Textbook Accessibility and Retention in Mathematics and Economics: Insights from Cameroon

Beyoh Dieudone Nkepah ᵃ* and Nubonyin Hilda Fokong ᵇ

ᵃ Department of Teacher Education, Faculty of Education, The University of Bamenda (UBa), Cameroon.
ᵇ Department of Curriculum and Pedagogy, Faculty of Education, The University of Bamenda (UBa), Cameroon.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aims: This study evaluates the impact of the Single Textbook Policy on high school students' retention in Mathematics and Economics in Cameroon. The policy, implemented to standardize educational resources, has raised concerns about its effectiveness in enhancing students' retention of key concepts. It seeks to compare retention scores among students using no textbooks, one official textbook, or multiple textbooks, with a focus on subject-specific and gender-based differences.
Study Design: The research employed a causal-comparative design to examine the retention of mathematical and economic concepts among students under varying textbook accessibility conditions.

_____

Corresponding author: E-mail: beyohdieudone@gmail.com;

Place and Duration of Study: The study was conducted in Cameroon, focusing on students who had completed their Advanced Level examinations and were registering for university. The duration spanned the period during the registration into the university of Bamenda for the 2024/2025 academic year.

Methodology: Data were collected from 300 high school students using a structured assessment of their retention of mathematical and economic concepts. Students were grouped based on their textbook usage: no textbooks, one official textbook, or multiple textbooks. Gender differences in retention were also analyzed. Means and standard deviations were used to answer the research questions while independent samples t-test and ANOVA were used to test the hypotheses at the 5% level of level significance.

Results: The analysis revealed significant differences in retention scores based on the number of textbooks used. Students who used multiple textbooks demonstrated higher retention scores compared to those using a single official textbook or no textbooks. Gender differences did not significantly impact retention in either Mathematics or Economics.

Conclusion: The study suggests that increasing access to multiple textbooks enhances students' retention of mathematical and economic concepts. These findings question the efficacy of the Single Textbook Policy and recommend that educational strategies in Cameroon's secondary schools incorporate diversified learning resources to improve academic outcomes.

1. INTRODUCTION

In educational systems worldwide, the choice and use of textbooks play a crucial role in shaping students' learning experiences and outcomes. In Cameroon, the implementation of a Single Textbook Policy (STP) aims to standardize educational materials across schools, with the intention of enhancing the quality and consistency of instruction. This policy, which mandates the use of a single approved textbook for each subject, including Mathematics and Economics, is designed to ensure uniformity in educational content and resources.

Despite its intended benefits, the impact of the Single Textbook Policy on student retention and performance remains a topic of debate. Proponents argue that standardizing textbooks can lead to improved educational equity, as all students have access to the same high-quality resources. However, critics suggest that this approach may limit exposure to diverse perspectives and instructional methods, potentially affecting students' engagement and retention.

This research seeks to evaluate the impact of the Single Textbook Policy on students' retention in Mathematics and Economics at the high school level in Cameroon. By examining how the policy influences students' ability to retain and apply mathematical and economic concepts, this study aims to provide insights into the effectiveness of the STP. It will explore whether the policy supports or hinders students' learning and retention in these critical subjects, which are foundational for their future academic and professional endeavours.

Mathematics and economics both emphasize the importance of data interpretation. Mathematics equips students with the tools for statistical analysis, while economics applies these tools to understand market trends and consumer behavior (Bhuiyan et al., 2024; Hossain et al., 2024). Many economic concepts involve graphical representations, such as supply and demand curves, which require a solid grasp of functions and graphing techniques. Thus, both fields foster logical reasoning and critical thinking, helping students analyze problems, identify variables, and develop solutions based on quantitative evidence. Economics frequently employs mathematical models to describe real-world phenomena, such as resource optimization and market predictions.

Key mathematical concepts, particularly from statistics and probability, are essential for making forecasts and assessing risks in areas like financial markets and business decision-making. Additionally, economics utilizes equations and functions, including cost functions and utility maximization, which rely heavily on algebraic principles. Many economic issues necessitate an interdisciplinary approach, integrating mathematical skills with economic theory to tackle complex societal problems (Faraji et al., 2024; Rahman et al., 2024). Consequently, high school mathematics provides the foundational

skills essential for analyzing and understanding economic concepts, highlighting the deep interconnection and complementarity between the two subjects. Thus, both subjects have the potentials of building the analytical thinking capacities of high school students (Beyoh, 2024).

