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Analyzing the Connections between Teacher Qualifications and the Availability of Trained Mathematics Teachers with Academic Performance in Public Secondary Schools in Bamenda III Subdivision, Cameroon

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Abstarct: This study seeks to explore the association between teacher qualifications, the quantity of trained mathematics educators, and students' academic achievements in public secondary schools within the Bamenda III Subdivision, Cameroon. Employing both descriptive survey and correlational research methodologies, the study population consisted of 45 mathematics teachers from the subdivision's five public secondary schools. Purposive sampling, particularly total population sampling, was utilized due to the population's small size. Data collection involved the administration of a self-designed questionnaire to mathematics teachers. Analysis encompassed both descriptive and inferential statistics, including means, correlation, coefficient of determination, p-value, and regression analysis at a significance level of 0.05. Results indicated significant correlations between mathematics teachers' qualifications, the quantity of mathematics educators in schools, and students' academic performance. The study suggests increasing the number of trained mathematics teachers through enhanced professional training and equitable distribution to schools by relevant authorities.

Key points: Teacher Qualification, Trained Mathematics Teachers, Mathematics, Public Secondary School, Students' Academic Performance.

Introduction

Bamenda III subdivision, like many other educational zones globally, faces challenges in the realm of education, particularly concerning mathematics education in public secondary schools. Mathematics is often regarded as a fundamental subject, laying the groundwork for various academic disciplines and real-world applications. However, the academic performance of students in mathematics can be significantly influenced by the qualifications and expertise of their teachers, as well as the availability of trained mathematics educators.

The importance of teacher qualifications in shaping students' academic outcomes has been widely acknowledged in educational literature. Studies have shown that teachers who possess higher qualifications and proficiency in their subject matter tend to have a positive impact on students' learning experiences and achievements. Conversely, the shortage of qualified and trained teachers, especially in critical subjects like mathematics, can hinder students' academic progress and overall educational attainment.

In the context of Bamenda III Subdivision, where public secondary schools serve diverse student populations with varying learning needs, understanding the relationship between teacher qualifications, the number of trained mathematics teachers, and students' academic performance becomes imperative. This understanding is essential for policymakers, educators, and stakeholders seeking to improve the quality of education and enhance students' mathematical proficiency.

Despite the significance of this issue, there is a gap in research specifically focusing on the correlation between teacher qualification, the availability of trained mathematics teachers, and students' academic performance in public secondary schools within the Bamenda III Subdivision. Therefore, conducting a comprehensive study in this area is warranted to fill this gap in the literature and provide valuable insights that can inform policy formulation, teacher training initiatives, and educational practices aimed at improving students' academic outcomes in mathematics.

Numerous studies have highlighted the significant impact of teacher qualifications on students' academic achievement. For instance, research by Darling-Hammond and Youngs (2002) demonstrated a positive correlation between teachers' subject-specific qualifications and students' performance in that subject. Similarly, a meta-analysis by Hattie (2009) found that teacher expertise and qualifications were among the most influential factors in determining academic outcomes.

Within the field of mathematics education, the qualifications and proficiency of teachers have been shown to be particularly crucial. Studies by Hill et al. (2005) and Goldhaber and Brewer (2000) emphasized the importance of teacher content knowledge and pedagogical skills in facilitating students' understanding and mastery of mathematical concepts. The availability of trained mathematics teachers thus plays a significant role in students' academic performance. Research by Ingersoll (2003) highlighted the negative effects of teacher turnover and the importance of retaining qualified educators, especially in high-need subjects like mathematics.

It is essential to consider contextual factors when examining the relationship between teacher qualifications, trained mathematics teachers, and students' academic performance. Studies by Fullan (2007) and Leithwood et al. (2006) emphasized the importance of understanding the unique characteristics of educational settings, such as school culture, resources, and community dynamics, in interpreting research findings. Limited research specifically focuses on the educational context of Bamenda III Subdivision in Cameroon. However, anecdotal evidence suggests challenges such as teacher shortages, inadequate resources, and disparities in educational quality. Understanding these contextual factors is crucial for interpreting the findings of the current study within the local context.

This study is guided by theoretical frameworks such as the Resource-Based View (RBV) of education, which posits that educational outcomes are influenced by the availability and quality of educational resources, including qualified teachers. Additionally, the study draws on sociocultural perspectives on education, which emphasize the role of social interactions and contextual factors in shaping learning experiences and academic achievement.

