



Understanding the Influence of 21st Century Diverse Mathematics Educators on Secondary School Student Outcomes in Mathematics in Mezam Division, Cameroon

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

This study explores the influence of 21st-century diverse mathematics educators on student outcomes in secondary school mathematics within Mezam Division, Cameroon. Employing an ex-post facto research design, the study assesses how gender, cultural diversity, and pedagogical diversity among mathematics teachers affect students' academic outcomes. The sample consisted of 518 students from 16 public and private high schools, who had completed their General Certificate of Education (GCE) Ordinary Level exams and were transitioning to Lower Sixth. Data were collected via a self-designed questionnaire, which evaluated perceptions of the impacts of

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teacher gender diversity, cultural diversity, and pedagogical diversity. Statistical analyses, including one-sample t-tests, revealed that male mathematics teachers had a significant positive impact on student outcomes compared to female teachers. Furthermore, cultural diversity among teachers significantly enhanced students' mathematics outcomes, and pedagogical diversity had a substantial positive effect as well. The findings underscore the importance of balancing gender representation, fostering cultural diversity, and embracing various pedagogical approaches to improve educational outcomes in mathematics. Recommendations include implementing policies for gender-balanced recruitment, supporting cultural inclusivity, and promoting diverse teaching methods to optimize student performance in mathematics.

Keywords: Gender diversity; cultural diversity; pedagogical diversity; mathematics education; student outcomes; secondary school.

1. INTRODUCTION

In the rapidly evolving landscape of education in this 21st century, the diversity of teaching staff has emerged as a crucial factor influencing student success. This is particularly relevant in the context of secondary education, where effective mathematics instruction is essential for developing critical thinking and problem-solving skills. Mezam Division, known for its rich cultural and socio-economic diversity, presents a unique setting to explore this dynamic.

As we move deeper into the 21st century, mathematics educators are increasingly diverse in terms of ethnicity, gender, and professional backgrounds. This diversity among teachers is believed to bring a range of perspectives and teaching styles that can enhance the learning experience. However, the impact of this diversity on student outcomes, especially in the realm of secondary education, is a subject of ongoing research and debate.

In Mezam Division, secondary schools are faced with the challenge of ensuring that all students achieve high levels of mathematical proficiency. With a varied pool of mathematics teachers, understanding how this diversity influences student performance is crucial. Does having a diverse range of educators improve student engagement and achievement? What specific aspects of teacher diversity contribute to better learning outcomes? These are the questions that this research aims to address.

This study will investigate the relationship between the diversity of mathematics educators and student outcomes in secondary schools within Mezam Division. By examining various dimensions of teacher diversity such as gender, cultural background and pedagogical approaches, this research seeks to provide

insights into how these factors impact student learning. The findings are expected to contribute valuable knowledge that can inform educational practices and policy-making, ultimately enhancing the effectiveness of mathematics instruction and promoting equitable academic success for all students in the region.

1.1 Background to the Study

As we advance into the 21st century, the dynamics of educational effectiveness are increasingly shaped by the diversity of educators and the approaches they adopt. This study aims to explore the impact of diverse mathematics educators on student outcomes in secondary education within the Mezam Division, located in the North West Region of Cameroon.

The impact of gender on educational outcomes has been widely studied, particularly in relation to teacher-student interactions and student performance. Gender dynamics in the classroom can influence various aspects of the educational experience, including teaching styles, student engagement, and academic achievement. Research suggests that male and female teachers may adopt different pedagogical approaches, which can affect students' learning experiences. For instance, male teachers might use more directive and competitive teaching methods, while female teachers might emphasize collaborative and supportive environments [1]. These differences can influence how students perceive and engage with the subject matter.

Gender may also affect students' comfort levels and willingness to participate in class. Some studies have indicated that students might perform better when taught by teachers of the same gender, as they may feel more understood and supported [2]. However, other research

suggests that the overall impact of teacher gender on academic achievement can be complex and mediated by other factors such as teaching quality and classroom environment. Furthermore, the presence of diverse gender role models in mathematics education can challenge traditional gender stereotypes and inspire students. For example, female students might benefit from having female mathematics teachers who can serve as role models and counteract stereotypes that suggest mathematics is a male-dominated field [3].

