

Assessing the Impact of Teacher Experience on Students' Mathematics Pass Rate in Basic Education Certificate Examination (BECE) in Bongo District



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Abstract

Aim: The purpose of this study was to examine the impact of teachers' teaching experience on students' past mathematics rates in BECE performance from 2020 to 2023.

Methods: A convenient sampling technique was employed to collect data from a sample of 79 teachers with varied teaching experience however, simple random was used to sample the 79 respondents out of the 99 respondents. A self-developed questionnaire instrument with a 4-point Likert rating scale was used for the data collection on the independent variable, teaching experience. A Cronbach alpha value of 0.08 was calculated to determine the reliability and effectiveness of the instrument. Also, secondary data which constitute the students' BECE results in Mathematics was used to measure the dependent variable, the pass rate. Data was analyzed using descriptive statistics and a simple linear regression model.

Results: The results showed that teachers with a high level of teaching experience have a tremendous and significant impact on their students' past rates in BECE mathematics from 2020 to 2023.

Conclusion: The study concluded that increased teaching experience fosters teacher effectiveness and improves students' learning performance.

Recommendation: Seminars and workshops should be organized for teachers with 0-3 years of teaching experience to augment their professional development and teaching experience.

Keywords: Professional development, past rate, teaching experience.

INTRODUCTION

The quality of education has become a key issue in promoting socio-economic development worldwide, and mathematics education is fundamental to developing students' critical inquiry and problem-solving skills (UNESCO, 2022). Research suggests that teacher experience is among the most influential factors in student achievement, especially in mathematics (Darling-Hammond, 2020). Experienced teachers can manage diverse classrooms, implement effective teaching strategies, and address resource constraints, which are critical for improving student achievement and high-stakes testing. However, disparities in teacher allocation and professional development remain ongoing challenges, especially in resource-poor settings (OECD, 2021). Mathematics is one of the foundations of Science, Technology, Engineering, and Mathematics (STEM) and Science, Technology, Engineering, Arts, and Mathematics (STEAM), which is useful worldwide which is why Sa'ad *et al.* (2014) highlighted that without mathematics, there is no science; without science, there is no modern technology.

Also, inexperience among teachers is affecting the standard of the education system in the world, especially in most developing countries across the globe which suffer underperformance in their competitions in international programs (Yariv, 2011; Elangovan & Rajendran, 2021). The decline in student performance in mathematics, particularly in the Basic Education Certificate Examination (BECE) in Ghana, suggests that it is too early to tell teachers about this. Recent studies show that mathematics pass rates at the BECE level have stagnated or declined due to a lack of appropriate teaching, and learning opportunities, and the allocation of experienced teachers (Fokuo, 2022). Ghana's education system relies on teachers' skills to address the learning gaps in mathematics, a key subject for students' success in higher education and careers in STEM fields. Despite numerous interventions to improve mathematics education, such as teacher training programs and curriculum reform, gaps remain, especially in rural areas where experienced teachers are limited (Essuman *et al.*, 2021).

For this reason, teaching and learning mathematics at all levels of education must be prioritized among teachers and students. For instance, students' inconsistent performance in BECE at the basic schools and STEM programs in the universities and colleges of education in mathematics and sciences is due to a weak foundation of mathematics at the basic and senior secondary school levels (Sakpla *et al.*, 2023).

In recent times, the academic performance of students especially in mathematics is attributed to factors such as teachers' qualities, actions, traits, behaviors, and others like methodology or strategy, and pedagogy (Borna *et al.*, 2023). Ghanaian students' performance in mathematics at the African and international levels has showcased little or no attention being given to factors that affect quality education (Ambussaidi & Yang, 2019; Yamoah, 2023). Lack of teaching experience of these teachers therefore contributes to the weak academic performance of students in mathematics. The effect of this is that some students fail mathematics because of poor teaching strategies or methods, integrating technology tools utilized by inexperienced mathematics teachers to teach (Yariv, 2011).

It is considered that experienced teachers are better facilitators and support students in gaining new knowledge based on students' experiences instead of spoon-feeding students with already existing knowledge (NaCCA, 2019). This requires that teachers must possess a level of teaching experience to be effective and efficient in engaging students physically, and cognitively in the knowledge acquisition process in a rich and rigorous inquiry-driven setting (NaCCA, 2019). Kantane *et al.* (2015) claimed that most employers expect an employee to possess experience before undertaking work. Thus, applicants may have accumulated sufficient

experience over a long period, it believes that competencies, skills, and knowledge acquired over the period will yield to productivity. This implies that the experience of workers or employees in any sector is relevant (Kantane *et al.*, 2015).

The Bongo region in Ghana's Upper East Region is an example of these challenges, with BECE mathematics pass rates below the national average. Between 2013 and 2018, the district's average math passing rate was only 54.2%, and it has declined in subsequent years (Essuman *et al.*, 2021). The lack of recent research on how teacher experience impacts student performance in this area represents a significant gap in the literature. This study is therefore timely and important, as it aims to measure the impact of teachers' mathematics experiences across domains, providing practical insights for policymakers and those taking action to increase teacher engagement and professional development in the region.

Statement of the Problem

Fokuo (2022) outlined that Ghana has seen negative performance in mathematics of students in recent years. Most of the Junior High school students in the Bongo District, particularly have not been performing well in Basic Education Certificate Examinations (BECE), as the performance from 2013 to 2018 was 54.2% (Essuman *et al.*, 2021). Since the year 2019 to date, there have been no studies on the student pass rate in BECE in mathematics. For this, reason this study sought to assess the impact of teacher experience on Students' Basic Education Certificate Examination (BECE) pass rate in Mathematics in Bongo district. Although much research was conducted to examine the possible variables that have an impact on students' academic performance in BECE.