Overall, the literature review underscores the importance of investigating the correlation between teacher qualification, number of trained mathematics teachers, and students' academic performance in public secondary schools in Bamenda III Subdivision, Cameroon. By investigating these correlations through empirical research and data analysis, this study aims to contribute to the existing body of knowledge on teacher quality and its implications for educational outcomes in the specific context of public secondary schools in Bamenda III Subdivision, Cameroon. Additionally, the findings of this study have the potential to guide targeted interventions and strategies aimed at enhancing students' mathematical proficiency and overall academic success in and beyond the subdivision.

Research Objectives

The study was guided by the following objectives:

- To determine the relative contribution of teachers' qualifications in mathematics on Students' Academic Performance (SAP).
- To determine how the number of trained mathematics teachers in a school relates to the academic performance of students in mathematics at the GCE O/L.

Research Questions

- What is the relative contribution of teachers' qualifications in mathematics on SAP in Bamenda III subdivision?
- How does the number of trained mathematics teachers in a school relate to the performance of students in mathematics at the GCE O/L?

Research Hypotheses

Specific Hypotheses

Ho_1: Teachers' qualifications in mathematics does not significantly contribute to secondary school SAP in Bamenda III subdivision.

Ha_1: Teachers' qualifications in mathematics significantly contributes to secondary school SAP in Bamenda III subdivision.

Ho_2: There is no significant relationship between the number of trained mathematics teachers and secondary school SAP in mathematics at the GCE O/L.

Ha_2: There is a significant relationship between the number of trained mathematics teachers and secondary school SAP in mathematics at the GCE O/L.

Methodology

This research employed both descriptive survey and correlational research methodologies. Descriptive survey research design was appropriate for this study because of the cross sectional nature of the data collected. Additionally, correlational research methods were utilized to examine relationships between various variables. The investigation took place in the Bamenda III subdivision, situated within the Mezam division of the North West region of Cameroon. Bamenda III was designated as a subdivision in 2007 by Presidential Decree No. 2007/117 on April 24, 2007. Geographically, Bamenda III is positioned between latitudes 6'15 and 6'25N and longitudes 10'02 and 10'15E of the Greenwich Meridian.

The population of this study comprised of 45 mathematics teachers from the five public secondary schools in Bamenda III subdivision, (see Table 1).

Table 1: Population of Mathematics Teachers in Public Secondary Schools in Bamenda III Subdivision

S/N	Name of School	Population of Mathematics Teachers
1	GBHS Atiela	11
2	GBHS Bayelle	12
3	GTC Nkeung	02
4	GTHS Bamenda	11
5	GTHS Nkwen	09
Total		45

The study's sample comprised all 45 mathematics teachers across the five public secondary schools within Bamenda III subdivision. Selection of this sample utilized purposive sampling, employing total population sampling due to the manageable size and accessibility of the study population.

The data collection instrument in this study was a self-designed structured questionnaire, with the items rated on a four-point Likert scale. Documents examined to obtain the performance of students included the GCE Ordinary Level results in mathematics for the academic years 2019/2020, 2020/2021 and 2021/2022 in all the five public secondary schools.

After formulating the instrument, the researchers gave them to three experts to vet. The experts were required to ascertain the clarity of the instruments, appropriateness of language use and to determine whether the questions/statements would bring out the expected responses. The

comments, observations and views of the experts meant to improve the quality of the items and were taken into consideration in developing the final instruments. No Content Validity Index (CVI) of any of the questionnaire items was less than 0.7, considered to be a cutoff point for a valid item.

After validating and refining the instruments, they were pilot tested using 5 mathematics teachers from three private schools within Bamenda III. The data collected was used to determine the Cronbach alpha reliability of the questionnaire. The Cronbach alpha reliability of the teachers' questionnaires yielded an index of 0.84. Thus, the reliability of the questionnaire was assured as the minimum acceptance value for Cronbach's alpha according to Bernard (2002) is 0.7.

The principals of the five schools were consulted, and the questionnaires were distributed among the mathematics teachers. The researcher personally oversaw the administration of the questionnaires. Additionally, the heads of the mathematics departments in each school assisted in distributing the questionnaires to their department members who were not present during the researcher's administration. They also provided essential information regarding the number of trained and untrained staff in their departments.

Data analysis employed both descriptive and inferential statistics. Specifically, means, Pearson correlation, and coefficient of determination were utilized to address the research questions, while the p-value for correlation was employed to test hypotheses at the significance level of 0.05.