Cultural diversity among educators can significantly impact students' academic experiences and outcomes by fostering a more inclusive and responsive learning environment. As proposed by Ladson-Billings [4], culturally relevant pedagogy involves incorporating students' cultural backgrounds into teaching practices. This approach can enhance students' engagement and understanding by making the content more relatable and relevant to their lives. Teachers who are culturally diverse themselves may be better equipped to employ culturally responsive teaching methods and address the needs of a diverse student body.

Students from diverse cultural backgrounds may benefit from seeing teachers who share or respect their cultural identity. Representation in education can help students feel valued and understood, which can improve their motivation and academic performance [5]. A diverse teaching staff can also expose students to a variety of perspectives and approaches, enriching their learning experience. The presence of culturally diverse educators can contribute to educational equity by challenging biases and providing all students with equitable learning opportunities. This approach aligns with the principles of Critical Pedagogy, which emphasizes the role of education in addressing social inequalities and promoting inclusivity [6].

Pedagogic diversity refers to the variety of teaching methods and strategies used by educators. This diversity can impact students' learning outcomes by addressing different learning styles and needs. According to Piaget [7] and Vygotsky [8], effective learning occurs when students actively construct knowledge through diverse and interactive teaching methods. Teachers who use a range of pedagogical approaches, such as hands-on activities, collaborative learning, and technological tools, can cater for various learning

preferences and enhance student understanding of mathematical concepts.

The concept of differentiated instruction, as outlined by Tomlinson and Moon [9], emphasizes the importance of adapting teaching strategies to meet the diverse needs of students. Teachers who employ pedagogic diversity are better able to address individual differences in learning styles, abilities, and interests, which can lead to improved student outcomes. Diverse pedagogical methods can increase student engagement by making learning more dynamic and interactive. When students encounter a variety of teaching approaches, they are more likely to find methods that resonate with their learning preferences, thereby improving their motivation and academic performance [10].

In recent years, there has been growing recognition of the impact that diverse teaching staff can have on educational outcomes. Diverse educators, defined by race, ethnicity, gender, and cultural background, bring a range of perspectives and pedagogical approaches that can enrich the learning environment [5]. Research has shown that students from diverse backgrounds often perform better academically when taught by educators who reflect their own cultural and demographic characteristics [2]. This is particularly pertinent in mathematics education, where diverse pedagogical strategies can address various learning needs and styles [4].

Mathematics education is a critical area of focus due to its foundational role in students' academic and career success. Studies have consistently highlighted the importance of effective teaching in mathematics for long-term student achievement [11]. Diverse educators in mathematics have the potential to employ varied instructional strategies that can cater to a broad spectrum of learning preferences and needs, thereby improving student engagement and performance [12].

Mezam Division, like many divisions in Cameroon, faces unique educational challenges. The division is characterized by its diverse student population, which includes various ethnic groups and languages [13]. Understanding how the diversity of mathematics educators impacts student outcomes in this context requires a careful approach, considering both the local educational policies and the socio-cultural dynamics of the division.

1.2 Theoretical Framework

This study is grounded in several theoretical frameworks that elucidate the interplay between educator diversity and student outcomes. These frameworks provide a basis for understanding how the characteristics of mathematics educators can impact student performance and engagement. This study is delimited to four such theories as presented below:

1.2.1 Culturally relevant pedagogy of Gloria Ladson-Billings (1995)

Culturally Relevant Pedagogy (CRP), as proposed by Gloria Ladson-Billings (1995), forms a central theoretical underpinning. CRP emphasizes the importance of incorporating students' cultural contexts into the educational process to make learning more meaningful and effective. According to Ladson-Billings, educators who draw on students' cultural backgrounds in their teaching practices can enhance student engagement and academic achievement. In the context of Mezam Division, where there is considerable cultural diversity, CRP suggests that diverse educators might be better equipped to connect with students' cultural experiences and thus improve their outcomes in mathematics.

