

Assessing the Impact of Continuous Professional Development of Teachers and its Effects on Satisfaction, Achievement, and Engagement: Colleges of Education, Northern Ghana

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Abstract

Aim: Continuous professional development (CPD) is critical for college tutors to maintain their effectiveness as educators and keep their teaching practices up-to-date. By investing time and effort in CPD, tutors can provide a better learning experience for their students and ensure that they are well-equipped to meet the challenges of a rapidly changing educational landscape. In this regard, the study examined how the CPD impacted the student's satisfaction, academic achievement, and classroom engagement. The study further assessed the moderating role of the tutor's teaching strategies and the student's learning strategies.

Methods: A quantitative study and a quasi-experimental design were used to demonstrate links between the study variables. A sample of three hundred and forty-six (346) students was taken from a total population of three thousand, two hundred (3200) students, and a sample of one hundred and ninety-one (191) teachers was taken from a population of three hundred and eighty (380) teachers using Krejcie and Morgan (1970). SmartPLS4 was used to perform a partial least square regression analysis on the data gathered.

Results: The study found that the teacher's continuous capacity development was the important factor influencing students' academic performance. Besides, their teaching and the student's learning strategies.

Conclusion: The study concludes that management of the colleges of education should invest in their teacher's professional development and leverage it for students' achievements.

Recommendation: For policy recommendations in resources allocation to improve student's academic achievement, management should first focus on assisting teachers with better classroom management, and career development and improve their teaching skills through the CPD programs.

Keywords: Academic achievement, classroom engagement, classroom management, continuous professional development, students' satisfaction, learning strategies, teaching strategies.

INTRODUCTION

To avoid a dependency relationship on outsiders from forming, the management of Ghana's colleges of education has adopted measures to encourage the capacity building of its teachers (Korantwi-Barimah & Schultz, 2019). The idea is to equip teachers with the right skills to act on teaching and learning issues to foster a sense of ownership and empowerment that helps them gain greater control of their future development (Perry & Bevins, 2019). Through extensive capacity-building measures, teachers at Ghana's colleges of education have received training on student-centred teaching methodology, pedagogy, and social & emotional learning (Adriansen & Madsen, 2019). In addition, the training is to enable them to make effective use of equipment, teaching aids and technology to ensure that each student gains enough knowledge from the learning. One of such training currently enforced across the colleges of education is the continuous professional development program (CPD), which was initiated in 2009 to focus on building teachers' capacity rather than imposing training on the teachers. The CPD is a lifelong learning process that starts with teachers' pre-service education but continues until teachers retire (Chitiyo et al., 2019).

The CPD programme is organized through systematic in-service training to improve teacher efficiency and effectiveness in knowledge delivery to students. In addition, the Ghana education service is mandated with logistics to all colleges of education for the program's success (Coffie, 2019). The CPD programme is designed to run on a three-year cycle and it is in its third cycle as at 2023. It has awarded teachers certificates and credit points for rising in ranks. Over the past decade, the programme has allowed teachers to attend workshops, seminars, and training on curricular knowledge, school-based inset (SBI), department-based inset (DBI), cluster-based inset (CBI) and many related programmes approved by the NTC (Perry & Bevins, 2019). The CPD programmes are strictly monitored to ensure absolute compliance and efficiency. For instance, each teacher must keep records of training activities, especially credit points, registration, certificates and attendance, to be submitted to the NTC for further action (Wolf et al., 2019). Similarly, a framework was created to group activities into mandatory, ranked-based and recommended activities. The idea is for teachers in specific ranks to access ranked-based or mandatory-based activities.

However, the recommended activities were to supplement teachers' credit points if they fell short in the developing professional rank cycle (Suaka & Kuranchie, 2018). The CPD program offers these opportunities to experienced and novice (beginner) teachers to acquire new learning, exploration, growth and development skills. According to Vanderpuye, Obosu and Nishimuko (2020), the CPD promotes the recognition of the hard work that experienced teachers do under stressful conditions. The rationale is that colleges of education teachers must be equipped with the skills and knowledge to perform several teaching and organizational functions. Such organizational functions are planning, designing and implementing teaching-learning activities, carrying out student assessment, organizing different curricular and co-curricular activities, participating in school administration and management, school development, and interaction with the community.

