior performance) to the outcome variable (i.e., academic achievement)
2. Tested hypotheses regarding individual mediators in the

context of multiple mediator models.

The motivation variables (Intrinsic Motivation, Extrinsic Motivation, Task Value, Control of Learning Beliefs, Self-Efficacy for Learning, and Test Anxiety) were used as mediators (M_1 to M_j) to examine the relations between prior performance (X) and academic achievement (Y). The model used is depicted in Figure 2.
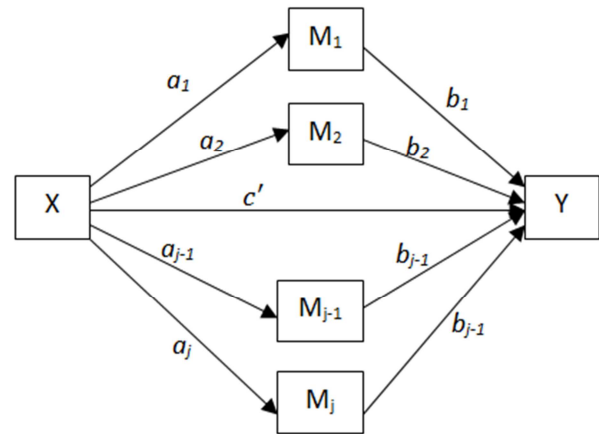

Figure 2. A model of multiple mediation analysis of the effect of Prior performance on Academic Achievement by Student teachers' Motivational orientations.

Mathematically: $Y_i = b_0 + b_1 M_1 + b_2 M_2 + \ldots + b_{j-1} M_{j-1} + b_j M_j + c' X_i + \varepsilon_i$; where b_0 is the intercept of the model; b_1 to b_j are the regression coefficients of the mediators; M_1 to M_j are the mediators in the model; c' is the direct effect of the independent variable (X) on the response variable (Y) controlling for M_1 to M_j and ε_i is the residual (error estimate) in the model.

The product-of-coefficients approach (Preacher & Hayes, 2008) was used in estimating the total indirect effects as follows:

Total indirect effect (f)=$a_1 b_1 + a_2 b_2 + \ldots + a_{j-1} b_{j-1} + a_j b_j$ and the significance tested using kappa-squared (k^2).

Data analysis was conducted using a custom dialog, PROCESSv3.4 procedure for SPSS release 3.0 [31]. All continuous variables except the outcome variable (academic achievement) were centered by their grand mean in order to clarify the interpretation of results. The data were bootstrapped for indirect effect with bootstrap samples fixed at 1000. The confidence interval (CI) method used was the bias-corrected (BCa) for all mediational analyses in this study. Results were interpreted using coefficients of determination (R^2) and/or kappa-squared (κ^2) in association with practical importance and theoretical reasonableness [26, 48, 47, 52).

3. Results

The results of an investigation into student teachers' motivational orientations used in a professional training environment and how they impacted on their academic performance in colleges of education are presented. Quantitative data analysis approach was used in answering

the research question and a hypothesis of the study.

3.1. Prevalence of Student Teachers' Motivational Orientations

The main research question of the study examined the most prevailing motivational orientation variable among student teachers in the colleges of education. Differences in means between first and second-year students were tested with an independent samples t-test. Table 1 displays the summary statistics and the independent t-tests for the variables in the motivational construct (i.e., value, expectancy, and affective components of self-regulation) among student teachers.

Table 1. *Summary statistics and independent t-tests for motivational orientation variables.*

SRL variables	Year	Rank	Mean	SD	t	p
Intrinsic motivation	1		5.23	1.39		
	2		5.38	1.11	-1.374	.170
Total		*4th*	*5.31*	*1.26*		
Control of learning beliefs	1		5.07	1.43		
	2		4.67	1.39	3.146	.002
Total		*5th*	*4.87*	*1.42*		
Test anxiety	1		4.94	1.35		
	2		4.68	1.28	2.172	.030
Total		*6th*	*4.81*	*1.32*		
Task value	1		5.88	.93		
	2		5.56	1.11	3.456	.001
Total		*2nd*	*5.72*	*1.03*		
Self-efficacy for learning	1		5.58	1.2		
	2		5.36	1.04	2.162	.031
Total		*3rd*	*5.47*	*1.13*		
Extrinsic motivation	1		6.25	.80		
	2		5.91	.94	4.329	.000
Total		*1st*	*6.08*	*.89*		

IM=intrinsic motivation, CLB=control of learning beliefs, TA=test anxiety, TV=task value, SEL=self-efficacy for learning, EM=extrinsic motivation, N=500 (250 for each year group).

