Ed Process Int J

www.edupij.com

ISSN 2147-0901 (Print), 2564-8020 (Online)

EDUCATIONAL PROCESS
INTERNATIONAL JOURNAL

An Analysis of School-Based Management on Learning Achievement in Senegal Primary Education

Yudai Ishii, Keiichi Ogawa

Research Article

Cite this article: Ishii, Y., & Ogawa, K. (2024). An Analysis of School-Based Management on Learning Achievement in Senegal Primary Education. *Educational Process: International Journal, 13*(2): 72-89. https://doi.org/10.22521/edupij.2024.132.5

Received August 04, 2023
Accepted May 03, 2024
Published Online June 11, 2024

Keywords:
School-based management, learning achievement, primary education, gender equality, Senegal

Author for correspondence:
Yudai Ishii
yuudai9120@gmail.com
Graduate School of International Cooperation Studies, Kobe University, Japan

Abstract

Background/purpose. School-based management (SBM) has gained international attention for the promotion of student learning and educational development. Senegal is one of the initiatives of French-speaking African countries that adopted the move towards promoting SBM at the school level, but lacks substantial evidence of its effectiveness in enhancing educational quality. In addition, there has yet to be a clear consensus on the heterogeneity of SBM on learning achievement. This study aimed to examine the influences of SBM characteristics on learning achievement and investigate the relationship between them and students' gender status in Senegal primary education.

Materials/methods. The study adapted the framework on what matters most in marginalized autonomy and school accountability for better education results. It linked autonomy and accountability, requiring parents and the community to participate in and trust the school. The study applied a multilevel regression model using the cross-sectional dataset of Program d'Analyse des Systemes Educatifs de la Confemen (PASEC) 2019 learning achievements survey.

Results. The study revealed that parental and community participation has a positive and statistically significant association with reading scores regardless of student gender. On the other hand, a positive correlation was found regarding information sharing with parents, and a negative correlation concerning school autonomy, but with no significant relationship to reading scores.

Conclusion. Participation from parents and the community can improve student learning and mitigate learning gaps in gender status. The findings of this study are expected to provide insight into narrowing the gap in student learning, especially for neighboring countries facing similar issues to Senegal

1. Introduction

Education quality is still a critical issue in many developing countries. Whilst the majority of children around the world are able to attend school, a large proportion of them are not learning adequately (UNESCO, 2013). World Bank (2019) also reported that 53% of children in developing countries cannot read or understand a simple story upon completion of their primary schooling. It is essential, therefore, to support preschool children by creating an environment at the primary level where they can continue learning in order to move successfully forward to secondary and higher education. In order to reach this goal, it is necessary to comprehensively improve the content of learning and educational services regardless of society, educational setting, or region. Many governments in developing countries make attempts to overcome these challenges and offer high-quality education for children; however, policy implementations have indicated gaps due to a context of scarce resources, a lack of learning material, and qualified human resources for education. Under these conditions, it is essential to create a flexible curriculum and a school management system that enables everyone to experience the joy of learning and develop their abilities.

School-based management (SBM) is a popular domain of decentralized education policy that governments and their development partners use to address improvements in school participation and student learning. Central governments are, in general, expected to encourage schools to reflect local voices and priorities and to bring about better education outcomes. There are three characteristics to the theory of SBM: managerial autonomy, learning assessment, and accountability to parents and other stakeholders (Yuki et al., 2016). Through combining these elements, it is aimed to produce better school performance and improve student learning.

France reflects the centralized education system in French-speaking West African countries, but decision-making power is increasingly decentralized to the school level (Garnier & Schafer, 2006). Senegal is categorized as a state in which the function of budget disbursement is transferred to the school level, and is a pioneering case in analyzing the partial delegation of authority in West Africa. According to an international comparative report, *the Program d'Analyse Sectoriel de Confemen* (PASEC), in 2019, the degree of learning achievement in Senegal was shown to have improved, and 74.7% of grade 6 children had reached sufficient competency in reading. This represented a significant gain from results in 2014 when the level was only 38.9%. This finding surpasses the average performance of the 14 countries participating in PASEC. Nevertheless, the exact reasons behind this tremendous shift have not been well understood or recorded.