It suffices to conclude that teachers are prepared for challenges as the teaching profession evolves with new knowledge and skills generated through experience, research and development in the education field (Opoku et al., 2020). This study seeks to address several gaps identified in the patient literature on the impact of the CPD programme over the years. Firstl, though several studies have examined the teacher's perception of the program's impact on teaching quality, limited studies, if any, have been done across the colleges of education in the Northern region. The region is home to some of Ghana's well-established teacher colleges

of education. It is known for producing many quality teachers annually for the country's education sector (Boadu, 2020). However, since the inception of the CPD programme, there has been hardly any extensive assessment of the impact of the programme on the colleges of education in the northern region colleges. Secondly, the few studies on the impact of the CPD programme in the literature are qualitative studies focused on the teacher's perception (Adriansen & Madsen, 2019).

The rationale is that the CPD programme is designed to ensure effective teaching and learning, ultimately ensuring better students' academic achievement. However, since the program's inception, the chief examiner's report has indicated poor student performance, with fewer students graduating successfully over the past decade (Coffie, 2019). Furthermore, in the pertinent literature, most college of education students' must retake the teacher license exams at two times to gain their license, indicating poor performance. The argument in this study is to assess how the CPD programme has influenced students' academic achievement besides other factors such as classroom engagement and students' satisfaction with teaching methods used by the teachers. With the CPD programme, teachers are to improvise teaching strategies that give students a high degree of attention, curiosity, interest, optimism, and passion when they are learning or being taught. Such strategies extend their motivation to learn and progress in their education, as seen in (Opoku et al., 2020).

No study has examined the causality between the CPD programme and classroom engagement based on the teacher's teaching strategies. Finally, the extent to which college students are satisfied with the CPD program's impact on their teacher's strategies has not been examined in the literature. Student satisfaction is a prime determinant of their performance, and many studies have established a direct relationship between the two (Adriansen & Madsen, 2019; Vanderpuye, Obosu, & Nishimuko, 2020). This study seeks to fill the gap in the literature by examining how the CPD programme influences all these factors and its ultimate impact on student performance.

The study tests the following hypothesis based on a 5% confidence interval

1. There is no significant relationship between CPD and student's academic achievement.
2. There is no significant relationship between CPD and classroom engagement.
3. There is no significant relationship between CPD and students' satisfaction.
4. There is no significant relationship between CPD and student's academic achievement.
5. The CPD programme does not significantly influence the teacher's teaching strategies.
6. Teacher's strategies do not play a significant moderating role.
7. Students learning strategies do not play a significant moderating role.

LITERATURE REVIEW

CPD Policy Framework in Ghana

To meet the rapidly changing demands in the quality of education, global reform initiatives are focused on improving teacher professional development for improving the quality of teaching and learning within schools (Abreh, 2018). Because of this recognition, the continuous professional development of college of education teachers has failed to attract enough policy interest in educational reforms. The literature suggested that these challenges have retarded efforts to improve the quality of education across sub-Saharan Africa (Coffie, 2019). However, several reform initiatives have been adopted within Ghana's teacher education curriculum and structure, efforts to implement it on a broader scale and as a coherent policy framework to guide college of education teacher CPD practices, design, and implementation has been relatively slow (Annan, 2020). In 2008, the Education Act (Act 774) was passed to give

legislative support to the Pre-Tertiary Teacher Professional Development and Management (PTPDM) policy (Anlimachie & Avoada, 2020).

The goal was to create standard guidelines for teachers' professional development activities. Accordingly, the program's specification and assessment were based on a competency-based approach. For instance, PTPDM enforced that professional development activities must equip teachers to meet specific demands of the teaching profession and the management and responsibilities that go with them (Yalley, 2022). According to Gunu, Nantomah and Inusah (2022), this informed the design of the CPD programs to reflect the aims and objectives of tertiary education in Ghana. In this regard, the existing promotion of college of education teachers included evidence of continuous professional development activities besides the years of teaching experience (Oduro & Yalley, 2022). Such requirements linked the teacher's participation in continuous professional development activities with their career advancement and professional growth as the basis of career progression and awards. On the other hand, the PTPDM policy requires a teacher's license to guarantee that teachers are up-to-date with pedagogical knowledge and classroom management (Abakah, Widin & Ameyaw, 2022).