1.2.2 Social role theory of Eagly and Wood [14]

Social Role Theory, developed by Eagly and Wood [14], provides insight into how gender roles and expectations influence behavior and perceptions in educational settings. This theory posits that societal norms and roles associated with gender can affect both the behavior of teachers and the responses of students. In the context of mathematics education, Social Role Theory helps explain how the gender of mathematics teachers might shape students' attitudes and performance, based on societal expectations and stereotypes related to gender and mathematics.

1.2.3 Theories of teacher diversity and student achievement of Dee [15] and Gay [5]

Theories related to teacher diversity, such as those discussed by Dee [15] and Gay [5], highlight how educators' demographic characteristics impact student outcomes. Dee's research suggests that students often perform better academically when taught by teachers

who share similar racial or gender identities, as these teachers may better understand and address students' unique needs and perspectives. Gay's work further elaborates on the positive effects of diverse teaching on students' learning experiences and outcomes, advocating for diverse educators as a means to improve educational equity.

1.2.4 Constructivist learning theories of Piaget [7] and Vygotsky [8]

Constructivist Learning Theory, as articulated by Piaget [7] and Vygotsky [8], provides a foundation for understanding how diverse teaching approaches can impact student learning. This theory emphasizes that learning is an active, contextualized process of constructing knowledge rather than passively receiving information. Diverse educators may employ various pedagogical strategies that align with constructivist principles, facilitating a deeper understanding of mathematics by engaging students in meaningful, contextually relevant ways.

1.3 Research and Gaps

Previous studies have provided insights into the general influence of educator diversity on student outcomes, but research specific to secondary mathematics education in Mezam Division is limited. Research by O'Connor and Geiger [16] indicates that while there is significant evidence of the benefits of diverse educators in mathematics, the context-specific factors and how they interact with educator diversity need further exploration. This study seeks to fill this gap by focusing on Mezam Division, aiming to provide a detailed analysis of how diverse mathematics educators influence students' outcomes in this specific educational setting.

1.4 Statement of the Problem

Mezam Division in Cameroon, characterized by its cultural and linguistic diversity, presents a unique educational environment for secondary education. Mathematics, a subject critical to academic and future career success, is a focal point of concern due to its complex nature and the diverse learning needs of students. Despite growing international recognition of the positive impact that diverse educators can have on student outcomes, there is a significant gap in research regarding how this dynamic plays out specifically within the context of secondary mathematics education in Mezam Division.

Thus, the problem addressed by this study is the lack of comprehensive understanding of how the diversity of 21st-century mathematics educators affects student outcomes in secondary education in Mezam Division. While there is substantial evidence suggesting that diverse educators can positively influence student performance and engagement [5], the specific impact within the context of mathematics education in this division remains underexplored.

In Mezam Division, the intersection of educational diversity with localized cultural and socio-economic factors creates a complex landscape that is not fully understood. There is a pressing need to investigate how various aspects of educator diversity such as cultural background, gender, and teaching approach affect students' mathematical achievement and engagement. This lack of targeted research undermines the ability of policymakers, educational planners, and stakeholders to effectively harness the potential benefits of a diverse teaching workforce in improving educational outcomes.

Therefore, this study seeks to fill this critical gap by examining the influence of 21st-century diverse mathematics educators on secondary students' performance and attitudes toward mathematics in Mezam Division. Understanding these dynamics will provide valuable insights for enhancing educational practices, supporting diverse educators, and ultimately improving student achievement in this specific educational context.

1.5 Objectives of the Study

- ◆ To identify how the gender of mathematics teachers impact students' outcomes in mathematics.
- ◆ To assess how the cultural diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division.
- ◆ To find out how the pedagogic diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division.

1.6 Research Questions

- ◆ How does gender of mathematics teachers impact students' outcomes in mathematics?
- ◆ How does cultural diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division?

- ◆ How does the pedagogic diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division?

1.7 Hypotheses

Ho₁: The gender of mathematics teachers has no significant impact on students' outcomes in mathematics.