Previous studies have well-documented the potential factors that can affect the quality of education. It has been revealed that children's family backgrounds seem to be the most significant determinant (Sikora et al., 2019). Burhanuddin (2018) concluded that providing suitable learning materials and highly-skilled teachers improves learning achievements. Other factors such as school environment, including society, community, and education policies, are also important. The theory of SBM in education has also been emphasized in developing countries, which indicates that SBM also contributes to education quality, but its influence is not automatically positive (Beasley & Huillery, 2017; Hanushek et al., 2013; Shimada, 2018). The empirical literature has emphasized that SBM should be analyzed more in line with each component and whether or not these are separately associated with education quality.

Furthermore, previous studies have pointed to various impediments to the SBM approach in education (Swift-Morgan, 2006; Yamada, 2014). One of the issues relates to sociocultural and political factors that can have an influence on school management. In Senegal, the patriarchal culture legitimizes men's power over women, and unequal gender relations are maintained in the way that the society functions (Masue & Askvik, 2017). However, the recent literature has paid less attention to empirical studies clarifying the influences of SBM characteristics on education quality, how gender

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

gaps are produced, and which characteristics relate to learning achievement by student gender status (Carr-Hill et al., 2015).

Hence, the current study sought to answer two research questions: 1) What are the influences of SBM characteristics, school autonomy, information sharing with parents, and parental and community participation on learning achievement at the school level? 2) How do SBM characteristics, school autonomy, information sharing with parents, and parental and community participation relate to learning achievement differentiated by gender status?

The current study's aim was to examine how SBM characteristics influence the quality of primary education in Senegal primary education. First, the study employed a quantitative approach to examine how SBM characteristics relate to learning achievement. Second, the study quantitatively examined how SBM characteristics affect gender gaps in learning achievement in order to point to which characteristics can help mitigate potential adverse influences and maximize the positive ones in Senegal primary education.

The study provided a unique viewpoint. First, it employed a multilevel regression model to clarify the relationship between SBM characteristics and education quality by comparing how much schools improved their learning achievement. Previous studies had indicated mixed results, with ongoing controversial debate regarding the SBM approach (Aryeh-Adjei, 2021) due to the comparatively weak analytical framework for measuring SBM. For instance, it should consider "to what extent" and to "which level" decision-making authority can be delegated (Leer, 2016). Thus, previous research has emphasized the need for a framework to understand the degree of authority delegated to schools and the accumulation of empirical evidence.

Second, the current study aimed to provide deeper insight into the debate on SBM by revealing quantitatively whether the influences of SBM characteristics on learning achievement are differentiated by gender status. Previous studies have pointed to gender inequalities and cultural beliefs affecting parent and community participation in school management affairs. Even though Nishimura (2017) revealed that school management committees (SMC) affect gender equality in schools, much less attention has been paid to revealing how parental and community interventions relate to student learning achievement according to student gender. Therefore, the current study aimed to address the weaknesses revealed in the previous literature.

2. Literature Review

Previous studies have tried to identify the factors that affect educational quality. Whilst school infrastructure is not the most critical factor in learning achievement, family background appears to be the most significant determinant (Shala & Grajcevci, 2018; Tesema & Braeken, 2018). On the other hand, it has been pointed out that factors related to learning achievement are weaker for socioeconomic status than for the quality of schools and teachers (Munawaroh, 2017). Although these prior studies have focused on the social status of students and the quality of schools and teachers to understand how they influence learning achievement, other factors such as society, community, and education policies can also have an impact too (Sanfo, 2020).

Previous literature analyzing how SBM relates to educational quality has shown mixed results. Hanushek et al. (2013) indicated school autonomy is a factor based on the results of the PISA assessment tests conducted from 2000 to 2009 in developing countries, and also in countries where student performance has not reached the recognized minimum proficiency level. Shimada (2018) also reported a negative relationship between academic achievement in developed countries and countries with excellent student performance overall. In Asia, school decentralization has had minimal effect on student achievement, although there has been considerable improvement in

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

access to education (Joshi, 2018). Therefore, inconclusive evidence exists to date that effective school management improves student achievement.

In the context of Africa, quantitative analysis in Uganda using nationally representative data has shown the effect of community participation on learning outcomes in terms of financial contribution (Ogawa & Nishimura, 2015). On the other hand, there was little involvement seen in the provision of school facilities under Nigeria's universal basic education program (Nnebedum & Akinfolarin, 2018). Moreover, Beasley and Huillery (2017) pointed to increased community participation in Niger having not significantly affected students' test scores. In a case study in Ghana, it was argued that low community participation affected a decline in learning outcomes from relational trust among communities (Shibuya, 2020). This contends that there remains uncertainty regarding whether or not the SBM approach can effectively enhance the quality of education in the Africa context.