Other mandatory requirements include the completion of induction and participation in other required in-service training programs. For these reasons, critics argued that the PTPDM policy is trying to institutionalize teachers' professional activities; besides, Ghana does not have an absolute number of years for the professional development programme nor the specifications of a professional development standard (Akyeampong, 2020). According to Abakah et al. (2022), these challenges create a deficit in the framework to guide CPD implementation as an ongoing learning process for teachers. Against this background, the study explores the current CPD situation in colleges of education within its impact on student satisfaction, classroom engagement, student academic achievement and the moderating effect of the teacher's strategies. Focusing on teachers in the colleges of education of the northern region of Ghana, the study explores teachers' impact of continuous professional development on teaching strategies and its moderate effects.

Conceptualizing Teacher CPD

The teacher CPD aims to equip teachers with professional and up-to-date professional knowledge in pedagogy and management. It is a continuous process that builds on the teachers existing knowledge and understanding to access up-to-date knowledge needed to transfer knowledge to students effectively (Shaibu & Abubakari, 2021). It means that teachers gain the professional knowledge, skills, and attitudes of educators and, in turn, improve students' learning. CPD focuses on activities addressing teachers' behaviours, knowledge, emotions, and cognition to improve classroom practice. In Boateng (2019) opinions, such activities are not isolated events but relatively continuous learning processes throughout the teachers' working lives. Therefore, CPD must not be viewed as an event to limit teachers' learning opportunities. Instead, it must be viewed as a continuous job-embedded process that presents various learning opportunities every day (Amponsah, Ampadu & Thomas, 2021).

Teaching Strategies

In line with the objectives of continuous professional development programmes, teaching is a continuous process of adapting to learners' needs through appropriate teaching strategies (Amponsah et al., 2020). Therefore, to ensure the right changes in students learning needs are met, the choice of teaching strategies should ideally align with the subject matter. This is akin to Acheampong and Gyasi (2019) assertions that teaching strategies work effectively only if they suit learners' needs since every learner interprets and responds to questions uniquely.

Similarly, Adasi et al. (2020) contends that the alignment of teaching methods with students' needs and preferred learning strategies influences students' academic attainments.

Teachers adopted different strategies to enhance the teaching and learning processes. For instance, with the teacher-centred strategy, there is little engagement as students receive information through theoretical and memorizing without much participation in subject (Armah & Kissi, 2019). Critics argue that it lacks activity-based learning to encourage students to learn real-life problems based on applied knowledge (Kim et al., 2019). Also, since the teacher controls the transmission and sharing of knowledge, the teacher can maximize the delivery of information while minimizing time and effort, causing lost interest and understanding (Mohammed & Amponsah, 2018). Conversely, a student-centred strategy employs discovery learning to enhance active learning. It promotes interest, analytical research, critical thinking and enjoyment among students (Wongnaa & Boachie, 2018).

The literature indicates that scholars regard student-centred strategy as an effective teaching strategy since it does not centralize the flow of knowledge from the lecturer to the student. Besides, it motivates goal-orientated behaviour among students, effectively improving student achievement. Finally, a teacher-student interactive strategy adopted essential features of teacher-centred and student-centred approaches (Wongnaa & Boachie, 2018). For instance, the subject information presented by the learners is remembered better than the same information presented to the learners by the teacher. Similarly, Adasi et al. (2020) noted that the strategy significantly improves students' performance because it encourages them to search for relevant knowledge rather than the lecturer monopolizing the transmission of information to the learners.

Students' Academic Performance

A proper assessment of academic performance requires thoroughly examining students' classroom performance and graduation rates. It results from standardized tests in different academic subjects (Budu et al., 2019). Such achievements are defined in literature as the extent to which a student has attained their short or long-term educational goals based on continuous assessment or a cumulative grade point average. According to Oduro and Yalley (2022), working towards good academic achievement is vital for the successful development of students in society. For instance, students who perform well in school transition properly into adulthood and achieve occupational and economic success, as seen in Ofori and Achiaa (2018). Teacher training plays a pivotal role in producing qualified teachers that accelerates economic development and solves some of the fundamental problems of a community's educational needs (Nyarko et al., 2018).