The results as indicated in Table 1 show that students in the study reported high on extrinsic motivation (M=6.08, SD=0.89, rank=1) than any other motivation variable. Students also reported as true of them their value of task as one of the top-ranked motivation variable in learning (M=5.72, SD=1.03, rank=2). The results from the descriptive analysis revealed that student teachers reported the affective component as the least true of them - the fear for a test or the prevalence of test anxiety (M=4.81, SD=1.32, rank=6). This was followed by the control of learning beliefs (M=4.87, SD=1.42). In all, students indicated that extrinsic motivation, task value and self-efficacy for learning were the three topmost motivational strategies they employed during their training. Although students reported as true of them, it was evident that test anxiety and control of learning beliefs were reported as the two least motivational variables prevalent during the period of academic work in college.

An independent t-test was conducted on each of the variables to ascertain whether significant differences exist between the motivational orientations of students in their first year of training and those in their final year of course work (i.e., the second-year cohort). The tests were conducted to assess students' "development" of motivational strategies for learning over time. The results indicate that first and second-year students differ in some of the motivational orientations. Specifically, first-year students (level 100) (M=6.23, SD=0.80) rated themselves as more extrinsically motivated than did second-year students (level 200) (M=5.91, SD=0.94), t (498)=4.33, $p<0.05$. Thus, students reported a significant decrease in their level of extrinsic motivation. First-year students (M=5.88, SD=0.93) perceived as more valuable the tasks they performed in college than did second-year students (M=5.56, SD=1.11), t (498)=3.46, p=.001). However, the mean difference for intrinsic motivation was not significant, even though second-year students (M=5.38, SD=1.11) reported higher on the construct than did first-year students (M=5.23, SD=1.39). In all, with the exception of intrinsic motivation where second-year students reported higher mean than the first year students, and even then, the mean differences was not statistically significant, all the mean scores reported show a lower mean for the second years than the first years.

3.2. Mediational Effect of Motivation on the Relationship Between Student Teachers' Prior Performance and their Academic Achievement

The main hypothesis of the study was to find out whether student teachers' motivational orientations have any mediational effect on the relationship between prior and their academic achievement.

As indicated in Table 2, student teachers' prior performance predicted their academic achievement in college, b=-.044, t=-11.95, $p<.05$. The negative b value indicates that the relationship is negative. Thus, as students' prior performance (entry aggregate) increases, their academic achievement (GPA) decreases. A decline in prior performance, which is a better entry aggregate leads to an increase in academic achievement. Without the mediators (motivational orientation variables), the R^2 =.217, which suggested that about 22% of the variability in student teachers' academic achievement is explained by their entry aggregates.

Table 2. *Mediation analysis of the effect of student teachers' prior performance on their academic achievement through motivation orientations.*

Model 1	Estimate	SE	p	95%CI		Indirect Effects	BC SE	BC 95% CI	
				lower	upper			lower	upper
Model without mediators									
Intercept	3.6457	.105	.00	3.4385	3.8528				
Aggr→Aca_Achi	-.0438	.004	.00	-.0510	-.0366				
R^2	.2173		.00						

Model 1	Estimate	SE	p	95%CI lower	upper	Indirect Effects	BC SE	BC 95% CI lower	upper
Model with mediators									
Intercept	3.1578	.169	.00	2.8258	3.4897				
Aggr→IM	-.0068	.010	.51	-.0270	.0134	-.0006	-.0006	-.0023	.0010
IM→Aca_Achi	.0815	.017	.00	.0484	.1145				
Aggr→CLB	-.0098	.011	.38	-.0319	.0122	-.0003	.0004	-.0015	.0003
CLB→Aca_Achi	.0331	.014	.022	.0048	.0615				
Aggr→TA	.0336	.011	.00	.0126	.0546	-.0030	.0010	-.0051	-.0010
TA→Aca_Achi	-.0885	.015	.00	-.1186	-.0584				
Aggr→TV	.0224	.008	.01	.0059	.0388	-.0004	.0005	-.0017	.0003
TV→Aca_Achi	-.0185	.020	.36	-.0583	.0213				
Aggr→SEL	-.0129	.009	.14	-.0300	.0041	-.0013	.0010	-.0034	.0003
SEL→Aca_Achi	.1027	.019	.00	.0648	.1406				
Aggr→EM	.0294	.008	.00	.0136	.0453	-.0016	.0008	-.0037	-.0004
EM→Aca_Achi	-.0561	.021	.01	-.0978	-.0143				
Aggr→Aca_Achi	-.0365	.004	.00	-.0435	-.0295				
Indirect Effect (f)						-.0072	.0020	-.0114	-.0036
Effect Size (κ^2)						-.0772*	.0208	-.1186	-.0381
R^2	.4198		.00						