Based on a review of the literature regarding the influence of the SBM approach, increasing attention has been paid to educational decentralization and the effect of the school environment on educational access and quality. In particular, it has been emphasized that a school culture that generates parental and community participation is an important aspect of improving school management (Tonegawa & Shoraku, 2016). It is known that patriarchal ideology hinders the level of female participation and voice. In the case of Ethiopia, female involvement outside of the home is limited, and few have joined the parent-teacher associations (PTAs) in school planning meetings (Swift-Morgan, 2006). Yamada (2014) emphasized that SMC favors educated males in Ethiopia. In the case of Tanzania, it is the fathers who often hold the decision-making power on financial contributions made to children's schooling, although it has been seen that both parents participate in the meetings (Masue & Askvik, 2017). Therefore, the previous research has indicated additional concern over the influence of the SBM approach, including parental community participation in school management on gender equality in education.

In Senegal, experimental methods have been used to measure the effectiveness of school grants, mainly for females with good pre-experimental grades in reading and math (Carr-Hill et al., 2015). On the other hand, some prior studies have indicated gender equality as a concern regarding community participation in school management (Ngom, 2013). However, these studies have lacked detailed interventions from both parents and the community. Moreover, the theory of SBM has only emphasized the importance of combining marginalized autonomy, school accountability, and school assessment in school management. Thus, it remains unclear what influence the SBM approach has on educational quality according to student's gender status.

3. Methodology

3.1. Analytical Framework

The current study adapted the framework on what matters most in school autonomy and accountability for better education results as a means to assessing the influence of SBM's characteristics. The framework and analytical tools used were created by the World Bank in collaboration with the Japan International Cooperation Agency (JICA) and other patterns under the Systems Approach for Better Education Results (SABER) program, following global best practices and empirical evidence (Demas & Arcia, 2015). This framework considers what combination of school management practices is deemed most important to promote improvements in school performance and educational quality. The framework is organized around three themes that sustain the cycle of autonomy, assessment, and accountability: marginalized autonomy, information sharing with parents and communities, and participation from parents and communities in school management.

This study followed the assumption of previous scholars, dividing the factors affecting educational participation and quality into two groups: student-individual factors, and school-level

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

factors. Statistical data can be in the form of students nested within schools. Thus, statistical methods that account for the hierarchical nature of the data should be used in order to provide consistent estimates (Odden et al., 2009). Learning achievement is a dependent variable of reading scores since reading is a foundational skill for all other subjects and for the higher levels of learning that societies aim to realize. Moreover, it seems to be the most widely used method in research that seeks to capture the quality of human capital. Therefore, the current study included independent variables of individual student background, school background, and SBM characteristics.

3.2. Hypotheses

The previous literature has provided supportive evidence indicating that SBM significantly predicts learning achievement (Andrabi et al., 2017; Aryeh-Adjei, 2021; Carr-Hill et al., 2015). However, these studies have tended to examine the overall influences of SBM, and have been insufficient to separately analyze the influence of each SBM component on educational quality. Therefore, the current study hypothesizes that school autonomy, information sharing with parents, and parental and community participation significantly correlates with reading test scores at the school level.

On the other hand, Masue and Askvik (2017) and Yamada (2014) insisted that a patriarchal culture legitimizes men's power over women, with unequal gender relations regarding school management maintained in both Ethiopia and Tanzania. Yet, there remains a dearth of empirical evidence on the influence of SBM on test scores heterogeneously. Thus, the current study also hypothesizes that the influences of SBM characteristics, school autonomy, information sharing with parents, and parental and community participation on reading scores are differentiated by gender status.

3.3. Econometric Model

The method utilized to clarify the study's research questions is a multilevel model. Although ordinary least square (OLS) regression is often used as a methodology in statistical analysis with a continuous outcome variable, the problem with OLS regression is when the data indicates the existence of a hierarchical or clustered structure (Woltman et al., 2012). In education, statistical data is in the form of students nested within schools. Thus, statistical methods that account for the data's hierarchical nature are indispensable for the provision of consistent estimates (Odden et al., 2009). Moreover, OLS estimates are known to have biases on the estimated β, which are missing variable bias and self-selection bias.