Therefore, college of education students are also expected to invest in their education and graduate with good academic results. However, the chief examiner report indicates that the trend of graduating students in the colleges of education in the northern region is not proportional to that of enrolled students. In addition, an increasing number of students committed readmission, suggesting poor academic performance. Such poor performance has been found to cause significant stress to the parents and low self-esteem to the students (Boahene, Fang, & Sampong, 2019). For these reasons, the Ghana education services have made the CPD programme mandatory to train college teachers with the necessary skills in pedagogy and classroom management. The idea is for them to impact and transfer knowledge to students effectively (Adriansen & Madsen, 2019). Therefore, education experts argue that the CPD programme must provide information to guide the provision, reforms, and effective teaching practice and reiterate (Abreh, 2018).

Alternatively, some researchers argue that the knowledge, skills and experience teachers acquire from the CPD programme should be used to help students develop effective self-regulated learning strategies (Annan, 2020). Zimmerman (1989) and Pintrich (1999) pioneered work on self-regulated learning strategies and provided a crucial understanding of the critical processes in modern educational psychology. However, studies from these authors noted that the concept of students learning strategies has not changed from its initial definition as students who set goals for their learning and then attempt to monitor, regulate and control their cognition, intentions and behaviour. For example, Pintrich (1999) argued that cognition, motivation, behaviour, and context are the primary determinants of student learning strategies that inform students' ability to plan, monitor, control, and react to academic challenges.

Zimmerman (1989) argued that planning, monitoring, controlling and reacting to academic challenges are based on previous task analysis and motivational beliefs, self-control and self-observation, and finally, self-reflection, self-evaluation and reaction. The CPD programme adopts these self-regulation processes and encourages them to be taught to students to help develop a better learning strategy for academic performance. According to Dornyei (2019), such an approach is crucial for teacher-trainee education, as good learning is related to solid self-regulated skills

Classroom Engagement

Although there is a consensus that student engagement is vital to the educational process, how to create engaged students remains unclear in the pertinent literature (Olivier et al., 2019). According to The Glossary of Education Reform since 1961, the New Educational Reform of 2007 indicates that an effective teaching strategy must focus on classroom engagement and attract students' attention, curiosity, interest, optimism, and passion during learning. It extends their motivation to learn and helps them progress rapidly in their education (Núñez & León, 2019). For these reasons, the CPD programme provides teachers with the skills that engage students in the learning process, increase their attention and focus, and motivate them to aspire to higher-level critical thinking (Baafi, 2020).

Teachers who adopt student-centred strategies can increase student engagement opportunities, which helps them achieve their learning objectives more successfully (Manu et al., 2021). Also, the CPD programme encourages teachers to adopt active learning strategies to promote student engagement. The rationale is that active learning is an instructional approach in which students actively participate in the learning process instead of sitting quietly and listening. The question-and-answer sessions, discussion, and interactive lectures make students respond to or ask questions that help them in writing assignments, hands-on activities, and experiential learning.

METHODOLOGY

The study used a quantitative research method to examine the CPD program's impact on student academic achievement, classroom engagement and satisfaction and the moderating effect of teachers' and students' learning strategies. The data on the CPD programme and teaching strategies were taken from the teachers. In contrast, a questionnaire gathered data on student academic achievement, classroom engagement, learning strategies and satisfaction from students of colleges of education in the northern region of Ghana. Specifically, a sample of three hundred and forty-six (346) students was taken from a total population of three thousand, two hundred (3200) students, and a sample of one hundred and ninety-one (191) teachers was taken from a population of 380 teachers using Krejcie and Morgan (1970). SmartPLS4 was used to perform a partial least squared regression analysis on the model in Figure 1.