Aggr=Prior Performance, Aca_Achi=Academic Achievement, IM=intrinsic motivation, CLB=control of learning beliefs, TA=test anxiety, TV=task value, SEL=self-efficacy for learning, EM=extrinsic motivation; BC=bias corrected; 1000 bootstrap samples, *κ^2 values of .01, .09 and .25 were interpreted as small, medium and large effect sizes respectively (see Preacher & Kelly, 2011, p. 107).

Table 2 also shows the regression of achievement predicted from the motivation variables (intrinsic motivation, control of learning beliefs, test anxiety, task value, self-efficacy for learning and extrinsic motivation) and prior performance. The mediation test showed that prior performance was a significant predictor of academic achievement with the motivation variables in the model, b=-.0365, t=-10.284, p<.05. Academic achievement was predicted by self-efficacy for learning, b=.103, t=5.329, p<.05; intrinsic motivation, b=.082, t=4.838, p<.05. Controlling for prior performance and the other motivation variables, test anxiety significantly predicted student teachers' academic achievement, b=-.089, t=-5.768, p<.05; so did extrinsic motivation, b=-.056, t=-2.636, p=.009. The negative b-values for test anxiety and extrinsic motivation indicate that as students' levels of test anxiety increase, their achievement outcomes decrease and vice versa and a decline in their expectation of external motivation lead to an increase in their academic achievement and the converse is also true. However, student teachers' value for course materials did not significantly predict their academic achievement.

I also examined whether prior performance has a significant effect on the motivation variables. The results revealed that prior performance significantly predicted test anxiety, a=.034, t=3.140, r^2=.020, p=.002; extrinsic motivation, a=.029, t=3.643, r^2=.034, p<.05; somewhat surprisingly, prior performance significantly predicted task value, a=.022, t=2.675, r^2=.015, p=.008. This means that prior performance explained 2%, 3.4%, and 1.5% of the variability in test anxiety, extrinsic motivation and task value respectively. Thus, student teachers who entered college with poor performance in their previous studies reported high on test anxiety, extrinsic motivation and task value. Prior performance did not significantly predict intrinsic motivation, control of learning beliefs, and self-efficacy for learning. In all, the model had an R^2=.42, which suggested

that the model with the mediators (student teachers' motivational orientations) accounted for 42% of the variation in student teachers' academic achievement.

Taken together, intrinsic motivation, control of learning beliefs, test anxiety, task value, self-efficacy for learning, and extrinsic motivation mediated the effect of prior performance on student teachers' academic achievement. As can be observed from Table 2, the total effect of prior performance on academic achievement was -.0438, p<.05, and the direct effect of prior performance on academic achievement controlling for the motivation variables was -.0365, p<.05. The estimated indirect effect from the difference between the total and the direct effect was -.0073. This means that approximately 16.7% of the change in the effect of prior performance on achievement was due to the presence of the motivation variables There was a significant indirect effect of prior performance on academic achievement through the motivation variables (i.e., intrinsic motivation, control of learning beliefs, test anxiety, task value, self-efficacy for learning and extrinsic motivation), b=-.007, 95% BC CI [-.011, -.004]. Since the bias-corrected confidence interval did not contain zero, I can claim that the difference between the total effect and the direct effect of prior performance on academic achievement through the motivation variables was different from zero. However, this difference represented a fairly moderate effect, κ^2=-.077, 95% BC CI [-.119, -.038].

As with mediation analysis, I was not interested in the total indirect effect of prior performance on academic achievement, as well as specific indirect effects [47] of the motivation constructs. The individual indirect effects of intrinsic motivation, control of learning beliefs, test anxiety, task value, self-efficacy for learning, and extrinsic motivation were examined (see Table 2) to tease out how individual motivation variables depended on prior performance in their relations with student teachers' academic achievement. The results indicated that students' entry aggregates (prior

performance) had minimal effect on the motivation constructs (and vice versa). Of the six motivation variables, two, test anxiety and extrinsic motivation significantly mediated the relationship between prior performance and achievement (GPA).