1.1 Conceptual Background

The Single Textbook Policy: The Single Textbook Policy (STP) is an educational reform designed to standardize instructional materials across schools to ensure uniformity and equity in education. By mandating that all schools use the same approved textbook for each subject, the policy aims to address disparities in educational resources and provide a consistent foundation for learning (World Bank, 2005). In the context of Cameroon, the STP seeks to reduce the cost of educational materials, enhance the quality of education and improve student outcomes by providing a standardized curriculum in critical subjects like Mathematics and Economics.

The Role of Textbooks in Education: Textbooks are central to the educational process, serving as primary resources for content delivery, instructional guidance, and assessment. They provide structured information and exercises that support both teaching and learning (Apple, 2000). In Mathematics and Economics, textbooks are particularly significant because they offer foundational knowledge, problem-solving techniques, and theoretical insights essential for students' understanding of these subjects (Grouws & Cebulla, 2000; Shulman, 1986). The effectiveness of a textbook can significantly influence students' retention of concepts and their ability to apply knowledge in practical contexts.

Concept of Student Retention: Student retention refers to the ability of learners to remember and apply learned information over time. It encompasses not only the memorization of facts but also the deeper understanding and application of concepts in various contexts (Baddeley, 2000). In Mathematics and Economics, retention is crucial for students to build upon previously learned material and perform well in assessments. Effective retention is often associated with the quality of instructional materials teaching strategies, and student engagement (Fokong, 2024; Brusilovsky & Millán, 2007).

This conceptual background sets the stage for evaluating the STP's impact on students' retention in Mathematics and Economics. By examining the interplay between standardized textbooks and student learning outcomes, this study aims to provide insights into the policy's effectiveness and its implications for educational practice in Cameroon.

1.2 Theoretical Review

Curriculum Theory: Curriculum Theory examines how curriculum design, content, and delivery impact teaching and learning. It explores the relationships between educational goals, instructional materials, and student outcomes (Tyler, 1949). This theory is fundamental in understanding how standardized textbooks under the Single Textbook Policy (STP) influence educational practices and student learning. Curriculum Theory emphasizes the importance of aligning educational content with pedagogical objectives. It considers how well-designed curricula support effective teaching and learning (Tyler, 1949). For the STP, this involves analyzing whether the standardized textbooks align with national educational standards and support the instructional goals for Mathematics and Economics. Effective curricula are designed with clear educational objectives that guide instructional practices and assessment methods (Pinar, 2012). Evaluating the STP involves examining if the standardized textbooks facilitate the achievement of specific learning objectives in Mathematics and Economics. Curriculum Theory also assesses the role of instructional materials in enhancing educational outcomes. Standardized textbooks should provide comprehensive and coherent content that supports students' understanding and application of mathematical and economic concepts (Kelly, 2009). By applying Curriculum Theory, this study can assess how well the STP's standardized textbooks align with educational objectives and support effective teaching practices. It helps evaluate whether the textbooks contribute to or hinder students' retention of key concepts in Mathematics and Economics.

Constructivist Learning Theory: Constructivist Learning Theory, developed by Jean Piaget and Lev Vygotsky, posits that learning is an active process where students construct knowledge through interaction with their environment and integration of new information into existing cognitive frameworks (Piaget, 1976; Vygotsky, 1978). Constructivism emphasizes that students learn best through active engagement and problem-solving rather than passive reception of

information (Piaget, 1976). The impact of the STP can be evaluated by examining whether standardized textbooks promote interactive and engaging learning experiences. Vygotsky introduced the concept of scaffolding, where learners receive support to achieve higher levels of understanding (Vygotsky, 1978). The STP's textbooks should ideally support scaffolding by providing adequate explanations, examples, and opportunities for collaboration. Constructivist theory focuses on cognitive development and the gradual construction of knowledge (Piaget, 1976). Evaluating the STP involves analyzing whether standardized textbooks support students' cognitive development by presenting information in a way that aligns with their developmental stages and promotes deeper understanding. Constructivist Learning Theory helps evaluate whether the STP's textbooks facilitate meaningful learning experiences and cognitive development. It provides insights into how well the textbooks support active learning and cognitive growth in Mathematics and Economics.