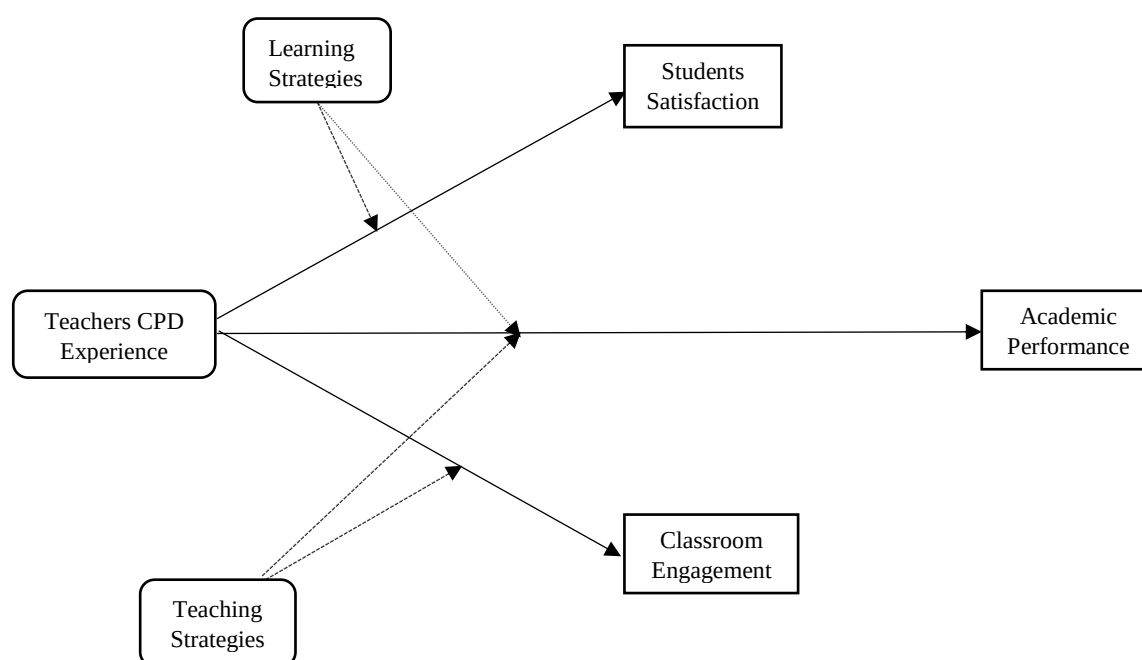


Figure 1: Analytical framework

The student's classroom engagement, their satisfaction of teachers' performance, their own learning strategies, and the teachers teaching strategies contributed 70.3%, 75.6%, 72.0%, and 77.4% respectively to the model in figure 1. It means that the teacher's continuous capacity development and teaching strategies are the principal contributors to the model. Finally, the AVE values measure the amount of variance captured by a construct concerning the amount of variance due to measurement error. The AVE value ≥ 0.5 indicate a direct association between the factors of each construct though they do not linearly predict each other.

Table 1: Construct reliability and validity

Construct	Key factors	Outer loadings (%)	Cronbach's Alpha (%)	Rho_A (%)	Composite reliability (%)	Average variance extracted (AVE)
Academic achievement	High motivation	85.2	78.8	74.8	82.1	0.606
	Improvement in test and exams scores	76.8				
	Standardized scores	71.0				
Teacher CPD experience	Better classroom management	92.5	76.2	81.3	86.3	0.679
	Career advancement	83.2				
	Improved teaching skills	70.0				
Classroom engagement	Better teacher-student relationship	78.2	76.4	70.3	76.4	0.524
	Improved classroom management	82.9				

	Teacher effectiveness	73.8				
Student satisfaction	Increased dialogue	80.4	74.3	75.6	85.2	0.657
	Active learning	84.1				
	Clear communication	78.6				
Learning strategies	Setting learning goals	85.8	72.0	72.0	84.0	0.724
	Utilizing study groups	84.4				
Teaching strategies	Collaborative learning	71.1	76.0	77.4	81.3	0.593
	Future opportunity	84.3				
	Inquiry-based learning	75.1				

Source: Field data, 2023

Table 1 is a measure of the validity of the research instrument in its ability to accurately measure the concept or construct as intended. Thus, since the Fornell-Larcker criteria values ≥ 0.7 , it means that the constructs were accurately measured as defined by Fornell-Larcker (1981). Also, since the HTMT values are smaller than one and the AVE values are more than 0.5, it implies discriminant validity was established. Thus, regarding policy direction and resource allocations, the F-squared values show that it should be guided by the relationship between students' satisfaction and their learning strategies (f-squared value = 12.559) followed by the relationship between teaching strategies and classroom engagement (f-squared=1.371) then the relationship between the teachers CPD and students' academic achievement.