The ability of test anxiety to intervene the effect of prior performance on achievement was significant, $b=-.003$, 95% BC [-.005, -.001], and so was extrinsic motivation, $b=-.002$, BC [-.004, -.001] conditional on the inclusion of intrinsic motivation, control of learning beliefs, task value and self-efficacy for learning in the model. I further examined the contrasts of the indirect effects through pairwise comparisons to determine whether the indirect effects through test anxiety and extrinsic motivation were significantly different from the other motivation variables; hence established which motivation variable to include and which to exclude in the final model. The results revealed that the specific indirect effect of prior performance on achievement through test anxiety was larger than the specific indirect effect of control of learning beliefs, with a 95% BC CI of. 001 to. 005, and task value, with a 95% BC CI of -.005 to -.001. The specific indirect effect of test anxiety was not significantly different from that of intrinsic motivation, self-efficacy for learning, and extrinsic motivation.

4. Discussion

The purpose of this study was to examine student teachers' motivational orientations used in a professional training environment and how it impacted on the influence of prior academic performance on their academic performance in colleges of education in Ghana. The mediation analysis model result provides evidence that the student teacher's motivational orientation has an effect on the relationship between prior performance (entry aggregate) and academic performance (GPAs) in college. Hitherto, a review of the literature suggests that, students' learning function under the assumption that the growth and development paths are linear. To this end, it is believed that students who enter colleges with good 'entry aggregates' are likely to achieve high at the end of their training period. Likewise, students who enter with low grades (high entry aggregates) would end up having a low performance at the end of the training session in what is often termed as *Mathew effect* [see 16] in both academic and practice performances [5, 17, 50, 35].

In the educational context, the 'Matthew effect' signifies that students with comparatively high academic ability at a certain time point of interest continue to increase academically faster than less able students. In this way, differences in achievement that already exist among students when they enter a school become increasingly greater as they progress through school. Studies [see 32, 70] that frequently assess students' gain in learning in relation to prior attainment have clearly shown this. Over the years, literature has it that achievement scores are deemed only to mirror the current attainment of a student in relation to the time of testing and do not give a complete depiction of the influence of other factors on the learning continuum such as the school, teachers, and resources on the student's performance throughout the study period in the school [32].

However, as suggested by some researchers, even though students' academic achievement in college requires some prior competencies, and even when these are clearly in evidence, these abilities alone do not often distinguish high-performing students from low-performing students [33]. As asserted by He and Tymms (2014), students' assessment scores are a reflection of the "combined influences of a number of factors such as the learning environment in the school, the socioeconomic background of the students, the student's attitudes to study, the academic achievement attained before entering the school, and many others" (p. 26).

In this study, I investigated the tempering of theories of prior performance by current behaviour, motivational orientations. The study attempted to understand the relationship between the two, and how this impacted on student teachers' performance. This study, therefore, assessed the incidence of motivation among teacher trainees in residential colleges, as well as differences, if any, between first and second-year students to ascertain their motivational orientations [7]. This was to add empirical data on how student teachers' motivational orientations relate to their prior and current academic performances during their study of courses whilst on campuses [38, 11].

The literature on students' learning highlights the importance of motives/goals (i.e., the combined form of values, beliefs, attributions, and affects/emotions that direct behavioural intents) as one most essential element in educational environments [59, 25]. It is generally believed that students make use of some elementary criteria in the initial cognitive-motivational analysis of the learning task based on contextual situations or personal variables of a cognitive, motivational (expectations), and affective form. As often observed [65, 57], students report high on extrinsic motivation in studies of motives and goal-related achievement. The negatively skewed report of extrinsic motivation was replicated in this present study. Extrinsic motivation, a reflection of activity or behaviour undertaken for some instrumental value or external reason was ranked as the number one self-regulatory activity among student teachers.