Educational Equity Theory: Educational Equity Theory focuses on providing equal access to educational resources and opportunities, aiming to reduce disparities and ensure that all students receive a fair and high-quality education (Rawls, 1971). This theory is crucial for assessing whether the STP effectively promotes fairness in educational resources. Educational Equity Theory emphasizes that all students should have access to the same high-quality educational materials (Rawls, 1971). The STP is designed to standardize textbooks, thereby theoretically ensuring that all students receive uniform resources in Mathematics and Economics. The theory also addresses the need to address disparities in educational resources and opportunities. Evaluating the STP involves assessing whether the policy effectively reduces inequalities in textbook quality and availability across different schools and regions (Flint, 2015). Equity Theory considers how equitable access to resources impacts student learning outcomes. The study will analyze whether the STP improves retention and performance by providing all students with the same high-quality textbooks (Flint, 2015). Educational Equity Theory provides a framework for assessing whether the STP achieves its goal of equitable resource distribution and whether it improves learning outcomes for all students. It helps evaluate whether standardized textbooks contribute to reducing educational disparities and

enhancing student retention in Mathematics and Economics.

This theoretical background provides a comprehensive foundation for evaluating the impact of the Single Textbook Policy on students' retention in Mathematics and Economics. It integrates concepts from Curriculum Theory, Constructivist Learning Theory, and Educational Equity Theory to assess the effectiveness of the STP in enhancing students' retention in high school mathematics and Economics.

1.3 Statement of the Problem

In Cameroon, the implementation of a Single Textbook Policy in secondary schools aims to standardize educational resources and improve learning outcomes. However, there is limited empirical evidence regarding the effectiveness of this policy on students' retention of key concepts in core subjects. This study seeks to evaluate the impact of the Single Textbook Policy specifically on students' retention in Mathematics and Economics. The primary problem is to determine whether the policy enhances or impairs students' ability to retain and apply mathematical and economic concepts over time. Understanding this impact is crucial for assessing the policy's effectiveness and making informed decisions about future educational strategies.

1.4 Objectives of the Study

- To compare the mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in mathematics?
- To compare the mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in economics?
- To compare the mean retention scores of male and female high school students who use only the single official textbook in mathematics?
- To compare the mean retention scores of male and female high school students who use only the single official textbook in economics?

1.5 Research Questions

- What are the mean retention scores of high school students who use no textbook,

the one official textbook and more than one textbook in mathematics?

- What are the mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in economics?
- What are the mean retention scores of male and female high school students who use only the single official textbook in mathematics?
- What are the mean retention scores of male and female high school students who use only the single official textbook in economics?

1.6 Hypotheses

Ho$_1$: High school students who do not use a textbook, those who use the single official textbook and those who use more than one textbook in mathematics do not differ significantly in their abilities to retain mathematical concepts.

Ha$_1$: The mean retention score of high school students who do not use a textbook, that of those who use the one official textbook and that of those who use more than one textbook in mathematics differ significantly.

Ho$_2$: High school students who do not use a textbook, those who use the single official textbook and those who use more than one textbook in economics do not differ significantly in their abilities to retain economics concepts.

Ha$_2$: The mean retention score of high school students who do not use a textbook, that of those who use the one official textbook and that of those who use more than one textbook in economics differ significantly.

Ho$_3$: There is a significant difference between the mean retention scores of male and female high school students who use only the single official textbook in mathematics.

Ha$_3$: The mean retention scores of male and female high school students who use only the single official textbook in mathematics differ significantly.

Ho$_4$: There is a significant difference between the mean retention scores of male and female high school students who use only the single official textbook in economics.

Ha$_4$: The mean retention scores of male and female high school students who use only the single official textbook in economics differ significantly.

2. METHODOLOGY

his study adopted the causal comparative research design with a cross-sectional approach.

This design is appropriate because it allows for comparisons across groups that has naturally existed (students who had used different numbers of textbooks) and provides insights into the relationship between the Single Textbook Policy and students' retention in Mathematics and Economics. Furhermore, students registering into the University of Bamenda represent a cross section of students from all the ten regions of Cameroon. Thus, the study targeted students who had obtain the GCE Advanced Level and who had studied either mathematics or economics (or both) at the Advanced Level, and were in the process of registering into the University of Bamenda for the 2024/2025 academic year. 300 students who had studied mathematics and economics in the high school constituted the sample for the study. This sample was obtained using the systematic sampling technique. 150 of these students had the science background, while 150 were from the arts background.

Two self-designed questionnaires with 15 items each were used to collect data for the study. The items measured students' ability to recall, understand, and apply key concepts. The questionnaires were vetted by subject and psychological experts and their Cronbach alpha reliability coefficients were established to be 0.85 and 0.82 for the Mathematics and Economics questionnaires respectively. 50 questionnaires were administered at the beginning of the registration process in UBa, 50 around midway and 50 towards the end for each subject. Some registration points around the university served as the meeting point for the researchers and their respondents. The data collected were analysed using means to answer the research questions; t-test and ANOVA to test the hypotheses at the 0.05 level of significance. The null hypothesis is rejected when the p-value of the test is less than or equal to 0.05, otherwise, it is retained.