Table 2: Convergent validity of the model

Measurement criteria	Constructs	Academic achievement	Classroom engagement	Learning strategies	Student satisfaction	Teacher CPD experience	Teaching strategies
Fornell-Larcker criterion	Academic achievement	0.779					
	Classroom engagement	0.793	0.724				
	Learning strategies	0.725	0.727	0.851			
	Student satisfaction	0.725	0.724	0.967	0.811		
	Teacher CPD experience	0.745	0.760	0.731	0.031	0.824	
	Teaching strategies	0.712	0.935	0.721	0.736	0.710	0.770

F-squared	Academic achievement					
	Classroom engagement					
	Learning strategies	0.002			12.559	
	Student satisfaction					
	Teacher CPD experience	0.927	0.044		0.003	
	Teaching strategies	0.012	5.443			
HTMT	Academic achievement					
	Classroom engagement	0.621				
	Learning strategies	0.181	0.255			
	Student satisfaction	0.227	0.239	1.393		
	Teacher CPD experience	0.960	0.574	0.124	0.108	
	Teaching strategies	0.420	1.371	0.184	0.213	0.409

Source. Field data, 2022

RESULTS AND FINDINGS

A detailed illustration of the intricate relationship between the study's constructs is shown in Figure 2. It can be observed that the teachers' CPD experience has a direct relationship with the student's academic achievement and classroom engagement. Currently, 57.1% of the student's academic achievement changes is attributed to the teacher's CPD experience. Also, further positive changes in the teacher's CPD experience will increase the student's academic achievement by 69.0%. In the same way, 87.9% of the current improvement in classroom engagement was caused by the teacher's CPD experience and will increase further by 7.7%. on the contrary, there was an inverse relationship between the teacher's CPD experience and the student's satisfaction. Currently, the students are about 93.7% satisfied with the teaching experience but it will be reduced by 1.5%. It suffices to conclude that the key to increasing student satisfaction with teacher strategies is to create a learning environment that is engaging, supportive, and personalized to meet the needs of each student.