On self-selection bias, the characteristics of students who attend schools with many school inputs are considered to differ from those who do not. Therefore, the influences of an explanatory variable on the dependent variable are not marginal effects. In addition, there is a possibility that the academic potential of children whose parents choose schools with significant facilities and renowned successful teachers is higher than for children whose parents do not, and the estimated β value is affected by that potential academic ability. Conversely, children in households that consider them as part of the labor force may have parents who deliberately choose low-quality schools, making it impossible to estimate the influence of certain variables on learning achievement.

The current study estimated each regression coefficient β separately from fixed effects and random effects, rather than observing all variables as a means to compensate for missing variables, incorporating effects that affect regression coefficients into the model, and thereby enabling a more accurate estimation of β. An important assumption was made here that the residual or within-group errors were normally distributed (Raudenbush & Bryk, 2002).

The modeling of this study was achieved through an exploratory approach. In the first step, the null model with random effects in which only intercept is tested to confirm any significant between-

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

school variation and to check whether or not the multilevel model was appropriate. In the second step, model 1 was obtained by adding student-individual factor variables and school-level factors for model 2. The level 1 and level 2 equations of the null model can be explained as follows:

Level I: Student level model

$$Yij = \beta 0j + \beta 1jXij + \varepsilon ij \quad (1)$$

Level II: School level model

$$\beta 0j = \gamma 00 + \gamma 01\,Wj + \mu 0j \quad (2)$$

$$Yij = \gamma 00 + \gamma 01Wj + \beta 1jXij + \mu 0j + \varepsilon ij \quad (3)$$

Where Yij is the mean plausible value of learning achievement of student i in school j, β0j is the intercept of the level 1 model. The error terms at levels 1 and 2 are denoted by εij and μ0j, respectfully. Xij in the formula represents student-level independent variables, whereas inserting the random effect μ0j into intercept β0j gives Wj as a school-level variable. These formulae were then combined in model 3 by substituting formula from model 2 into model 1. The study employed a random intercept model in which a random effect was set only for intercept since it was easy to interpret the analysis results.

The null model is informative because it partitions variance in the outcome variable into within- and between-school variances. The intraclass correlation coefficient (ICC) ρ ranged from 0 to 1, with a high ρ value close to 1 indicating that a large proportion of total variance was explained by between-school differences, while a low ρ value close to 0 reveals little difference in the between-school variances as most variance differences are within schools at the student level.

Furthermore, SBM characteristics were created for this study, as can be seen in Table 1. Since the concept of SBM is not easily measured using a single observable variable, it is important, therefore, to estimate its influence on students' reading test scores using measurement techniques that capture the concept more accurately than a single variable. The current study employed principal component analysis (PCA), allowing information to be derived dispersed over a set of SBM characteristics and to then condense them into single variables (Vyas & Kumaranayake, 2006). The information sharing index includes two aspects of SBM characteristics: accountability to parents, and learning assessment. This index means that schools inform the parents about the results of students' final exams, school management, students' learning progress, and class performances. The participation index means that parents and the community contribute to school support, including school construction, class resources, school maintenance, textbooks, school feed, teacher training, financial support for exam fees, teacher salary, and learner support. Initial items are standardized, and correlation validation of each set of items indicates a Cronbach alpha of more than .7 (Dhrymes, 1970).

3.4. Data

The study utilized data from the *2019 Program d'Analyse des Systemes Educatifs de la Confemen (PASEC)*. PASEC is a standardized international assessment that measures elementary school students' learning achievements. The results of PASEC surveys are used to address educational effectiveness and equity issues in and across participating countries. In PASEC 2019, data were collected on primary school students and their related educational information in 10 French-speaking countries across West and Central Africa: Benin, Burkina Faso, Burundi, Cameroon, Chad, Congo, the Ivory Coast, Niger, Senegal, and Togo.

The data consists of information regarding student-level and school-level characteristics. The PASEC 2019 survey was implemented for grades 2 and 6, but the current study's analysis used only data for grade 6 students. In Senegal, grade 6 is the final year of primary education, requiring students to pass the national elementary leaving certificate examination in order to progress to lower

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

secondary school. It is also used to assess their overall primary education academic achievement, and therefore attracts significant attention.

PASEC uses a three-stage sampling approach. The first follows probability proportional to size (PPS) in order to select a certain number of schools from a list of eligible institutions provided by each country. In the second stage, classes are randomly selected from schools retained in the first stage. In the third stage, students from retained classes of the second stage were then randomly sampled.