Participants received detailed information about the study's purpose, procedures, and confidentiality. Data was further anonymized to protect their identities. Participation was entirely voluntary, with the option to withdraw at any time.

3. RESULTS

Research Question 1: What are the mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in mathematics?

The findings in Table 1 indicate that high school students who use more textbooks in mathematics tend to have higher mean retention scores. Students with no textbooks have the lowest mean score (28.88), followed by those using one official textbook (30.70), and those using two or more textbooks achieving the highest mean score (32.84). The standard deviations suggest relatively consistent performance within groups, though the smallest deviation is among students without textbooks, possibly reflecting uniformly lower scores. The confidence intervals show no overlap between groups, particularly between students using no textbooks and those using two or more textbooks, suggesting statistically significant differences in retention scores across these groups. This implies that increased access to multiple textbooks may enhance mathematical retention in high school students.

Ho₁: High school students who do not use a textbook, those who use the single official textbook and those who use more than one textbook in mathematics do not differ significantly in their abilities to retain mathematical concepts.
Ha₁: The mean retention score of high school students who do not use a textbook, that of those who use the one official textbook and that of those who use more than one textbook in mathematics differ significantly.

The ANOVA results in Table 2 indicate a significant difference in the mean retention scores of high school students based on their textbook usage. The F-value of 47.183 and a p-value of .000 (p < 0.05) show that the null

hypothesis (Ho₁) is rejected, supporting the alternative hypothesis (Ha₁). This means that students who do not use a textbook, those who use one official textbook, and those who use more than one textbook differ significantly in their ability to retain mathematical concepts. The significant variation suggests that the number of textbooks available influences students' retention abilities, with further analysis needed to pinpoint which specific groups differ from each other (See Scheffe's test on Table 3).

The results of Scheffé's multiple comparisons reveal significant differences in the mean outcomes based on the number of mathematics textbooks used, with all pairwise comparisons showing statistically significant differences at the 0.05 level. Students with no textbooks had significantly lower mean scores compared to those with one official textbook (mean difference = -1.822, p = .000) and those with two or more textbooks (mean difference = -3.964, p = .000). Similarly, students with one textbook had lower mean scores compared to those with two or more textbooks (mean difference = -2.142, p = .000). The confidence intervals for all comparisons do not cross zero, reinforcing the reliability of these differences. These findings suggest a strong positive relationship between the number of mathematics textbooks and student performance.

Research Question 2: What are the mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in economics?

Table 1. Mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in mathematics

Number of Textbooks	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
No Textbook	41	28.88	.954	.149	28.58	29.18
One Official Textbook	90	30.70	1.725	.182	30.34	31.06
Two Textbooks or more	19	32.84	1.385	.318	32.17	33.51
Total	150	30.47	1.924	.157	30.16	30.78

Table 2. ANOVA Results to test Hypothesis 1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	215.577	2	107.788	47.183	.000
Within Groups	335.817	147	2.284		
Total	551.393	149			

Table 3. Scheffe's Multiple Comparisons

(I) Number of Mathematics Textbooks	(J) Number of Mathematics Textbooks	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No Textbook	One Official Textbook	-1.822*	.285	.000	-2.53	-1.12
	Two Textbooks or more	-3.964*	.419	.000	-5.00	-2.93
One Official Textbook	No Textbook	1.822*	.285	.000	1.12	2.53
	Two Textbooks or more	-2.142*	.382	.000	-3.09	-1.20
Two Textbooks or more	No Textbook	3.964*	.419	.000	2.93	5.00
	One Official Textbook	2.142*	.382	.000	1.20	3.09

. The mean difference is significant at the 0.05 level.

Table 4. Mean retention scores of high school students who use no textbook, the one official textbook and more than one textbook in economics

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
No Textbook	38	27.68	1.416	.230	27.22	28.15
One Official Textbook	85	30.20	2.963	.321	29.56	30.84
Two Textbooks or more	27	32.96	1.454	.280	32.39	33.54
Total	150	30.06	2.966	.242	29.58	30.54

The findings from Table 4 reveal the mean retention scores of high school students in economics, categorized by the number of textbooks used. Students who used no textbook had the lowest mean retention score (27.68), followed by those who used one official textbook (mean score of 30.20). Students who used two or more textbooks had the highest mean retention score (32.96). The standard deviations for these groups indicate that the scores for the "Two Textbooks or more" group are more consistent, with a smaller variation (1.454), compared to the "One Official Textbook" group, which had a higher standard deviation (2.963). The 95% confidence intervals for the mean scores suggest that the differences between the groups are statistically significant, with the mean scores for students using multiple textbooks clearly higher than those using one or no textbooks.