Ha₁: The gender of mathematics teachers has a significant impact on students' outcomes in mathematics.

Ho₂: The cultural diversity of mathematics teachers has no significant influence on students' outcomes in mathematics in Mezam Division.

Ha₂: The cultural diversity of mathematics teachers has a significant influence on students' outcomes in mathematics in Mezam Division.

Ho₃: The pedagogical diversity of mathematics teachers does not significantly influence students' outcomes in mathematics in Mezam Division.

Ha₃: The pedagogical diversity of mathematics teachers significantly influences students' outcomes in mathematics in Mezam Division.

2. METHODOLOGY

The study utilized an ex-post facto research design to examine the impact of 21st-century diverse mathematics educators on student outcomes in secondary school mathematics. It focused on students who had experienced instruction from both male and female mathematics teachers during their first cycle (Forms 1–5) and who had completed their General Certificate of Education (GCE) Ordinary Level (O/L) exams and were in the process of enrolling in the Lower Sixth at functional high schools in Mezam Division for the 2024/2025 academic year. This suggests that the findings of this study could be generalized beyond Mezam Division given that students who attend Lower Sixth classes obtained the GCE O/L from any school within the national territory of Cameroon. A sample of 518 students was selected from 16 public and private high schools in the division (see Table 1). The researcher distributed 50 questionnaires to administrators responsible for registering students into Lower Sixth at each of the 16 schools. These administrators then facilitated the distribution of the questionnaires to students applying for admission into Lower Sixth at their respective institutions.

Table 1. Distribution of sample size of the study

S/N	Name of School	Questionnaires handed to schools	Filled Questionnaires returned
1	Cameroon College of Arts Science and Technology Bambili	50	40
2	Government Bilingual High School Atiela	50	29
3	Government Bilingual High School Bayele	50	37
4	Government Bilingual High School Bamenda	50	31
5	Government Bilingual High School Down Town	50	40
6	Government Bilingual High School Medankwe	50	31
7	Government Bilingual High School Santa	50	26
8	Presbyterian High School Mankon	50	27
9	Presbyterian Comprehensive High School Azire	50	26
10	City College of Commerce (CCC) Mankon	50	33
11	Progressive Comprehensive High School (PCHS) Mankon	50	44
12	Step-by-Step Comprehensive High school	50	29
13	Blessed High School Nchobuh	50	31
14	Baptist High School Nkwen	50	33
15	Sacred Heart College Mankon	50	21
16	Saint Frederick High School Mankon	50	40
Total		800	518

Quantitative data were gathered using a self-designed questionnaire (see Appendix A), which was divided into three sections. Section A collected students' demographic information. Section B contained 7-item scale measuring students' perceptions of the impact of gender diversity among mathematics teachers on their outcomes. This section used a 4-point Likert scale, with a cutoff score of 17.5 out of 28 (calculated as seven items multiplied by the midpoint of 2.5). Scores above 17.5 indicated that female mathematics teachers had a more positive impact on student outcomes, whereas scores below 17.5 suggested that male mathematics teachers had a greater positive impact.

Sections C and D evaluated the impact of cultural diversity and pedagogical diversity among mathematics teachers on student outcomes, respectively. Each of these sections also included seven items. In these sections, a score above 17.5 signaled a high influence, while a score below 17.5 indicated a low influence.

The questionnaire was reviewed by three experts: one in measurement and evaluation, one in educational psychology, and one in

mathematics education. A pilot test with 16 students yielded a Cronbach's alpha reliability coefficient of 0.81, demonstrating high reliability. Data analysis was conducted using frequency counts, means and the one-sample t-tests.

The study followed ethical guidelines by ensuring informed consent, voluntary participation, and the confidentiality and anonymity of respondents, thereby adhering to research standards for studies involving human subjects.

3. FINDINGS

Research Question 1: How does gender of mathematics teachers impact students' outcomes in mathematics?