This finding suggests that students' reasons for learning course materials and their choice of colleges to be trained as teachers mostly were influenced by extrinsic motives (getting good grades, preparing for a future career, and increases in salaries), altruistic and less autonomous forms of regulation [65]. External motives such as students wanting to do well to show their ability to friends and family, desire to transmit (impart) knowledge to children and earning respect from the communities they would be teaching after training also featured high in self-reports. Even though my cross-sectional data cannot address causal change in motives, it does appear first-year students reported high on the extrinsic motive variable than their colleagues in the second year on the extrinsic motivation variable. Accordingly, students'

development of extrinsic motivation was assessed through the use of independent t-test and the results indicated that first-year students reported having had higher levels of external motives than students in their second year on the programme. These findings supported the notion that when students feel less in control of their learning, they are motivated extrinsically rather than intrinsically [68, 45]. Likewise, teacher candidates in the study could be said to have not assumed control of their learning and reported to have relied on external factors as catalysts for learning course materials during training.

According to Sitzmann and Ely (2012) learners' beliefs about the rewards or values of learning have a direct effect on learning, in that trainees tend to show dwindling interest in activities that they deem not worthy of their time and resources. The results from the current study show this situation as students ranked as second their value for tasks on their training programmes (e.g. "I think the course materials in this programme are useful for me to learn"). Like other motivation variables in the SRL construct, task value has a major influence on the decision to use a particular strategy or not [38, 10]. This implies that student teachers are likely to employ strategies as they deem appropriate to enable them to achieve their goals, and in relation to the importance they attach to course content and materials they are given to learn.

However, if teaching and learning are not modelled well to fit the aims of the training programme being offered, students are likely to direct the importance of the programme in their own way and decide on which parts of the programme are important or not. For example, students in the study indicated as the second-highest ranked apart from the general importance of the materials on the programme, the fact that what they were learning would help them in other courses later. Thus, their utility value (i.e., the usefulness of the acquired skill in future goals [23] lay in what student teachers would be using their knowledge gained on other future courses rather than their chosen career. This finding parallels that of Akyeampong and Stephen's (2002) study which found out that, student teachers often believed their initial training would afford them the opportunity for higher education that could gain them other more well-paid jobs.

Trainees' beliefs as regards their capability to succeed in training and perform training-related tasks are an important component of students' learning. However, student teachers' rating concerning their self-efficacy for learning and performance was moderate as they ranked their self-efficacy for learning in the third position. In fact, they were almost unsure whether they could understand the most difficult material presented in the courses of their training programme and showed a lack of confidence in understanding materials they deemed complex that was presented by their tutors. Further analysis of the observed variables that make up the construct indicated that student teachers were more concerned about how to improve their GPAs (e.g., "I expect to get a high GPA in this programme," mean of 5.84, a standard deviation of 1.41) as compared to their self-conceptions about their understanding of subject matter

knowledge (e.g., "I am certain I can understand the most difficult material presented in the courses for this programme," mean of 4.77, standard deviation of 1.68) and how to develop high levels of competence in core teaching knowledge and skills [49].

Perhaps, teacher trainees in the present study did not consider their self-perceptions about content knowledge the most paramount in studying the course materials. This finding is at variance with most studies of self-regulated learning in terms of students' ratings of motivation variables. For example, a review of several studies by Sitzmann and Ely (2012) revealed that students who self-regulate usually report high on self-efficacy for learning [69]. But that could not be said of the current students in this study. Nevertheless, the findings corroborate other researchers [9, 45] who have found out that, students who are less efficacious tend to employ surface learning strategies such as rehearsal in achieving their performance goals because self-efficacy serves as a mechanism that plays a central role in the exercise of personal agency [38]. First-year students reported slightly higher than their second-year counterparts, yet the mean difference of 0.22 was statistically significant at the 0.05 confidence level. This implies that the self-efficacy variable is a dynamic construct under classroom learning conditions [64, 36, 68] and seems to decline as a student progresses the academic ladder, probably due to demanding upper-level classes or more demanding courses [33].

Even though the findings of this study and others [59, 69, 46] differ on students' reports of motivational orientations, they converge on student's report of test anxiety. Like the other studies, student teachers in this study reported low on test anxiety. First-year students were more likely than second-year students to prioritise their fear for examinations. The implication of this finding is that new entrants to colleges may not be aware of the consequences associated with failing the tests. In fact, the prevalence of test anxiety might have resulted from the need for student teachers to satisfy external agents as shown in Table 1 of this study, and others [3, 42], which might have resulted in their use of coping strategies in order to protect their self-worth [45].