A study was conducted on the influence of school physical resources, teacher qualifications, and students' perceptions on students' performance in mathematics (Bhagat *et al.*, 2019). However, no study research was on teachers' experience in mathematics performance among JHSs in the district. This study is timely and relevant because it addresses the lack of research on the experiences of teachers in Junior High Schools (JHS) in Bongo District, a key education sector. Given the decline in mathematics achievement in BECE, no recent research has been conducted since 2019, and this research provides valuable intuition into a poorly understood area of schooling. By examining the experiences of teachers, the study provides recommendations to improve mathematics education and address learning challenges in the region.

Research Objectives

The study aimed to:

1. Investigate the Students' Basic Education Certificate Examination (BECE) pass rate in Mathematics in Bongo District
2. Examine mathematics teachers' level of teaching experience in Bongo District
3. Assess the impact of teacher experience on Students' Basic Education Certificate Examination (BECE) pass rate in Mathematics in Bongo District.

LITERATURE REVIEW

Theoretical Review

The study made use of the Human Capital Theory (HCT). Human capital theory (HCT) posits that people can increase their economic potential and output by investing in their education, and experience (Becker, 1964). Human capital is essential to comprehending how teacher credentials and student performance are related, particularly in disciplines like mathematics

that call for more sophisticated cognitive abilities (Schultz, 1961). The theory posits that a highly competent workforce, especially instructors with more experience, is crucial to increasing student performance in the educational setting. It ties the quality of human capital, particularly that of teachers, to student results (Schultz, 1961). According to this approach, evaluating how teacher experience affects student performance, for example, the mathematics pass rates on the Basic Education Certificate Examination (BECE) in districts like Bongo offers important intuitions into how teacher competence shapes academic performance.

Teacher experience is regarded by HCT as a key component of human capital that affects learning outcomes (Wuttaphan, 2017). Since they have had more time to hone their teaching experiences, comprehend the needs of their pupils, and gain subject-matter competence, the idea contends that more experienced instructors are better able to promote learning and effectively run classrooms (Darling-Hammond, 2020).

Becker (1964) opined that Human capital theory (HCT) provides a valuable lens through which to analyse the impact of teacher experience on BECE performance rates in Bongo District. By emphasizing the role of education, training, and experience in developing human skills, the theory emphasizes the importance of experienced teachers in promoting student success, especially in mathematics, which requires advanced skills. In Bongo District, where systemic challenges such as lack of resources and socioeconomic disparity persist, the skills of experienced teachers become even more important, as evidenced by HCT. The ability of these teachers to overcome obstacles and adapt their methods to meet the diverse needs of their students is consistent with the theory that higher human development produces better outcomes. Studying the relationship between teacher experience and BECE performance can therefore provide important information on how investments in teacher development can reduce educational inequalities and improve student performance in the Bongo District.

Empirical Review

Teacher experience and students' performance

Students' mathematics learning is influenced by the teacher's teaching experience (Musau & Abre, 2015), and this constantly has an impact on the academic performance of students. Borisade (2011); Faremi (2021) research revealed that a typical measure of a teacher's quality is the number of years they have spent teaching in a classroom. In elementary and upper secondary education, the performance of students is greatly influenced by the experience of their teachers. A more diverse range of experiences is available to more seasoned educators, who may also offer ideas and insight into the process of teaching and learning.

Studies by Borisade, (2011); and Ewetan & Ewetan, (2015) revealed that years of experience affect how well students do, there is often a statistically weak link between years of experience and student performance, which means that the influence cannot be strongly assumed. Many studies have used this theory, for instance, Ouyang *et al.* (2021); Wang *et al.* (2024) examined the association between teacher experience and instructional quality in mathematics, based on human capital theory. Apau (2022) describes three categories of experience period of teachers that were examined including inexperienced teachers (0–12 months), semi-experienced teachers (1–4 years), and experienced teachers (more than 4 years). It is said that it takes six months to a year for teachers hired by the Ghana Education Service (GES) to adjust to the contextual and cultural aspects of their new surroundings. These educators are classified as novices in this study in this regard.

Boyd *et al.* (2021) stated that a phenomenon often referred to as the "experience plateau" has been documented in educational research, where mid-career teachers may stagnate without ongoing professional development. This may indicate a plateau in professional growth, where teachers are no longer novices but have not yet reached the level of mastery that typically comes with extensive experience (Darling-Hammond *et al.*, 2019). The obvious result is that there is an urgent need to provide structured, ongoing professional development programs for mid-level teachers that emphasize modern teaching methods, technology integration, and differentiated instruction. Without such measures, there is a continuing risk of underestimating the long-term effects of teacher experience on mathematics achievement. This is particularly true in areas like Bongo District where systemic issues such as limited resources and high teacher-student ratios already pose challenges to effective education provision. Therefore, solving the "experience platform" problem is crucial to maintaining the quality of education and promoting continuous improvement of teaching effectiveness.

The findings of Darling-Hammond *et al.* (2019) confirmed that advocate for the retention of experienced teachers as a means of ensuring high-quality education and improving student performance. Ewetan & Ewetan (2015) argued that findings of students' academic performance in mathematics and English language, as assessed by their performance in the senior secondary certificate examinations (SSCE) and as reported by the respondents, have been significantly influenced by teachers' teaching experiences.