Ho₂: *High school students who do not use a textbook, those who use the single official textbook and those who use more than one textbook in economics do not differ significantly in their abilities to retain economics concepts.*
Ha₂: *The mean retention score of high school students who do not use a textbook, that of those who use the one official textbook and that of those who use more than one textbook in economics differ significantly.*

Table 5.ANOVA Results to test Hypothesis 2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	443.687	2	221.843	37.623	.000
Within Groups	866.773	147	5.896		
Total	1310.460	149			

The results from Table 5 indicate a statistically significant difference in the mean retention scores of high school students based on the number of textbooks they use in economics, as tested by ANOVA. The F value of 37.623 is much higher than the critical value, and the Sig. value of 0.000 is well below the 0.05 threshold, indicating strong evidence to reject the null hypothesis (Ho$_2$) and accept the alternative hypothesis (Ha$_2$). This suggests that students who use no textbook, one official textbook, and more than one textbook differ significantly in their abilities to retain economics concepts. The significant Between Groups sum of squares (443.687) further confirms that the differences between these groups' mean retention scores are not due to random variation (See Scheffe's comparisons on Table 6).

The results from Scheffé's multiple comparisons indicate that there are significant differences in the mean retention scores between the groups of students who use different numbers of textbooks in economics. Students with no textbook scored significantly lower than those with one official textbook (mean difference = -2.516, p = .000) and those with two or more textbooks (mean difference = -5.279, p = .000). Furthermore, students who used one official textbook had significantly lower scores compared to those using two or more textbooks (mean difference = -2.763, p = .000). All differences are statistically significant at the 0.05 level, with 95% confidence intervals for the mean differences indicating that the observed effects are reliable and not due to random variation. These findings suggest that

the number of textbooks used by students has a meaningful impact on their ability to retain economics concepts, with multiple textbooks associated with the highest retention scores.

Research Question 3: What are the mean retention scores of male and female high school students who use only the single official textbook in mathematics?

The findings from Table 7 show that both male and female high school students who use only the single official textbook in mathematics have similar mean retention scores. The mean retention score for male students is 30.53, with a standard deviation of 1.709, while the mean retention score for female students is slightly higher at 30.97, with a standard deviation of 1.740. The standard errors of the mean for males and females are 0.230 and 0.294, respectively, indicating that the precision of the mean retention scores is slightly higher for males. Although the mean scores differ marginally, the close proximity of these scores suggests that gender does not appear to have a significant impact on retention for students using the single official textbook in mathematics.

Ho$_3$: There is a significant difference between the mean retention scores of male and female high school students who use only the single official textbook in mathematics.
Ha$_3$: The mean retention scores of male and female high school students who use only the single official textbook in mathematics differ significantly.

Table 6. Scheffe's Multiple Comparisons

(I) Number of Economics Textbooks	(J) Number of Economics Textbooks	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No Textbook	One Official Textbook	-2.516*	.474	.000	-3.69	-1.34
	Two Textbooks or more	-5.279*	.611	.000	-6.79	-3.77
One Official Textbook	No Textbook	2.516*	.474	.000	1.34	3.69
	Two Textbooks or more	-2.763*	.536	.000	-4.09	-1.44
Two Textbooks or more	No Textbook	5.279*	.611	.000	3.77	6.79
	One Official Textbook	2.763*	.536	.000	1.44	4.09

. The mean difference is significant at the 0.05 level

Table 7. Mean retention scores of male and female high school students who use only the single official textbook in mathematics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
Retention in Mathematics	Males	55	30.53	1.709	.230
	Females	35	30.97	1.740	.294

Table 8. Independent Samples t-test for Hypothesis 3

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Retention in Mathematics for STP	Equal variances assumed	.057	.812	-1.193	88	.236	-.444	.372	-1.184	.295
	Equal variances not assumed			-1.189	71.564	.239	-.444	.374	-1.189	.301

Table 9. Mean retention scores of male and female high school students who use only the single official textbook in economics

Group Statistics					
	Sex	N	Mean	Std. Deviation	Std. Error Mean
Retention in Economics	Males	34	29.71	2.908	.499
	Females	51	30.53	2.982	.418