Findings of the Study

Relative Contribution of Teachers' Qualifications in Mathematics on Students' Academic Performance

Research Question One: *What is the relative contribution of teachers' qualification in mathematics on students' academic performance in Bamenda III subdivision?*

Ho_1: *Teachers' qualifications in mathematics do not significantly contribute to secondary school students' academic performance in Bamenda III subdivision.*

Ha_1: *Teachers' qualifications in mathematics significantly contribute to secondary school students' academic performance in Bamenda III subdivision.*

Table 2: Relative Contribution of Teachers' Qualification in Mathematics on Students' Academic Performance

		Teachers' Qualifications	Students' Academic Performance	Coefficient of Determination (r^2)
Teachers' Qualifications	Pearson Correlation	1	.673**	0.453
	Sig. (2-tailed)		.000	
	N	45	45	
Students' Academic Performance	Pearson Correlation	.673**	1	
	Sig. (2-tailed)	.000		
	N	45	45	
**. Correlation is significant at the 0.05 level (2-tailed).				

The table reveals that there is a high positive relationship (r = 0.673) between mathematics teachers' qualifications and students' academic performance. This means that an increase in teachers' qualifications will also lead to an increase in students' academic performance. The table also shows that the coefficient of determination (r^2) is 0.453. This suggests that 45.3% of the variations in students' academic performance in mathematics can be accounted for by teachers' qualification.

The 2-tailed p-value (p = 0.000) further indicates that this contribution is significant. Thus, Ho_1 is rejected and it can therefore be concluded that teachers' qualification in mathematics significantly contributes to secondary school students' academic performance in Bamenda III subdivision.

Relationship between the Number of Trained Mathematics Teachers and Secondary School Students' Academic Performance in Mathematics

Research Question Two: *How does the number of trained mathematics teachers in a school relate to the performance of students in mathematics at the GCE O/L?*

Ho_2: *There is no significant relationship between the number of trained mathematics teachers and secondary school students' academic performance in mathematics at the GCE O/L.*

Ha_2: *There is a significant relationship between the number of trained mathematics teachers and secondary school students' academic performance in mathematics at the GCE O/L.*

Table 3: Relationship between the Number of Trained Mathematics Teachers and Secondary School Students' Academic Performance in Mathematics

		Number of Trained Mathematics Teachers	Students' Academic Performance
Number of Trained Mathematics Teachers	Pearson Correlation	1	.721**
	Sig. (2-tailed)		.000
	N	45	45
Students' Academic Performance	Pearson Correlation	.721**	1
	Sig. (2-tailed)	.000	
	N	45	45
**. Correlation is significant at the 0.05 level (2-tailed).			

The table reveals that there is a high positive relationship (r = 0.721) between the number of trained mathematics teachers and students' academic performance. This means that an increase in the number of trained mathematics teachers will also lead to an increase in students' academic performance. The 2-tailed p-value (p = 0.000) further indicates that this relationship is significant. Thus, Ho_2 is rejected and it can therefore be concluded that the number of trained mathematics teachers in a school, significantly relates to secondary school students' academic performance in mathematics in Bamenda III subdivision.

Discussion of Findings

Relative Contribution of Teachers' Qualification in Mathematics on Students Academic Performance

The results of this study demonstrate a strong positive correlation (r=0.673) between teachers' qualifications and students' academic achievements. This implies that as teachers' qualifications increase, so does students' academic performance. Furthermore, the study indicates that 45.3% of the variability in students' math performance can be attributed to teachers' qualifications. Moreover, the two-tailed p-value (p=0.000) underscores the significance of this contribution. These findings align with previous research by Casian et al. (2021), highlighting a statistically significant association between teachers' qualifications and students' academic outcomes. Similarly, they echo the findings of Badmus (1993), who found that higher subject teacher qualifications correlate with improved student performance. This suggests that enhanced teacher training corresponds to greater proficiency in teaching skills, subject knowledge, and effective communication abilities.

However, this finding contradicts the findings of the studies by Kimani et al. (2013) who argued that teachers' professional qualifications and experiences have no significant relationship with students' academic performance. Maphoso and Mahlo (2015) further argued that teacher qualification is not the sole contributor in academic achievement. Possible reasons to these contradictory findings is that teachers in those countries are not motivated enough to be able to fully utilize the more skills and higher subject matter which they possess given that the teaching workload for most mathematics teachers is always high.