Adadu (2017) posited that schools with a higher proportion of instructors with ten years or more of experience produced superior performances compared to those with a lower proportion of teachers with ten years or less. The findings showed that student progress in both communication arts and mathematics was impacted by years of experience as well as the connection between years of experience and degree level. Higher student performances are the primary measure of a teacher's experience and efficacy (Ewetan & Ewetan, 2015). Low performance in STEM has been connected to the teacher factor in both developed and developing nations. The results aligned with Anderson (2019) who asserted that students do better under the guidance of more experienced teachers.

Rice (2019) investigated the influence of teaching experience on students' mathematics performance. The researchers utilized a longitudinal research design, collecting data from standardized test scores of students in grades 3 to 5 over five years. The study revealed a positive correlation between teachers' years of service and students' mathematics performance. A study conducted by Ene *et al.* (2022) confirmed that teachers' years of teaching experience influence students' academic performance in the Basic Education Certificate Examination in Basic Science. The research findings indicate that experienced teachers with years of teaching experience significantly influence the academic performance scores of Basic science students in BECE. This change is in the direction of 11-15 years of teaching experience in science, and 6 years and above teaching experience in which these teachers do better than the fewer teachers (Ene *et al.*, 2022). This result finding is in correlation with Agharuwhe (2013) who stressed that efficacy due to long practice of teaching may influence the academic performance of students in mathematics positively. Also, Ewetan and Ewetan's (2015) research was consistent with the study that experienced teachers with teaching years of experience have a significant impact on the academic performance of students in mathematics and English Language in their SSCE results.

However, the study is contrary to some studies like Kini and Podolsky (2020) who stated that the teaching years of experience may not be sufficient to guarantee improved student academic

performance, rather it must be accompanied by progress in professional development, supportive school environments and access to resources that enable teachers to constantly adjust their practices.

Auletto and Stein (2020) result of the findings pointed out that a new graduate teacher or less experienced teachers will equally perform in teaching as much as the more experienced teachers, this is because the more experienced teachers fail to upgrade and update themselves, they may lose the content knowledge along the line (Okebukola *et al.* 2021). Dorji (2022) opined that a teacher may profess to hold fifteen years of experience, but the experience means nothing if he keeps repeating the same thing without bringing innovation into his teaching. Ambussaidi and Yang (2019) emphasized that a teacher's years of experience in the classroom and academic credentials do not significantly affect students' academic progress if they lack deep subject knowledge. There is a persistent idea that a teacher's impact on a student's academic performance improves with the length of their teaching year.

METHODOLOGY

The study employed a quantitative research approach with a descriptive survey design. This design allowed the researcher to systematically collect data on the experiences of teachers as well as the corresponding academic performance of students.

The target population included 99 mathematics teachers in the district. A total of 79 teachers were selected using a random sampling method that followed the Yamane model to ensure that the sample could be complete and representative of the fourteen genders of the Bongo District. Since the purpose of this study was to evaluate the impact of teachers on student achievement, teachers were selected with particular attention to their relevance to the learning objectives, especially their skills. Although the teaching title and its presence were not explicitly stated as selection criteria, the purpose of the samples reflects the deliberate intention of mathematics teachers who were actively teaching in the selected areas. This method ensures that the sample is directly related to the purpose of the study to assess the relationship between the teaching experience and the academic performance of students.

The study used two sets of data, primary and secondary. The secondary data included the students' BECE performance rates from 2020 to 2023 which was collected from the district education directorate. The study also collected primary data on teaching experience levels using a questionnaire a questionnaire instrument. The instrument was designed with a 4-point Likert scale (strongly disagree=1, disagree=2, agree=3, and strongly agree=4) (Li *et al.*, 2024). The instrument was self-developed and was piloted. Data was collected during the piloting and analyzed using the Cronbach alpha reliability test method which produced a coefficient of 0.8 indicating that there was internal consistency among the items in the construct. This is consistent with the view of Pallant (2013) that a Cronbach alpha coefficient of more than 0.8 indicates reliability. An average Cronbach alpha. Data analysis methods included descriptive statistics and a simple linear regression model. The simple linear regression model in this study was designed to examine the relationship between teacher experience and student performance and BECE mathematics scores. The independent variable was the years of teaching experience of mathematics teachers in Bango District, and the dependent variable was the BECE pass rate of students in mathematics from 2020 to 2023.

RESULTS AND DISCUSSION

Demographic Information of Respondents

Table 1: Age Range Distribution of Teachers

Age Range	Frequency (N)	Percentage (%)
Below 35 years	9	11.4
36-40 years	27	34.2
41-45 years	24	30.4
46-50 years	11	13.9
Above 50 years	8	10.1
Total	79	100.0

Source: Field Data (2024)

The table depicts that the majority of these experienced teachers are aged between 36 and 40 years comprising 27(34.18%) of the sample. This is closely followed by those in the 41-45 years range representing 24(30.38%). Teachers below 35 years account for 9(11.39%) of the respondents, the teachers between 46-50 years range represent 11(13.92%) and the least represented group of those above 50 years, consisting of 8(10.13%) of the sample.

Table 2: Distribution of Sex by Teachers

Sex	Frequency (N)	Percentage (%)
Female	10	12.7
Male	69	87.3
Total	79	100.0

Source: Field Data (2024)

The demographic analysis of respondents from the experienced teachers' questionnaires in the Bongo District, Upper East Region of Ghana, reveals the sex distribution among 79 experienced mathematics teachers. Out of the 79 respondents, a striking 69(87.34%) consisting of male experienced teachers, whereas only 10(12.66%) were female. This distribution highlights a pronounced sex imbalance in the teaching workforce, particularly in mathematics education at the Junior High school levels. The fact that there were more male teachers (87.34%) than female teachers (12.66%) among the survey respondents indicates that there is a gender gap in the teaching profession in Bongo Region. This underrepresentation may reflect barriers such as cultural norms, gender discrimination or limited access to career advancement for women. Addressing differences is important because diverse teaching teams can promote equity, have diverse teaching perspectives and work better with diverse student groups.