Table 10. Independent Samples t-test for Hypothesis 4

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Retention in Economics for STP	Equal variances assumed	.122	.727	-1.260	83	.211	-.824	.654	-2.124	.477
	Equal variances not assumed			-1.266	72.105	.210	-.824	.650	-2.120	.473

The results from the independent samples t-test in Table 8 show that there is no significant difference between the mean retention scores of male and female high school students who use only the single official textbook in mathematics. Levene's test for equality of variances indicates that the assumption of equal variances is met (F = 0.057, *p* = 0.812). The t-test for equality of means reveals a t-value of -1.193 with 88 degrees of freedom and a *p*-value of 0.236, which is greater than the 0.05 significance level, suggesting that the difference in mean retention scores between males (mean = 30.53) and females (mean = 30.97) is not statistically significant. Thus, we fail to reject the null hypothesis (Ho3), indicating that gender does not significantly affect retention scores for students using the single official textbook in mathematics.

Research Question 4: What are the mean retention scores of male and female high school students who use only the single official textbook in economics?

The findings from Table 9 show that female high school students who use only the single official textbook in economics have a slightly higher mean retention score (30.53) compared to male students, whose mean score is 29.71. The standard deviations for the male and female groups are 2.908 and 2.982, respectively, suggesting that the variation in retention scores is similar between genders. The standard errors of the mean are 0.499 for males and 0.418 for females, indicating that the mean retention score for females is slightly more precise. While the mean scores for male and female students differ by 0.82 points, this difference is relatively small, and further statistical analysis would be required to determine if this difference is statistically significant.

Ho4: *There is a significant difference between the mean retention scores of male and female high school students who use only the single official textbook in economics.*
Ha4: *The mean retention scores of male and female high school students who use only the single official textbook in economics differ significantly.*

The results from the independent samples t-test in Table 10 indicate that there is no significant difference between the mean retention scores of male and female high school students who use only the single official textbook in economics. Levene's test for equality of variances shows that

the assumption of equal variances is met (F = 0.122, p = 0.727). The t-test for equality of means reports a t-value of -1.260 with 83 degrees of freedom and a p-value of 0.211, which is greater than the 0.05 significance level. This suggests that the difference in mean retention scores between male (mean = 29.71) and female (mean = 30.53) students is not statistically significant. Therefore, we fail to reject the null hypothesis (Ho4), meaning that gender does not significantly affect the retention of economics concepts among students using only the single official textbook.

4. DISCUSSION

4.1 Textbook Usage and Retention of Concepts

In mathematics, students using no textbooks had the lowest mean retention scores (28.88), while those using two or more textbooks had the highest (32.84). ANOVA results confirmed significant differences in retention scores among the groups (F=47.183, p<0.05), with pairwise comparisons (Scheffé's test) showing that all group differences were statistically significant. These results suggest that increased access to resources, such as multiple textbooks, enhances students' ability to retain mathematical concepts, corroborating research by Hattie (2009), which identified access to varied learning materials as a critical factor in academic achievement.

Similarly, in economics, retention scores followed a similar pattern, with students using two or more textbooks scoring highest (mean = 32.96) and those using no textbooks scoring lowest (mean = 27.68). ANOVA findings (F=37.623, p<0.05) and Scheffé's comparisons confirmed that these differences were significant. This supports prior studies, such as those by Schleicher (2019), which emphasize the role of instructional resources in enhancing academic performance.

4.2 Gender Differences in Retention Scores

The analysis of gender differences in retention scores revealed no significant differences for students using a single official textbook in either mathematics or economics. In mathematics, the t-test results (t=−1.193, p=0.236) indicated no significant difference between male (mean = 30.53) and female (mean = 30.97) retention scores. This aligns with research by Hyde

(2005), which posits that gender differences in mathematics performance are negligible in most contexts. Similarly, the t-test for economics (t=−1.260, p=0.211) showed no significant gender differences, with mean scores for males (29.71) and females (30.53) being comparable. These findings align with earlier work by Buchmann and DiPrete (2006), which found that gender gaps in academic performance are context-dependent and tend to be less pronounced in subject areas where resources and teaching quality are consistent (Hiebert and Grouws, 2007; Hodgson and Spours, 2006).

5. CONCLUSION

This study evaluated the impact of the Single Textbook Policy on students' retention of Mathematics and Economics concepts in high school in Cameroon. The findings reveal that students who had access to more than one textbook demonstrated significantly better retention scores than those with just the official textbook or no textbooks at all. This trend was consistent for both Mathematics and Economics, indicating that the availability of multiple textbooks supports higher retention. Additionally, no significant gender differences were found in the retention scores, suggesting that the policy's impact on retention does not vary between male and female students.