Relationship between Number of Trained Mathematics Teachers and the Performance of Students in Mathematics at the GCE O/L

The table reveals that there is a high positive relationship (r=0.721) between the number of trained mathematics teachers and students' academic performance. The 2-tailed p-value (p=0.000) further

indicates that this relationship is significant. This study is in line with that of Abdul (2020) who revealed that the number of mathematics teachers within a school significantly relates to students' academic development. The finding of this study suggests that even when mathematics teachers are trained, they need to be in their numbers so that they can effectively distribute the teaching load of the school. Thus when the number of trained mathematics teachers within a school are not enough, teachers are bound to be overloaded and even though trained, they turn to be ineffective as they lack time to prepare effectively for the lessons. However, this finding does not completely concur with that of Bressoux et al. (2008) who stated that the number of trained mathematics teachers are not able to improve performance of below average students. Possible reasons to this contradictory finding could be related to the school environment; lack of basic facilities in such schools, the attendance rate of the students, among others.

Conclusion

This study set out to determine the relative contribution of teachers' qualifications in mathematics on students' academic performance and how the number of trained mathematics teachers in a school relate to the performance of students in mathematics in Bamenda III subdivision. The study arrived at the conclusion that teachers' qualifications in mathematics significantly contribute to secondary school students' academic performance, and that a significant relationship exists between the number of trained mathematics teachers and secondary school students' academic performance in mathematics in Bamenda III subdivision. Based on the findings of the study, it was recommended that education authorities should encourage all teachers to improve on their academic qualifications through regular in-service training in order to update their knowledge and acquire relevant teaching skills that will help them to transmit appropriate knowledge to their students. Furthermore, the ministry of secondary education should request for massive recruitment of mathematics teachers. This will help to reduce the huge teaching load which most mathematics teachers have, thus, rendering them more effective.

References

1. Abdul, H (2020). Effect of teachers training on students' academic performance. *Pakistan Journal of Humanities and Social Sciences, 8*(1), 10-14. https//journals.internationalrsd.org/index.php/pjhss
2. Badmus, M. M. O. (1993). *An assessment of the implementation of the national junior secondary school: Home Economics Curriculum in South western states of Nigeria.* PhD thesis, University of Benin, Benin City, Nigeria
3. Bernard, H. R. (2002). *Research method in anthropology:* Qualitative and quantitative approaches (3rd Ed.). Walnut Creek, CA: Altamira Press.
4. Bressoux, P., Kramarz, F., & Prost, C. (2008). *Teachers' Training, Class size and Students' Outcomes:* Learning from administrative forecasting mistakes, IZA Discussion Papers, No. 3871, Institute for the Study of Labor (IZA), Bonn, https;//nbn-resolving.de/urn:nbn:de:101:1-20081216251
5. Casian, M., Mugo, L., & Claire, M. M. (2021). Impact of teacher' qualification on students' academic performance in public secondary schools in Rwanda. *Journal of education, 4*(2). Retrieved from http://stratfordjournals.org/journal/
6. Darling-Hammond, L., & Youngs, P. (2002). Defining "Highly Qualified Teachers": What Does "Scientifically-Based Research" Actually Tell Us? *Educational Researcher, 31*(9), 13-25. https://doi.org/10.3102/0013189X031009013
7. Fullan, M. (2007). *The New Meaning of Educational Change***.** Teachers College Press.
8. Hattie, J. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement.* Routledge.

9. Hill, L., Mellon, C., Laker, L., Reilly, L., & Rooney, P. (2005). *School Leadership Study: Developing Successful Principals.* University Council for Educational Administration.
10. Ingersoll, R. M. (2003). *Who controls teachers' work? Power and accountability in America's schools*. Harvard University Press.
11. Kimani, G., Augustine, M., Kara, I. & Ngaji, W. (2013). Teacher factors influencing students' academic achievements in secondary schools in Nyandaruna County, Kenya. *International Journal of Education and Research, 1*(3), 1-14.
12. Leithwood, K., Day, C., Sammons, P., Harris, A., & Hopkins, D. (2006). *Successful school leadership: What it is and how it influences pupil learning*. Department for Education and Skills.
13. Mophoso, L. S. T., & Mahlo, D. (2015). Teacher qualification and pupil academic achievement. *Journal of Social Science, 42* (12), 51-58.