Research Question One

What is the pass rate level of junior high school students in the Basic Education Certificate Examination (BECE) Mathematics paper from 2020 to 2023 in Bongo district?

Table 3: Level of Pass Rate in the Basic Education Certificate Examination (BECE)

School Identity	YEAR			
	2020	2021	2022	2023
S1	100	88.2	48.6	10
S2	8.5	12.5	10.3	7.1
S3	8.9	43.5	93.1	3.6
S4	8.6	26.2	36	0
S5	88.4	88.2	95.8	125
S6	80.5	74.4	100	96.8
S7	70	36	94.3	35.3
S8	94.1	12	38.9	51.8
S9	45	71.8	65.2	34.3
S10	97.7	19.4	12	2.6
S11	6.7	10.2	0	12.1
S12	100	100	2.7	25.7
S13	3.6	22.3	92.9	12.1
S14	94.4	81.4	0	0
S15	88.9	7.7	8.3	0
S16	100	88.6	2.6	12.8
S17	10.8	30.8	3.2	0
S18	100	100	100	53.1
S19	25	33.3	86.5	0
S20	22.6	48.4	37.3	0
S21	86.4	64.5	43.8	3.7
S22	72.7	32.1	100	3.3
S23	91.7	86.1	62.5	21.1
S24	97.3	26.9	66.7	3.1
S25	93.5	86.4	2.9	0
S26	100	92	91.3	13
S27	97	58.6	100	74.1
S29	97.8	75	43.8	25
S30	96.7	80	0	4.3
S31	52.5	15	48.5	0

S32	89.3	83.9	92.6	100
S33	100	96	78.3	55.6
S34	100	88.9	19	19.2
S35	100	76	88.2	3.3
S36	66	89.3	26.1	65
S37	100	54.2	17	6.1
S38	87.5	82.4	0	45.5
S39	97.1	100	47.5	0
S40	91.7	92.1	19.6	85.7
S41	100	96.7	76	63
S42	100	89.7	0	3.1
S43	3.6	6.7	0	3.2
S44	5.6	41.7	3.6	10
S45	96	100	80.8	10
S46	4.4	11.8	2.8	8.3
S47	100	100	100	48.3
S48	88.9	100	100	50
S49	100	100	100	96.8
S50	36.4	100	100	37.5
S51	100	80	13	4
S52	19.4	25.8	46.9	0
S53	100	100	91.7	64
S54	100	100	58.3	83.3
S55	17.1	31.3	86.1	3

Source: Bongo District Education Directorate (Primary Data) (2024)

Table 3 contains the pass rates of students for the selected schools for the period 2020 to 2023. The results in Table 3 revealed that schools S1, S12, S18 and others recorded a perfect pass rate of (100%). These results could in turn point out the effectiveness of the teaching, the energy students put into preparations or even the available resources within these schools. On the other hand, the schools such as S43 in the first group had a pass rate of 3.6% while the S15 passed rate was 8.9% which could indicate issues like lack of adequate teaching personnel, resource limits or sociocultural issues and economic status of the learners (Boakye & Gyi, 2021). Hence, the disparity in pass rates reflects systemic issues such as the uneven distribution of teaching staff, facilities, and resources. High teacher-student ratios limit private instruction, but socio-economic challenges, such as poverty and low primary education, hinder external support. These factors combine to create a dysfunctional learning environment that impacts student performance.

In 2021, the data shows a contrasting trend to that in 2020. These schools include S12, S18, and S47 which still have a pass rate of 100% but other schools witness a drop in performance. However, the general trends appear to be downward, particularly towards schools S10 (19.4%) and S15 (7.7%) which had lower pass rates than the ones recorded for 2020 (Bongo District Education Directorate (BDED), 2024). These changes may well be due to multiple reasons including changes that may have happened during the pandemic such as changes in teaching and learning activities specifically in classrooms (Adu & Osei, 2021). It can be assumed that there were disruptions to a usual classroom helping to prepare students for the exams

By the end of 2022, many schools showed a remarkable drop in pass rates, for instance, S12 went from 100% in 2020 to a rare 2.7%, and S43 and S54 schools also recorded disturbingly near-zero rates. Notwithstanding this, S3 and S32 schools appeared to have done well, in otherwise rather trying circumstances as they emerged with strong results. The decrease in pass rates among school-going populations was felt even more acutely in the year 2023 and is viewed as an erosion of academic progress likely caused by the COVID-19 pandemic, teacher shortage, and socio-economic issues. Only a few S5 and S6 schools remained unfazed and continued to post respectable results as the wider trend continued to be one of decline. Henceforth, the pass rate data for the BECE mathematics paper in the Bongo District from 2020 to 2023 revealed successes and challenges in the education system. While some schools consistently achieved high pass rates, many others faced significant difficulties, especially in recent years. The result asserts that the teaching and learning in the district is marked by considerable disparities, with certain schools presenting resilience while others grapple with persistent challenges. The steep reduction in pass rates in 2023 warrants further investigation into the underlying causes, including the lingering effects of the COVID-19 pandemic and structural matters within the district.

In short, the numbers between schools shown in Table 3 show significant variation over the years, with some schools showing improvement while others showing decline or change. For example, schools such as S18, S47 and S49 continued to perform at a similar level until 2022 before experiencing a decline in 2023. There may be problems in teaching or training students. Importantly, in some schools, such as S25, S14 and S42, the number fell to 0% in 2023, indicating systemic problems. Overall, these factors indicate inequities in resource allocation, quality of education and other factors related to employment.