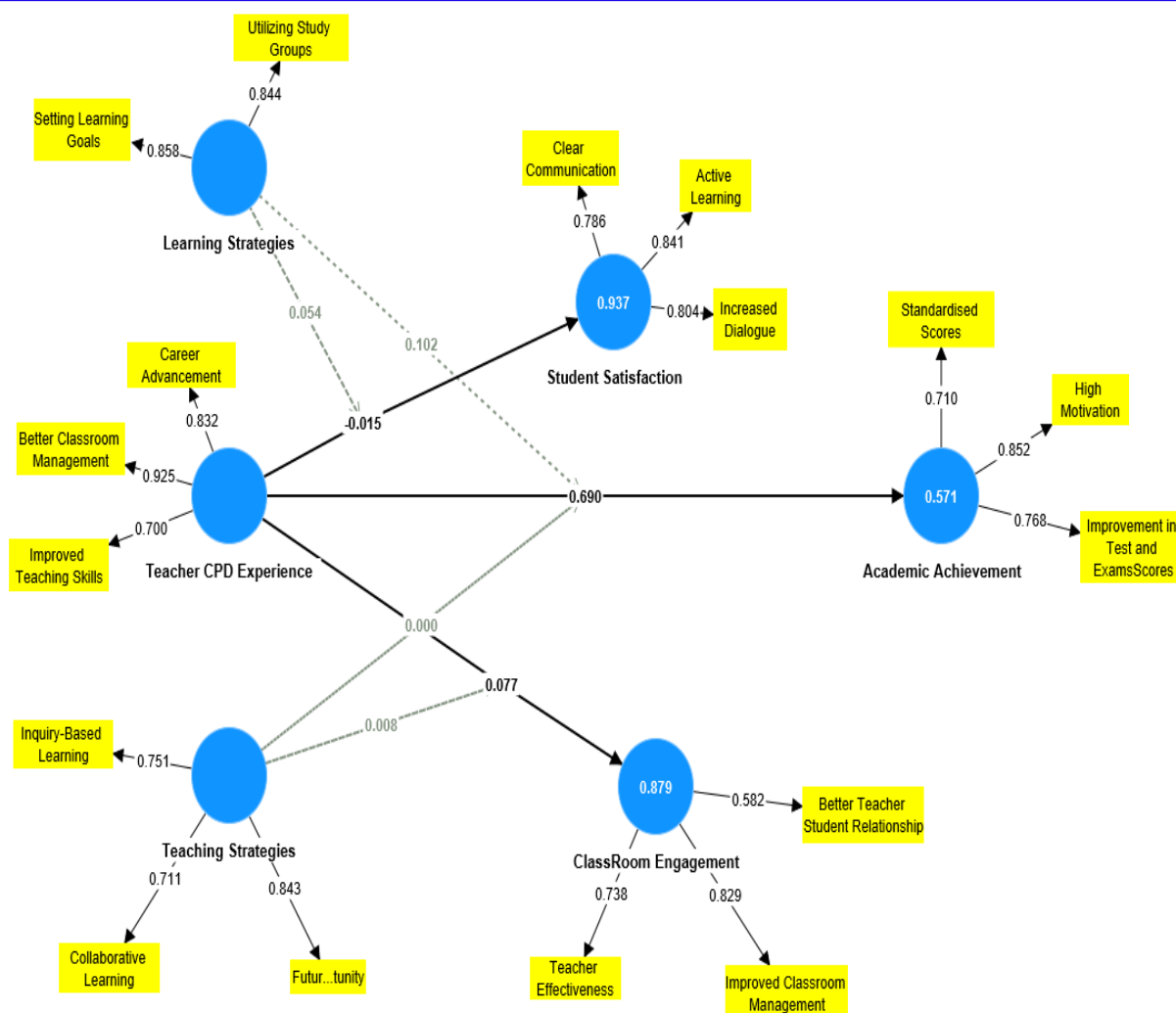


Figure 2: The model of the study

The role of Teaching and Learning Strategies

The teaching strategies and the learning strategies had different moderating effects in the model in figure 1. First, the study argued that the relationship between the teacher's CPD experience and classroom engagement is influenced by the teaching strategies adopted by the teachers and the academic achievement of the students. Conversely, the results revealed that the teaching strategies did not have any impact (0.00) in magnitude on the relationship between the CPD experience of the teachers and students' academic achievement. However, it augments the relationship between the teacher's CPD experience and classroom engagement by 0.8%. This means that classroom, environmental and instructional factors. Teachers must effectively manage these factors to create a learning environment that promotes engagement and maximizes student learning.

Secondly, students' learning strategies had a 5.4% direct influence on the relationship between the teacher's CPD experience and their satisfaction with their teachers. In addition, it strengthened the relationship between the teacher's CPD experience and the student's academic achievement by 10.2%. it means that teachers who engage in continuous capacity development are better equipped to meet the diverse learning needs of their students, and provide a high-quality education that can positively impact their performance and learning strategies.

On the other hand, the importance performance map analysis revealed that though the student's learning strategies contributed more to the general student's achievement (performance = 70%), its importance in terms of the policy to improve students' achievement is very low (3%). Also, the relative importance and performance of teacher's CPD experience to students' academic achievement is the highest (performance = 45% and importance = 69%). Finally, the teacher's teaching strategies had a performance = 30% and importance = 9%. This can be e

Significance of Impact

The hypotheses testing was based on the p-values < 0.05. It is observed that the teacher's CPD experience does not significantly influence the student's satisfaction and in the same way, the student's learning strategies does not significantly influence their academic performance. For the rest of the relationships, the null hypothesis was rejected.

Table 3: Hypothesis test

Null hypothesis	Relationship between constructs	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Hypothesis test
H_0	Teacher CPD Experience - > Academic Achievement	0.692	0.031	22.017	0.000	Rejected
H_0	Teacher CPD Experience - > Classroom Engagement	0.077	0.020	3.959	0.000	Rejected
H_0	Teacher CPD Experience - > Student Satisfaction	-0.015	0.015	1.062	0.288	Retain
H_0	Teaching Strategies -> Academic Achievement	0.078	0.036	2.218	0.027	Rejected
H_0	Teaching Strategies -> Classroom Engagement	0.908	0.015	60.923	0.000	Rejected
H_0	Learning Strategies -> Academic Achievement	-0.034	0.034	0.989	0.323	Retain
H_0	Learning Strategies -> Student Satisfaction	0.949	0.005	185.218	0.000	Rejected