5.1 Implications of the Study

- The study shows that the Single Textbook Policy may limit students' ability to retain key concepts, as those with access to more than one textbook demonstrated higher retention. This suggests that while standardization is beneficial in some contexts, it may not be sufficient in fostering deep learning in subjects such as Mathematics and Economics. Therefore, policymakers may need to reconsider the exclusivity of the Single Textbook Policy.
- The findings suggest that access to more learning resources, such as multiple textbooks, can enhance retention and comprehension, thereby improving educational outcomes. Ensuring equitable access to these resources could help address disparities in retention among students from diverse backgrounds, particularly in subjects that require complex understanding, such as Mathematics and Economics.

- The absence of significant gender differences in retention scores implies that the Single Textbook Policy affects male and female students similarly in terms of their ability to retain subject matter. This is an important consideration for promoting gender equity in education, as it shows that the policy does not disproportionately benefit or disadvantage one gender over the other.

5.2 Recommendations

- ***Diversifying Educational Resources***: To enhance retention and comprehension, it is recommended that the government and educational authorities consider revising the Single Textbook Policy to allow for the use of multiple textbooks. This could provide students with diverse perspectives and reinforce their learning in key subjects.
- ***Encouraging Supplementary Learning Materials***: Schools should encourage students to access supplementary materials, such as online resources, study guides, and additional textbooks, which could complement the official textbooks and enhance understanding.
- ***Policy Adjustments***: Policymakers should consider providing schools with the flexibility to choose textbooks that best meet the needs of their students, particularly in core subjects like Mathematics and Economics, where conceptual understanding is critical. Additionally, incorporating teacher feedback into textbook selection could further improve learning outcomes.
- ***Further Research***: Given the limitations of this study, further research could explore the impact of other factors, such as teacher quality, teaching methods, and student engagement, on retention. Additionally, a longitudinal study could provide more insight into how retention develops over time with different types of resources.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The Authors hereby declare 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.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Apple, M. W. (2000). *Official Knowledge: Democratic Education in a Conservative Age.* Routledge.

Baddeley, A. D. (2000). The Episodic Buffer: A New Component of Working Memory?. *Trends in Cognitive Sciences, 4*(11), 417-423.

Baker, D. P., & LeTendre, G. K. (2005). *National Differences, Global Similarities: World Culture and the Future of Schooling.* Stanford University Press.

Beyoh, D. N. (2024). Analytical thinking and mathematics performance: Insights from Mezam Division, Cameroon. *Asian Research Journal of Arts & Social Sciences 22* (9), 9-19. https://doi.org/10.9734/arjass/2024/v22i9569.

Bhuiyan, M. R. I., Hossain, R., Rashid, M., Islam, M. M., Mani, L., & Milon, M. N. U. (2024). Gravitating the components, technologies, challenges, and government transforming strategies for a Smart Bangladesh: A PRISMA-based review. Journal of Governance and Regulation, 13(3), 177–188. https://doi.org/10.22495/jgrv13i3art15

Brusilovsky, P., & Millán, E. (2007). User Models for Adaptive Hypermedia and Adaptive Educational Systems. In *The Adaptive Web* (pp. 3-53). Springer.

Buchmann, C., & DiPrete, T. A. (2006). Gender inequalities in education. *Annual Review of Sociology, 32*(1), 217–242. https://doi.org/10.1146/annurev.soc.32.061604.123105

Faraji, M. R., Shikder, F., Hasan, Md. H., Islam, Md. M., & Akter, U. K. (2024). Examining the Role of Artificial Intelligence in Cyber Security (CS): A Systematic Review for Preventing Prospective Solutions in Financial Transactions. *International Journal of Religion, 5*(10), 4766–4782. https://doi.org/10.61707/7rfyma13

Flint, K. (2015). *Educational Equity: A Historical and Theoretical Overview.* Palgrave Macmillan.

Fokong, N. H. (2024). Innovations in GCE Ordinary Level Economics Syllabus as a Determinant of Students' Academic Performance: An Empirical Survey of Secondary School Economics Teachers in Cameroon, *ISRG Journal of Education, Humanities and Literature, I*(IV), 1-8.

Grouws, D. A., & Cebulla, K. J. (2000). *Improving Student Achievement in Mathematics.* National Council of Teachers of Mathematics.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement.* Routledge.