Taken together, the motivation components of students' self-regulation learning contributed unique variance in predicting academic achievement over and above the impact of prior attainment (student entry aggregate). In terms of student motivation constructs, the results indicated that when predicting final academic achievement, intrinsic motivation, test anxiety, self-efficacy for learning, task value, extrinsic motivation and control of learning beliefs mediated moderately in the effect of prior attainment, and each variable, with the exception of task value, contributed significantly to the model. In all, the model explained about 42% of the variance in students' academic performance. However, task value did not predict student teachers' GPA. Self-efficacy for learning, test anxiety, intrinsic motivation, control of learning beliefs, and extrinsic motivation accounted for approximately 36% of the variance in student GPA, after controlling for student prior performance (entry

aggregate).

It was evidenced that a student teacher's intrinsic interest, control of learning belief, and self-efficacy predicted his or her GPA independent of prior performance. This finding seems to suggest that, student teachers developed these motivational orientations based on the academic tasks in college. The result supports Sitzmann and Ely's (2012) findings that motivation variables such as self-efficacy for learning and intrinsic interest play an independent and essential role in student learning and academic performance. On the other hand, test anxiety and extrinsic interest were found to be dependent on prior performance. Thus, a student teacher's entry grade predicted positively a student's level of test anxiety and extrinsic interest. That is, students who entered college with high aggregates (poor entry grades) were more likely to report high feeling anxious during tests and examinations, and also being extrinsically motivated.

5. Conclusion

The study explored the mediational effect of student teachers' motivational orientations on the impact of prior attainment on their academic performance in college. The present study has followed the belief that behaviour of motivational orientations needs to be constructed and experienced by student teachers, and for trainees to nurture the same development in their students, they need to discuss among themselves, with their tutors and others for a better understanding. In the teacher training context, it is believed that trainees actively construct or build new ideas or concepts from their current and past experiences; connect new knowledge to prior knowledge and incorporate the new experiences into an already existing framework with alterations in the existing structures. Therefore, identification of the motivational strategies adopted by the student teachers would provide a concrete profile of the motivated strategies of prospective teachers in guiding policies and practices in training them for eventual transfer to the field of practice.

Generally, it is expected that student teachers display intrinsic interest in academic tasks associated with their teaching programmes if they had willingly chosen that path as their future career, and that intrinsic interest would be associated with student teachers' motivational beliefs. Teachers who are intrinsically motivated tend to have a high sense of resilience and adaptive abilities and students who self-regulate usually report high on intrinsic task interest and also high on their beliefs about their locus of responsibility, degree of self-determination, and sense of agency in creating positive possibilities for self-development and self-regulation [5, 45]. That is, when student teachers are mindful of the fact that they are in control of their own learning, they are likely to become efficacious, feel competent and internalise learning goals. But this could not be said about the students in the present study. Teacher trainees in the present study did not consider their self-efficacy about content knowledge the most paramount in studying the course materials. This is not surprising, because student teachers are likely to employ strategies as they deem appropriate to enable them to achieve their goals, and in relation to the importance they attach to course content and materials they are given to learn. The findings suggest that student teachers perceive themselves to be extrinsically motivated and are mostly influenced by external factors in their actions relative to career choice and studying course materials during training.

To conclude, the present study has shown that the motivational orientations of student teachers' contributed unique variance in predicting academic achievement over and above the impact of prior attainment (student entry aggregate). In terms of student motivation constructs, the findings show that when predicting final academic achievement, intrinsic motivation, test anxiety, self-efficacy for learning, task value, extrinsic motivation and control of learning beliefs mediated moderately in the effect of prior attainment, and each variable, with the exception of task value, contributed significantly to the model.

6. Implications for Initial Teacher Training

Founded on the main findings of this study, tutors and other teacher educators should devote attention to building students' efficacy beliefs [5] as many of the students they recruit into training usually come in with low grades [4] in order to optimise their learning during training and possibly transfer it to the field of practice. Overall, the results revealed that a student's entry aggregate (prior performance) had minimal predictive value for their motivational orientation such as self-efficacy for learning, control of learning beliefs, and intrinsic motivation. This probably suggests that these constructs are task and context-specific and may be dynamic across time [68, 30, 45]. However, task value, extrinsic motivation, and test anxiety were predicated on prior performance. This means that student teachers' entry aggregates are very essential for gauging how they can manage their examination anxieties and their attitudes towards course work. Therefore, courses should be modelled well to suit the aims of the training programme being offered. Other than that, students are likely to tailor the importance of the programme in their own direction (i.e., personal beliefs and values) and decide on which parts of the programme to study or not.

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