Table 2 reveals that the mean of the responses on the impact of gender diversity of mathematics teachers on students' outcomes in mathematics range from 1.98 to 2.34. This gives an overall mean of 14.86 (which is below the cut-off point of 17.5), suggesting that female mathematics teachers create a low impact on students' outcomes in mathematics in Mezam Division compared to their male counterparts. This means that gender diversity of mathematics teachers

has an impact on students' outcomes with male teachers impacting students more.

Ho₁: The gender of mathematics teachers has no significant impact on students' outcomes in mathematics.

Ha₁: The gender of mathematics teachers has a significant impact on students' outcomes in mathematics.

A one-sample t-test was conducted to determine if the overall mean of the responses on the impact of gender diversity of mathematics

teachers on students' outcomes in mathematics in Mezam Division was significantly different from that of the general population (17.5). The finding on Table 3 revealed that the overall mean (M = 14.86) on the impact of gender diversity of mathematics teachers on students' outcomes in mathematics in Mezam Division was significantly lower than that of the general population, [t(517) = -27.211, P < .001]. Thus, Ho₁ was rejected. This therefore means that gender diversity of mathematics teachers has a significant impact on students' outcomes with the male mathematics teachers impacting students more.

Table 2. Impact of Gender diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA	Mean	Std Dev	Decision
1	I find that female mathematics teachers explain concepts in a way that helps me understand better compared to the males.	64	254	158	42	2.34	.798	Low Impact
2	I feel more comfortable asking questions about mathematics when taught by a female teacher.	96	232	169	21	2.22	.791	Low Impact
3	Mathematics becomes more interesting when taught by a female teacher.	80	296	128	14	2.15	.699	Low Impact
4	I perform better in mathematics when taught by a female teacher compared to a male teacher.	109	273	93	43	2.14	.840	Low Impact
5	Female mathematics teachers use teaching methods that help me better grasp mathematical concepts compared to male teachers.	146	235	132	5	1.98	.740	Very Low Impact
6	I am more motivated to participate in mathematics lessons when taught by a female teacher.	158	225	86	49	2.05	.921	Low Impact
7	I feel that female mathematics teachers make me more engaged in solving mathematical concepts compared to their male counterparts	115	297	99	7	1.98	.654	Very Low Impact
Overall Mean (Out of 28)						14.86	1.778	Low Impact

Table 3. One-Sample t-test on the impact of gender diversity of mathematics teachers on students' outcomes in mathematics

	Test Value = 17.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Gender Diversity and Students' Outcomes	-27.211	517	.000	-2.637	-2.83	-2.45

Table 4. Influence of cultural diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA	Mean	Std Dev	Decision
8	My performance in mathematics improves when my teacher shares similar cultural background with me.	67	190	168	92	2.55	.929	High Influence
9	I feel more engaged in mathematics lessons when taught by a teacher from a different cultural background.	11	265	180	62	2.57	.727	High Influence
10	I believe that my teacher's cultural background influences their teaching style in mathematics.	36	176	254	52	2.62	.759	High Influence
11	I am more motivated to learn mathematics when my teacher understands my cultural context.	21	185	245	67	2.69	.745	High Influence
12	Teachers from diverse cultural backgrounds provide examples that help me relate better to the mathematics content.	20	164	227	107	2.81	.802	High Influence
13	I find it easier to understand mathematical concepts when taught by a teacher who respects my cultural beliefs.	56	184	176	102	2.63	.920	High Influence
14	I feel that cultural diversity among my mathematics teachers helps to improve my learning experience.	71	222	194	31	2.36	.790	Low Influence
Overall Mean (Out of 28)						18.23	1.810	High Influence

Table 5. One-Sample t-test on the influence of cultural diversity of mathematics teachers on students' outcomes in mathematics

	Test Value = 17.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Cultural Diversity and Students' Outcomes	5.570	517	.000	.726	.47	.98

Research Question 2: How does cultural diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division?

Table 4 reveals that the mean of the responses on the influence of cultural diversity of mathematics teachers on students' outcomes in mathematics range from 2.55 to 2.81. This gives an overall mean of 18.23 (which is above the cut-off point of 17.5), suggesting that the cultural diversity of mathematics teachers has a positive influence on students' outcomes in mathematics in Mezam Division.