Hiebert, J., & Grouws, D. A. (2007). The Effects of Classroom Mathematics Teaching on Students' Learning. In *Handbook of Research on Mathematics Teaching and Learning* (pp. 371-404). Information Age Publishing.

Hodgson, A., & Spours, K. (2006). *The Role of Curriculum in Educational Reform: Standardization, Innovation, and Change.* Routledge.

Hossain, R., Al- Amin, A.-A., Mani, L., Islam, M. M., Poli, T. A., & Milon, M. N. U. (2024). Exploring the Effectiveness of Social Media on Tourism Destination Marketing: An Empirical Study in a Developing Country. *Wseas Transactions On Business And Economics*, 21, 1392–1408. https://doi.org/10.37394/23207.2024.21.114

Hyde, J. S. (2005). The gender similarities hypothesis. *American Psychologist, 60*(6), 581–592. https://doi.org/10.1037/0003-066X.60.6.581

Kelly, A. V. (2009). *The Curriculum: Theory and Practice.* Sage Publications.

Piaget, J. (1976). *The Child's Concept of Number.* W.W. Norton & Company.

Pinar, W. F. (2012). *What Is Curriculum Theory?* Routledge.

Rahman, Md. M., Islam, Md. M., Khatun, M., Uddin, S., Faraji, M. R., & Hasan, Md. H. (2024). Gravitating towards Information Society for Information Security in Information Systems: A Systematic PRISMA Based Review. *Pakistan Journal of Life and Social Sciences (PJLSS), 22*(1). https://doi.org/10.57239/PJLSS-2024-22.1.0089

Rawls, J. (1971). *A Theory of Justice.* Harvard University Press.

Schleicher, A. (2019). *PISA 2018 insights and interpretations.* OECD Publishing.

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14.

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14.

Tyler, R. W. (1949). *Basic Principles of Curriculum and Instruction.* University of Chicago Press.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* Harvard University Press.

World Bank. (2005). *Textbooks and School Library Provision in Developing Countries.* World Bank Education Sector.

APPENDIX

Questionnaire for Measuring Retention in Mathematics and Economics

Dear Student,
We kindly request your participation in completing this questionnaire for our research study titled *"Evaluating the Impact of a Single Textbook Policy on Students' Retention in Mathematics and Economics at High School in Cameroon."* Please respond to the items as honestly as possible. Rest assured, your responses will be kept confidential and used solely for research purposes. There is no need to provide your name.

Section 1: Demographic Information
Please 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. Name of School: _____
d. How many text books did you use in mathematics at the high school?
     None   ( )   The one Official Textbook   ( )   More than one Textbook   ( )
e. How many text books did you use in economics at the high school?
     None   ( )   The one Official Textbook   ( )   More than one Textbook   ( )
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 four, where SD = Strongly Disagree, D = Disagree, A = Agree and SA = Strongly Agree.

Section 2. Mathematics Retention

S/N	Statements	SA	A	D	SD
1	I feel confident in my ability to solve mathematical problems covered in the textbook(s).				
2	I can apply mathematical concepts learned in class to real-life situations.				
3	The textbook(s) has/have helped me understand mathematical concepts better than previous resources.				
4	I often review mathematical concepts from the textbook(s) outside of class.				
5	Due to the use of my textbook(s), I find myself recalling and using mathematical concepts from previous lessons regularly.				
6	The examples in the textbook(s) clarify difficult mathematical topics for me.				
7	I enjoy working on mathematics assignments from the textbook(s).				
8	I always feel prepared for mathematics exams because of the textbook(s).				
9	The textbook(s) encourages me to explore additional resources for deeper understanding.				
10	I actively participate in mathematics discussions in class because of the confidence gained from the textbook(s).				

Section 3. Economics Retention

S/N	Statements	SA	A	D	SD
11	I feel confident in my ability to explain economic principles covered in the textbook(s).				
12	I can relate economic theories to current events or personal experiences.				
13	The textbook(s) has/have improved my understanding of economics compared to previous materials.				

14	Due to the use of my textbook(s), I frequently discuss economic concepts learned in class with friends or family.
15	I find myself applying economic concepts from previous lessons in real-world scenarios.
16	The examples and case studies in the textbook(s) enhance my understanding of economics.
17	I enjoy learning about economics as presented in the textbook(s).
18	I always feel prepared for economics exams because of the textbook(s).
19	The textbook(s) motivates me to read more about economics outside of class.
20	I can critically analyze economic issues because of what I've learned from the textbook(s).

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/129559