Source: Field data, 2023

CONCLUSION

In summary, continuous capacity development for teachers is essential for ensuring effective teaching, improved student learning outcomes, proper classroom engagement, and a positive school environment. Teachers who engage in continuous capacity development can acquire and refine their teaching skills, such as instructional design, classroom management, and student engagement. This can lead to more effective teaching practices and better learning outcomes for students. Further, the results indicated that since education is constantly evolving, teachers who participate in continuous capacity development can stay up-to-date with changes in the curriculum, teaching methods, and educational technology. This ensures that their teaching remains relevant and effective and can improve their ability to meet the diverse needs of their students, resulting in improved learning outcomes for students.

RECOMMENDATIONS FOR POLICY

The study recommends management of the colleges of education and the ministry of tertiary education to allocate additional financial resources to ensure an adequate budget for continuous professional development programs in colleges of education. This will support the implementation of effective teaching and learning strategies and provide opportunities for teachers to enhance their skills. The study also recommends leadership of the colleges of education and stakeholders in teacher education to work in-hand to identify specific areas of need within teaching and learning strategies and allocate resources accordingly. This could include investing in technology infrastructure, educational materials, and training programs that align with the goals of professional development.

The study further recommends stakeholders in teachers' education, student leadership and leadership of colleges of education to devise strategies to foster collaborations between colleges of education, government agencies, and education stakeholders to pool resources and expertise. This can lead to more comprehensive and sustainable resource allocation strategies, ensuring that teaching and learning strategies in professional development programs are adequately supported. Also, this study recommends the ministry of tertiary education to encourage government to allocate resources for research and evaluation of teaching and learning strategies in professional development programs. This will provide valuable insights into their effectiveness and help in identifying areas where resource allocation can be optimized.

In addition, this study recommends the management of the colleges of education to establish support systems that provide ongoing mentorship, coaching, and networking opportunities for teachers participating in professional development programs. Allocate resources to ensure the availability of trained mentors and facilitators who can guide and support teachers in implementing new strategies effectively. This study finally recommends management of the colleges of education and stakeholders in teacher's education to allocate resources for monitoring and evaluation processes to regularly assess the impact of teaching and learning strategies in professional development. This will enable continuous improvement and adaptation of resource allocation strategies based on evidence-based findings.

Rebuttals

In the literature, conflicting arguments regarding the impact of teaching and learning strategies in continuous professional development in colleges of education in Northern Ghana include:

Effectiveness of Strategies: Some argued that certain teaching and learning strategies employed in professional development programs have a significant positive impact (Annan, 2020), while others argue that their effectiveness is limited or inconclusive (Korantwi-Barimah & Schultz, 2019).

Student Satisfaction: There were differing views on whether continuous professional development programs significantly enhance student satisfaction or if other factors have a greater influence on student satisfaction levels (Perry & Bevins, 2019; Oduro & Yalley, 2022).

Academic Achievement: Conflicting arguments may arise regarding the extent to which teaching and learning strategies in professional development programs contribute to improved academic achievement, with differing interpretations of research findings (Chitiyo et al., 2019; Núñez & León, 2019).

Classroom Engagement: There could be conflicting opinions on whether the implementation of teaching and learning strategies in professional development positively impacts classroom

engagement, as different studies may present varying results or emphasize alternative factors influencing engagement (Núñez & León, 2019; Manu et al., 2022).

These conflicting arguments highlight the diverse perspectives and interpretations found within the literature, and further research and analysis are necessary to arrive at a comprehensive understanding of the topic.

Authors Contributions

Conceptualization: Sayibu Abdul-Gafaar, Rudolf Anyoka Nyaaba; **Methodology:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Software:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Validation:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba, Sayiba Abdul-Gafaar and Dennis Offei Kwakye; **Investigation:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Data Curation:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Writing original draft preparation:** Dennis Offei Kwakye; **Writing:** Sayibu Abdul-Gafaar and Dennis Offei Kwakye; **Visualisation:** Rudolf Anyoka Nyaaba; **Supervision:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Project administration:** Christopher Atingazaa Akulga, Rudolf Anyoka Nyaaba and Sayiba Abdul-Gafaar; **Final draft:** Dennis Offei Kwakye

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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