Research Question Two

What is the current level of teacher experience among junior high school mathematics teachers in the Bongo district?

Table 4: Showing Categories of Level of Teacher Experience

Year	Level of Experience
0-3	Low Experience
4-7	Average/Moderate Experience
8+	High Experience

Source: Field Data (2024)

Table 4 grouped the teacher's years of experience into three namely; low experience (0 – 3) years teaching experience, average experience (4 – 7) years and 8 years and above considered as having high experience.

Table 5: Showing ANOVA Results Levels of Teacher's Experience

Levels of Teacher's Experience	N	Mean	Std. Error	Std. Deviation
Low Experience	79	.09	.032	.286
Average /Moderate Experience	79	.08	.030	.267
High Experience	79	.84	.042	.373
Valid N (listwise)	79			

Source: Field Data (2024)

Table 5 shows the descriptive statistics of the various categories of the teacher's teaching experiences. The high experience category had the largest mean (0.84) followed by low experience (0.09) and finally the average experience (0.08) respectively.

Research Question Three

What is the impact of an experienced teacher's years of teaching on the academic performance of JHS Students in Mathematics in the Bongo District?

Table 6: Depicting Regression Analysis of Teacher's Years of Experience on Students in the 2020 BECE.

R	R Square	Std. Error	F	df1	df2	Sig.
.291a	0.085	256.2008	4.907	1	53	0.031

a Predictors: (Constant), Levels of teaching experience

Source: Field Data (2024)

In Table 6, the regression analysis results of teacher's years of experience with students in the 2020 BECE indicated that the teacher's teaching experience has an impact on student academic performance in BECE. This is because, in the regression model results, the $R^2 = (0.085)$ shows that the model presents (8.5%) change in the BECE results. The 8.5% variance explained by teacher experience suggests that it has a significant impact on BECE outcomes, suggesting its importance alongside other factors such as socio-economic status and school resources. A holistic approach is needed to address these general implications for better educational outcomes, whilst the significant findings ($p < .031$) which mean that the levels of teachers' experience have an impact on student's academic performance, however, other related factors can influence student's performance.

Table 7: Presenting Regression Analysis of Teacher's Years of Experience on Students in the 2021 BECE

R	R Square	Std. Error	F	df1	df2	Sig.
.295 ^a	0.087	256.4242	5.056	1	53	0.029

a Predictors: (Constant), Levels of teaching experience

Source: Field Data (2024)

In Table 7, the regression model results of teacher's years of experience with students in the 2021 BECE indicated that the teacher's teaching experience has an impact on student academic

performance in BECE. The regression model results of $R^2 = (0.087)$ show that the model presents (8.7%) change in the BECE results. This suggests that while teacher experience has a measurable impact on student outcomes, the remaining 91.3% of the variance is accounted for by other factors, highlighting the need for a comprehensive approach to improving education, whilst the significant findings ($p < .029$) which mean that the levels of teachers' experience have an impact on student's academic performance, however, other related factors can influence student's performance.

Table 8: Indicating Regression Analysis of Teacher's Years of Experience on Students in the 2022 BECE.

R	R Square	Std. Error	F	df1	df2	Sig.
.333 ^a	0.111	255.5998	6.610	1	53	0.013

a Predictors: (Constant), Levels of teaching experience

Source: Field Data (2024)

Table 8, showing the regression model results of teacher's years of experience on students in the 2022 BECE indicates that the teacher's teaching experience has an impact on student academic performance in BECE. This is because, in the regression model results, the $R^2 = (0.111)$ shows that the model presents (11.1%) change in the BECE results. This means that while teacher experience has a significant impact on student outcomes, the remaining 88.9% of the variance is still explained by other factors, suggesting the need to address additional influences such as socio-economic status and school resources to improve academic performance, whilst the significant findings ($p < .013$) which mean that the levels of teachers' experience have an impact on student's academic performance, however, other related factors can influence student's performance.

Table 9: Showing Regression Analysis of Teacher's Years of Experience on Students in the 2023 BECE

R	R Square	Std. Error	F	df1	df2	Sig.
.337 ^a	0.114	257.5603	6.794	1	53	0.012

a Predictors: (Constant), Levels of teaching experience

Source: Field Data (2024)

Table 9, showing the regression model results of teacher's years of experience on students in the 2022 BECE indicates that the teacher's teaching experience has an impact on student academic performance in BECE. The regression model results of $R^2 = (0.114)$ show that the model presents (11.4%) change in the BECE results. This shows that while teacher experience significantly influences student outcomes, the remaining 88.6 percent of the variance is accounted for by other factors, highlighting the importance of addressing broader systemic and contextual challenges to significantly improve educational performance, whilst the significant findings ($p < .012$) which mean that the levels of teachers' experience are one of the most predictors that have an impact on student's academic performance, however, there are other related predictors or factors that can influence student's performance.

DISCUSSION

From the data collected, the percentage pass rates of Junior High School students in the Bongo District of the Upper East Region of Ghana between 2020 to 2023 indicate upward, downward and sideward trends and glaring discrepancies among the various schools. For instance, some of the schools represented in the table like S1, S2 and S18 also recorded over 95% pass rates in 2020, possibly due to better teaching experienced teachers and more resources. However, S43 and S15 recorded abysmally low pass rates, which may be due to socio-economic disadvantage. (Boakye & Gyi, 2021).