Ho₂: The cultural diversity of mathematics teachers has no significant influence on students' outcomes in mathematics in Mezam Division.

Ha₂: The cultural diversity of mathematics teachers has a significant influence on students' outcomes in mathematics in Mezam Division.

A one-sample t-test was conducted to determine if the overall mean of the responses on the influence of cultural diversity of mathematics teachers on students' outcomes in mathematics in Mezam Division was significantly different from that of the general population (17.5). The finding on Table 5 showed that the overall mean (M = 18.23) was significantly higher than that of the

general population [$t(517) = 5.570, P < .001$]. Thus, H_{02} was rejected. This therefore means that cultural diversity of mathematics teachers has a significantly positive influence on students' outcomes in mathematics.

Research Question 3: How does the pedagogic diversity of mathematics teachers influence students' outcomes in mathematics in Mezam Division?

Table 6 reveals that the mean of the responses on the influence of pedagogic diversity of mathematics teachers on students' outcomes in mathematics range from 2.90 to 3.12. This gives

an overall mean of 21.02 (which is above the cut-off point of 17.5), suggesting that the pedagogic diversity of mathematics teachers has a positive influence on students' outcomes in mathematics in Mezam Division.

H₀₃: The pedagogical diversity of mathematics teachers does not significantly influence students' outcomes in mathematics in Mezam Division.

H_{a3}: The pedagogical diversity of mathematics teachers significantly influences students' outcomes in mathematics in Mezam Division.

Table 6. Influence of pedagogic diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA	Mean	Std Dev	Decision
15	I benefit from a variety of teaching methods used by my mathematics teachers.	5	154	249	110	2.90	.734	High Influence
16	Mathematics lessons are more interesting when my teacher uses different teaching strategies.	4	130	254	130	2.98	.715	High Influence
17	I understand mathematical concepts better when my teacher uses a mix of traditional and modern teaching methods.	5	114	211	188	3.11	.779	Very High Influence
18	The use of different types of instructional materials (e.g., visual aids, hands-on activities) by my teacher helps me learn mathematics more effectively.	5	153	255	105	2.91	.734	High Influence
19	I am more engaged in mathematics lessons when my teacher incorporates diverse teaching techniques.	6	128	265	119	2.99	.715	High Influence
20	My performance in mathematics improves when my teacher adapts their teaching approach to suit different learning styles.	3	116	219	180	3.12	.779	Very High Influence
21	I feel that pedagogic diversity in my mathematics classes helps address my individual learning needs.	6	129	250	133	3.00	.720	Very High Influence
Overall Mean (Out of 28)						21.02	1.739	Very High Influence

Table 7. One-Sample t-test on the influence of pedagogic diversity of mathematics teachers on students' outcomes in mathematics

	Test Value = 17.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Pedagogic Diversity and Students' Outcomes	30.204	517	.000	3.519	3.29	3.75

A one-sample t-test was conducted to determine if the overall mean of the responses on the influence of pedagogic diversity of mathematics teachers on students' outcomes in mathematics in Mezam Division was significantly different from that of the general population (17.5). The finding on Table 7 showed that the overall mean ($M = 21.02$) was significantly higher than that of the general population [$t(517) = 30.204, P < .001$]. Thus, H_{03} was rejected. This therefore means that the pedagogic diversity of mathematics teachers has a significantly positive influence on students' outcomes in mathematics.

4. DISCUSSION OF FINDINGS

The findings of this study revealed that gender diversity of mathematics teachers has a significant impact on students' in outcomes with male mathematics teachers impacting students more. This finding corroborates that of Dee [17] who explored how teacher gender affects student performance and found that male teachers could have a positive impact on male students' performance in mathematics, possibly due to role modeling effects. Furthermore, Sullivan & Sullivan [18] suggest that male teachers might foster a more competitive and achievement-oriented environment, which could benefit certain students. However, this effect is not uniform and can vary based on other contextual factors such as teacher quality and student characteristics. Gender diversity among teachers, including a balance of male and female educators, has also been shown to provide a richer learning environment. For example, a study by Lavy and Sand [19] examined how gender-diverse teaching teams could enhance student outcomes by providing varied perspectives and teaching styles. This diversity helps address different learning needs and can positively impact student performance across genders. Conclusively, the gender of mathematics teachers does influence student outcomes, with male teachers having a distinct impact that might benefit certain student demographics, particularly male students. However, the broader benefits of gender diversity in the teaching workforce suggest that a balanced representation of male and female teachers could optimize educational outcomes for all students.