The repercussions of the pandemic were seen in 2021, as BDED (2024) and Adu & Osei (2021) argued, schools, especially S10 and S15, remained far below the national performance standard due to learning process interruptions. Many schools were faring worse in this regard in 2022, with average pass rates plunging for many of the schools, but as S3 and S32 continued to do reasonably well, there was some degree of elasticity (Adams, 2022). The year 2023 went further and took most of the academic efforts, many schools tried but achieved a pass rate average of zero, failing in the quality of instruction delivery, although S5 and S6 managed to do relatively better (Osei & Ayensu, 2023). These results point to the insistent effects of the pandemic, fewer teachers, and socio-economic matters as the key factors affecting academic performance in the district.

Tables 4 and 5 illustrate that most JHS mathematics teachers from the Bongo District have considerable teaching experience with a mean score of 0.84 among those having more than 8 years. This argues a relatively experienced workforce, has positive implications for improving teacher quality (Darling-Hammond, 2000). The range of $\sigma = 0.37$ suggests some heterogeneity among the teachers within this highly competent category, whereas the low (0.09) and moderate experience groups (0.08) are considerably smaller and thus insignificant in size, it indicates a small measure of teachers belonging to these groups. This situation shows an over-dependence on the use of upper-grade teachers, which is expected to improve effective teaching (Ingersoll, 2001). However, teachers with lower experience and moderate level of experience being underrepresented affect the sustainability of the quality of teaching especially with the highly experienced teachers likely to retire and not ample fodder to fill in gaps (Liu & Meyer, 2005). Apau (2022) describes three categories of experience period of teachers that were examined including inexperienced teachers (0–12 months), semi-experienced teachers (1–4 years), and experienced teachers (more than 4 years). It is said that it takes six months to a year for teachers hired by the Ghana Education Service (GES) to adjust to the contextual and cultural aspects of their new surroundings.

The Impact of an Experienced Teacher's Years of Teaching on the Academic Performance of JHS Students in Mathematics BECE in the Bongo District

The Regression Analysis model results from Tables 8, 9, 10 and 11 indicated that the $R^2 = (0.085)$ shows that the model presents (8.5%) change in the BECE results, whilst the significant findings ($p < .031$), $R^2 = (0.087)$ shows that the model presents (8.7%) change in the BECE results, whilst the significant findings ($p < .029$), the $R^2 = (0.111)$ shows that the model presents (11.1%) change in the BECE results, whilst the significant findings ($p < .013$) and $R^2 = (0.114)$ shows that the model presents (11.4%) change in the BECE results, whilst the significant findings ($p < .012$) respectively. This implies that the levels of teachers' experience are one of the most predictors that have an impact on student's academic performance; however, some other related predictors or factors can influence students' performance. This study is therefore consistent with the research findings of Ene *et al.* (2022) who indicated that experienced

teachers with years of teaching experience significantly influence the academic performance scores of Basic science students in BECE. Babatunde *et al.* (2021) claimed that there is a need to involve emeritus of mathematics because of their long years of teaching experience they can teach students well to perform in tests, and examinations, in schools in Nigeria. Based on the findings, it is obvious that as the experience of teachers influences the academic performance of students in mathematics, it also builds their socioeconomic, thus all spheres of life of these students be achieved.

On the contrary, the study disagreed with Bamidele and Adekola, (2017) who discovered that the academic performance of students in chemistry does not differ statistically significantly across any of the groups [$F(5,14) = 2.20$; $p > .05$]. This finding implies that students' academic progress is unaffected by teachers' years of teaching experience, even if they lack the most extensive professional and subject-matter knowledge. Dorji (2022) opined that a teacher may profess to hold fifteen years of experience, but the experience means nothing if he keeps repeating the same thing without bringing innovation into his teaching.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of the Study

The aim of the study was to assess the impacts of teacher experience on students' academic performance in BECE mathematics. Also, the objective of the study was to; examine the impact of teacher experience on the academic performance of Junior High School (JHS) students in Mathematics in the Bongo District.

A convenient sampling technique was employed to select all experienced mathematics teachers in the selected JHSs for the research. The use of a convenience sampling technique to select experienced mathematics teachers was appropriate for this study because the study focused on analyzing their specific influence on how BECE is conducted. This approach allowed the researcher to gain access to participants who were easily accessible and directly related to the research objectives and ensured the participation of faculty with the necessary experience and expertise. However, this system may introduce potential limitations, such as selection bias, as it may not fully represent the population of mathematics teachers in the district. Additionally, it may limit the generalizability of findings on certain topics because the sample is limited to older and more determined individuals.

The researcher therefore developed four-point Likert-scale questionnaires and secondary data, BECE results from Bongo District Educational office as the data collection instruments to collect data for the research. A four-item Likert-scale questionnaire was designed to measure specific constructs such as teacher experience, and perceived challenges that influence BECE performance. The reliability of the scale was assessed through pilot testing to ensure consistency of responses, and its validity was determined through expert review and alignment with the research objectives. The questionnaires provide a method designed to collect qualitative knowledge that complements secondary data from BECE results.

Key Findings

The numbers between schools shown in Table 3 show significant variation over the years, with some schools showing improvement while others showing decline or change. For example, schools such as S18, S47 and S49 continued to perform at a similar level until 2022 before experiencing a decline in 2023. There may be problems in teaching or training students. Importantly, in some schools, such as S25, S14 and S42, the number fell to 0% in 2023, indicating systemic problems. Overall, these factors indicate inequities in resource allocation,

quality of education and other factors related to employment., with some schools performing well while others struggled due to issues such as insufficient teachers and socio-economic challenges. The Covid-19 pandemic has exacerbated inequality in the Bangor region, leading to a significant drop in educational achievement in 2023. The long-term closure of schools has affected students from low-income families who do not have access to the internet, digital devices, and electricity to learn remotely.

Many students are forced to work to earn money to support their families, which reduces their attention to education. Parents' low level of education has hindered support for family education during the lockdown. In addition, the lack of necessary teaching resources such as textbooks and textbooks has also made many students unwilling to continue self-study. Tables 4 and 5 revealed that the majority of the JHS mathematics teachers in the Bongo District have high levels of experience, with a mean value of 0.84 for those with 8+ years of teaching. However, the low representation of teachers with moderate and low experience raises concern about the sustainability of teaching quality as highly experienced teachers may retire without enough replacement.

Tables 6, 7,8 and 9 also revealed that there was a significant positive correlation between a teacher's years of teaching experience and the academic performance of their students in BECE Mathematics. The research findings are consistent with the previous studies which indicate that experienced teachers with years of teaching experience significantly influence academic performance. Ewetan and Ewetan (2015) research was consistent with the study that experienced teachers with teaching years of experience have a significant impact on the academic performance of students in mathematics and English Language in their SSCE results.

CONCLUSIONS

The study concluded that the majority of Junior High School mathematics teachers in Bongo District had a high level of experience, with a mean value of 0.84 for teachers with 8 years or more of experience. This reflects teacher experience, which is often seen as important for student outcomes. However, the study also raised concerns about the underrepresentation of mid-level and low-level teachers, which raises questions about the future of teacher education in the region. If less experienced teachers are not adequately replaced, the district may face challenges in maintaining the quality of teaching. This suggests a potential gap in the preparation and retention of young, inexperienced teachers in the region.

It was concluded that the fluctuating pass rates in the Bongo District reflect challenges like the COVID-19 pandemic, inadequate teachers and socio-economic factors for example parental education level, and limited access to educational resources like textbooks, and stationery. The fluctuating pass rates in Bongo reflect challenges such as the COVID-19 pandemic, teacher shortages, and socio-economic conditions. The pandemic has impacted education due to prolonged school closures, leaving many students unable to access the learning process due to limited resources such as internet and textbooks. Inadequate teaching staff, including high teacher-student ratios, have hindered quality learning, particularly in mathematics. Socio-economic challenges such as poverty, low parental education, and limited access to education have harmed student performance. Taken together, these factors pose significant barriers to sustained educational progress in the region.

It was also concluded that teaching experience significantly influences performance in mathematics at the JHS level in the Bongo District. Teachers with more years of experience were found to be positively associated with higher BECE scores, suggesting that experienced teachers are more likely to improve student outcomes. This is consistent with previous research

including Ewetan and Ewetan (2015) who also found that teachers are aware of the impact of learning. In contrast, schools with less experienced teachers did not perform as well, indicating the importance of teachers. Therefore, the study confirms that teacher education is important in improving students' mathematics performance at the JHS level in Bongo District.

RECOMMENDATIONS

It is recommended that teacher recruitment efforts be intensified to address shortages and improve pass rates in the district. Also, it is recommended that offering scholarships for teacher training or improving working conditions to attract more candidates. The study recommended organizing structured mentorship and professional development programs for less experienced teachers, such as peer observation, training workshops, or coaching sessions. It is recommended that insensitivity should be given to experienced teachers.

REFERENCES

- Adadu, C. (2017). *Teachers' Teaching experience and students' academic performance in Science, Technology, Engineering and Mathematics (STEM) Programs in Secondary Schools in Benue State, Nigeria*.
- Ademola, I. A., Okebukola, P. A., Oladejo, A. I., Onowugbeda, F. U., Gbeleyi, O. A., & Agbanimu, D. (2021). Teachers' -s and teaching experience: Impact on quality assurance in Nigeria secondary education. *NOUN Journal of Management and International Development (NOUN JOMAID)*, 6(1). ISSN: 978-978-928-241-0.
- Agharuwhe, A. A. (2013). Effects of teachers' effectiveness on students' academic performance in Public Secondary Schools; Delta State – Nigeria. *Journal of Educational and Social Research*, 3(3), 105-111.
- Ambussaidi, I., & Yang, Y. F. (2019). The impact of mathematics teacher quality on student achievement in Oman and Taiwan. *International Journal of Education and Learning*, 1(2), 50-62
- Auletto, A., & Stein, K. C. (2020). Observable mathematical teaching expertise among upper elementary teachers: Connections to student experiences and professional learning. *Journal of Mathematics Teacher Education*, 23(5), 433-461.
- Bamidele, A. D., & Adekola, F. F. (2017). Effects of teacher's -s and teaching experience on students' academic achievement in basic science in junior secondary school. *International Journal of Education and Evaluation*, 3(2), 1-9.
WWW.iardpub.org
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. New York: National Bureau of Economic Research.
- Borisade, F. T. (2011). Teacher qualities and school factors as correlates of academic performance of secondary school students in mathematics in Ekiti State, Nigeria. *Journal of Research in Education and Society*, 2(2), 173-179
- Borna, C. S., Oppon-Wusu, M., Bedu-Addo, P. K. A., Dabone, K. T., Kwarteng-Nantwi, E., Churcher, K. A., Aninganigu, K., Owusu-Sekyere, F., & Kissi-Abrokwhah, B. (2023). Professional Development of Mathematics Teachers: Its Impact on Their Classroom Delivery in Ghana *East African Journal of Education Studies*, 6(1), 320-337.
<https://doi.org/10.37284/eajes.6.1.1152>.