The findings also revealed that cultural diversity of mathematics teachers has a significantly positive influence on students' outcomes in mathematics. This finding supports that of

Villegas and Lucas [20] who highlight that teachers who bring diverse cultural perspectives into the mathematics classroom contribute to improved academic performance by engaging students more effectively and addressing their diverse learning needs. Thus, culturally diverse teachers often employ teaching strategies that resonate with students from various backgrounds, thereby increasing student engagement and motivation. Gay [21] argues that culturally responsive teaching practices, which are more likely to be employed by culturally diverse teachers, can enhance students' interest in mathematics and improve their academic outcomes. Furthermore, cultural diversity among mathematics teachers also provides diverse role models for students, which can be particularly influential for students from underrepresented backgrounds. This representation helps students visualize themselves in academic and professional roles related to mathematics. Lastly, the presence of culturally diverse teachers can help reduce stereotype threat, which adversely affects student performance. Blazar and Kraft [22] explain that when students are taught by individuals who share or understand their cultural background, they experience less anxiety related to stereotypes and perform better academically.

Lastly, the study revealed that the pedagogical diversity of mathematics teachers has a significantly positive influences on students' outcomes in mathematics in Mezam Division. Empirical research supports the notion that pedagogic diversity positively influences student outcomes in mathematics. For instance, a study by Blazar and Kraft [22] demonstrated that teachers' instructional practices, including their pedagogic variety, were strongly related to students' performance on standardized math assessments. This finding suggests that teachers who employ a range of teaching strategies can better meet diverse student needs, leading to enhanced mathematical understanding and performance. Furthermore, Darling-Darling-Hammond et al. [23] highlight that effective teaching involves not only subject matter expertise but also a repertoire of instructional techniques that can address different learning styles. They argue that when teachers use diverse methods, they are more likely to engage students and facilitate deeper learning. Thus, when teachers implemented a variety of instructional approaches they are indirectly providing differentiate instructions to their learners. This assertion is supported by OECD

(2013) who found that teachers who adapt their instructional strategies to meet the diverse needs of their students tend to achieve better educational outcomes. Conclusively, evidence suggests that pedagogic diversity among mathematics teachers is a crucial factor in enhancing students' mathematical outcomes. By employing a range of teaching strategies, teachers can better address the varied needs of their students, thereby improving overall much desired achievement in mathematics [24,25].

5. CONCLUSION

The study reveals that 21st-century diverse mathematics educators significantly influence student outcomes in secondary school mathematics in Mezam Division, Cameroon. Key findings highlight that male teachers have a notably positive impact in enhancing positive student outcomes compared to female teachers. Additionally, cultural diversity among educators is shown to enhance student outcomes, while varied pedagogical approaches also contribute positively to academic success.

These results emphasize the need for educational policies that ensure gender balance in recruitment, promote cultural inclusivity, and encourage diverse teaching methods. By addressing these factors, schools can create a more effective learning environment that supports improved mathematics performance for all students. Implementing these recommendations could lead to more equitable and successful educational experiences in mathematics, ultimately benefiting students as they transition to higher levels of study.

6. RECOMMENDATIONS

To enhance educational outcomes for all students, schools should implement policies and initiatives aimed at achieving a gender-balanced representation of mathematics teachers. This can be done by actively recruiting and supporting both male and female candidates for mathematics teaching positions, implementing gender sensitivity training for educators, encouraging collaboration and sharing of best practices, providing targeted professional development and mentorship programs to retain a diverse teaching staff. Ensuring a balanced gender representation among mathematics teachers can help provide diverse role models and perspectives, which can positively impact

student engagement and achievement in mathematics.

To enhance students' mathematics outcomes in the Mezam Division, schools should actively promote and support cultural diversity among mathematics teachers. This can be achieved by implementing inclusive recruitment practices that reflect a range of cultural backgrounds, offering training that emphasizes the benefits of cultural diversity in education, and creating an environment where diverse perspectives and teaching styles are valued and integrated into the curriculum. By increasing cultural diversity among mathematics teachers, schools can better connect with students and improve their overall performance in mathematics.

To enhance mathematics outcomes for students, it is crucial to promote and support a range of teaching approaches among mathematics teachers in Mezam Division. This can be accomplished by offering professional development that emphasizes various teaching strategies, creating a collaborative environment where educators can exchange and learn from different instructional techniques, and using feedback to continuously improve and adjust teaching methods. By embracing pedagogical diversity, schools can more effectively meet the diverse learning needs of students and boost overall performance in mathematics.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Author has declared that no competing interests exist.

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APPENDICES

APPENDIX A: Instrument for Data Collection

Student Questionnaire:

Dear Student,

I humbly invite you to complete this questionnaire for this research study on "Understanding the Influence of 21st-Century Diverse Mathematics Educators on Student Outcomes in Secondary School Mathematics in Mezam Division, Cameroon". I plead that you respond to the questionnaire items as honestly as possible. I assure you that your responses will remain confidential and will only be used for research purposes as your names are not even required.

Section A: Demographic Information

Tick on the option that applies to you or provide the required responses for the items in this Section.

- a. Sex: Male / Female
- b. Age: _____
- c. Class: _____
- d. School where O/L was obtained: _____
- e) Have you been taught mathematics by both male and female teachers during your first cycle studies? Yes / No

For the sections which follow, please indicate your degree of agreement or disagreement with the following statements as they apply to you by ticking the most appropriate option on a scale of 4, where SD = Strongly Disagree, D = Disagree, A = Agree and SA = Strongly Agree.

Section B. Impact of Gender diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA
1	I find that female mathematics teachers explain concepts in a way that helps me understand better.				
2	I feel more comfortable asking questions about mathematics when taught by a female teacher.				
3	Mathematics becomes more interesting when taught by a female teacher.				
4	I perform better in mathematics when taught by a female teacher compared to a male teacher.				
5	Female mathematics teachers use teaching methods that help me better grasp mathematical concepts compared to male teachers.				
6	I am more motivated to participate in mathematics lessons when taught by a female teacher.				
7	I feel that female mathematics teachers make me more engaged in solving mathematical concepts compared to their male counterparts				

Section C. Influence of cultural diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA
8	My performance in mathematics improves when my teacher shares similar cultural background with me.				
9	I feel more engaged in mathematics lessons when taught by a teacher from a different cultural background.				
10	I believe that my teacher's cultural background influences their teaching style in mathematics.				
11	I am more motivated to learn mathematics when my teacher understands my cultural context.				
12	Teachers from diverse cultural backgrounds provide examples that help me relate better to the mathematics content.				
13	I find it easier to understand mathematical concepts when taught by a teacher who respects my cultural beliefs.				
14	I feel that cultural diversity among my mathematics teachers helps to improve my learning experience.				

Section D. Influence of pedagogic diversity of mathematics teachers on students' outcomes in mathematics

S/N	Statement	SD	D	A	SA
15	I benefit from a variety of teaching methods used by my mathematics teachers.				
16	Mathematics lessons are more interesting when my teacher uses different teaching strategies.				
17	I understand mathematical concepts better when my teacher uses a mix of traditional and modern teaching methods.				
18	The use of different types of instructional materials (e.g., visual aids, hands-on activities) by my teacher helps me learn mathematics more effectively.				
19	I am more engaged in mathematics lessons when my teacher incorporates diverse teaching techniques.				
20	My performance in mathematics improves when my teacher adapts their teaching approach to suit different learning styles.				
21	I feel that pedagogic diversity in my mathematics classes helps address my individual learning needs.				

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