- Boyd, D., Landford, H., Loeb, S., Rockoff, J., & Wyckoff, J. (2008). The narrowing gap in New York City teacher qualifications and its implications for student performance in high-poverty schools. *Journal of Policy Analysis and Management*, 27(4), 793–818.
- Creswell, J. W., & Creswell, J. D. (2021). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approach* (6th ed.). Thousand Oaks, CA: SAGE.
- Darling-Hammond, L. (2020). Teacher quality and student performance: A review of the state policy evidence. *Education Policy Analysis Archives*, 8(1), 1-44
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2020). Effective Teacher Professional Development. *Learning Policy Institute*. 32, 3-18
- Darling-Hammond, L., Saunders, R., Podolsky, A., Kini, T., Espinoza, D., Hyler, M., & Carver-Thomas, D. (2019). Best practices to recruit and retain well-prepared teachers in all classrooms. *Learning Policy Institute*.
- Dorji, T. (2020). Integration of ICT in Bhutanese schools–Common obstacles and the way forward. *The Druk Journal*, 6 (1), 49-54.
- Edwards, M. Y. (2023). The relationship between teacher evaluation scores and teachers' years of service and level of education (Doctoral dissertation, Baker University).
- Ee, J. (2023). *Beyond grades: A holistic parental report card for Korean Dual Language Programs*. Teachers College Record, 01614681231182220.
- Elgesem, D. (2008). Anonymity and identity in the information society: Challenges of privacy, security and anonymity. Springer.
- Ene, C. U., Anyiam, L. I., & Onoja, A. E. (2022). Influence of teachers' years of teaching experience on students' academic achievement in Basic Education Certificate Examination in Basic Science. *African Journal of Science, Technology, and Mathematics Education*, 8(Special Issue 1), 488–494. <https://www.ajstme.com.ng>.
- Er, Z. (2024). Examination of the relationship between mathematical and critical thinking skills and academic achievement. *Pedagogical Research*, 9(1), em0176. <https://doi.org/10.29333/pr/14028>
- Essuman, A. S., Nyarko, J. & Frimpong, K. (2021). Impact of Mathematics Anxiety on the Academic Performance of Junior High School Pupils in the Bongo District of Ghana. *International Journal of Social Sciences and Humanities Invention* 8(09): 6562-6569, <https://doi.org/10.18535/ijsshi/v8i09.05>
- Ewetan, T. O., & Ewetan, O. O. (2015). Teachers' Teaching Experience and Academic Performance in Mathematics and English Language in Public Secondary Schools in Ogun State, Nigeria. *International Journal of Humanities, Social Sciences and Education*, 2(2), 123-134.
- Feng, L., & Sass, T. R. (2020). Teacher quality and teacher mobility. *Education Finance and Policy*, 12(3), 396-418.
- Fisher, I. (1906). *The nature of capital and income*. Berlin, Boston: De Gruyter

- Fokuo, M. O., Lassong, B. S., & Kwasi, S. F. (2022). Students' poor mathematics performance in Ghana: Are there contributing factors? *Asian Journal of Education and Social Studies*, 30(4), 16-21.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2023). *How to design and evaluate education research (11th ed.)*. McGraw Hill LLC.
- Goldhaber, D., Gross, B. & Player, D. (2007). Are Public Schools Really Losing Their Best? Assessing the career transitions of teachers and their implications for the quality of the teacher workforce. Working Paper 12. *National Center for Analysis of Longitudinal Data in Education Research*.
- Graham, L., Smith, R., & Johnson, P. (2020). Investigating the impact of teacher experience on student performance: A comparison of novice and experienced teachers. *International Journal of Educational Research*, 45(3), 120-134.
- Kim, S. W., Cho, H., & Kim, L. Y. (2019). Socioeconomic status and academic outcomes in developing countries: A meta-analysis. *Review of Educational Research*, 89(6), 875-916.
- Kini, T., & Podolsky, A. (2016). Does teaching experience increase teacher effectiveness? A review of the research. *Learning Policy Institute*
- Makondo, P. V., & Makondo, D. (2020). Causes of poor academic performance in mathematics at the ordinary level: A Case of Mavuzani High School, Zimbabwe. *International Journal of Humanities and Social Science Invention (IJHSSI)*, 9(6), 10-18. <https://doi.org/10.35629/7722-0906011018>.
- National Council for Curriculum and Assessment (NaCCA) (2019). *Mathematics curriculum for primary school*. Ministry of Education.
- OECD (2021). *Teachers and school leaders as lifelong learners: Tackling professional development gaps*. OECD Publishing.
- Okebukola, P. A., Onowugbeda, F. U., Oladejo, A. I., Gbeleyi, O. A., & Agbanimu, D. (2021). Teachers' -s and teaching experience: Impact on quality assurance in Nigeria Secondary Education. *NOUN Journal of Management and International Development (NOUN JOMAIID)*, 6(1).
- Poku, D. A. (2019). *Analysis of JHS students' attitudes toward mathematics and its effect on academic achievement: the case of Asunafo South District* (Doctoral dissertation, University of Ghana).
- Punch, K. F. (2019). *Introduction to social research: Quantitative and qualitative approaches*. Sage Publications
- Rice, J. K. (2003). *Teacher quality: Understanding the effectiveness of teacher attributes*. Washington, DC: Economic Policy Institute.
- Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51, 1-17.
- UNESCO (2022). *Reimagining our futures together: A new social contract for education*. Paris
- Wuttaphan, N. (2017). Human capital theory: The theory of human resource development, implications and future. *Faculty of Management Sciences, Pibulsongkram Rajabhat University*. 240-253.

Yariv, E. (2011). Deterioration in teachers' performance: Causes and some remedies. *World Journal of Education*. Vol . 1, No. 1. <https://doi.org/10.5430/wje.v1n1p81>

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