The original sample consisted of 3,832 students, with data for 893 students subsequently dropped after data cleansing using STATA 17 software. As for student factors, student gender, student age, labor status, and repeat experience at least once are set as the first layer of the multilevel model. In the current study, student SES is a family material possessions index consisting of eight materials: students have a TV, telephone, refrigerator, fan, gas, house table, iron, and car within their household (see Appendix I). As for school factors, management training for school principals is used if the principal has received training in school management. In the current study, school SES is a school equipment index comprising 11 resources: school library, school hall, staffroom, principal's office, playground, fence, pharmacy, computer, computer room, nurse's room, and photocopier (see Appendix II).

Table 1. Definition of Variables

Variables	Definition	Type
Dependent Variable		
Learning Achievement	Student's grade 6 reading scores	Numerical
Independent Variables		
Student level		
Gender	Female = 1	Dummy
Age	Student age in years	Numerical
Repeat (at grade 6)	Student has had a repeated grade = 1	Dummy
Labor status	Student is also working = 1	Dummy
Student's SES	Family material possessions index	Numerical
School level		
Principal's training	Principal received management training = 1	Dummy
School SES	School equipment index	Numerical
School location	Urban = 1	Dummy
School type	Public school = 1	Dummy
School autonomy	School has responsibility for teacher employment, school plan, learning content = 1	Dummy
Information sharing	Information sharing index	Numerical
Participation	Participation index	Numerical

Source: Created by the authors based on PASEC (2019)

Table 2. Descriptive Statistics

Variables	Observation	Mean	*SD*	Min	Max
Student Achievements					
Reading scores	2939	569.741	80.836	280.835	820.413
Student level					
Gender	2939	0.550	0.498	0	1
Age	2939	12.406	1.131	10	19
Repeat	2939	0.518	0.499	0	1
Labor status	2939	0.291	0.454	0	1

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

Variables	Observation	Mean	*SD*	Min	Max
Student's SES	2939	-0.020	1.657	-3.524	2.402
School level					
Principal's training	2939	0.587	0492	0	1
School SES	2939	-0.019	1.684	-3.553	4.258
Urban	2939	0.316	0.465	0	1
Public	2939	0.892	0.310	0	1
School autonomy	2939	0.821	0.384	0	1
Information sharing index	2939	0.000	1.486	-1.009	4.231
Participation index	2939	0.000	1.781	-1.907	7.614

Source: Calculated and created by the authors based on PASEC (2019)

4. Results

4.1. Influences of SBM Characteristics on Learning Achievements

The ICC in the reading models is shown to be statistically different from zero at 0.54 in Table 3. This implies that between-school differences can explain 54% of reading scores. In general, the ICC needs to be about 40%, the highest level reported in a prior study on school effects by Mortimore (1997). The results from null models confirm that using a multilevel model for the main analysis is more appropriate. In the current analysis, Akaike's Information Criteria (AIC) was calculated to measure adaption for each model. Compared to the null model and model 1, model 2 has a smaller AIC, and was shown to be the most appropriate model within the scope of the analysis.

There are some clear trends identifiable in the test score results, with a significant correlation established between student backgrounds, school backgrounds, SBM characteristics, and educational quality. Student backgrounds were almost all found to be statistically significant. Student's age shows a negative association, whilst gender has a positive association, meaning that younger females tend to perform better at reading. In Senegal, older females tend to achieve lower scores than those who attend school at the appropriate age because they have often repeat grades or were unable to receive education at the appropriate school age. Students who work and repeat grades were shown to have a negative association that was statistically significant.

School SES was shown to be statistically significant against reading scores, but the influence of the school principal's management training notably disappeared. In SBM characteristics, parental and community participation indexes were positively associated with and statistically significant against reading test scores. On the other hand, school autonomy and the information sharing index were not significantly related in terms of reading scores. These results imply that participation from parents and the community in school management can help to improve students' reading scores. However, school autonomy and information sharing with parents did not always promote student learning achievements in the current analysis.

Table 3. Influences of SBM Characteristics on Reading Scores

	Null Model	Model 1	Model 2
Female		4.828**	4.885**
		(2.109)	(2.107)
Age		-2.921***	-3.167***
		(1.064)	(1.061)
Repeat		-28.518***	-27.971***
		(2.273)	(2.27)
Labor		-9.191***	-9.305***

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

	Null Model	Model 1	Model 2
		(2.434)	(2.428)
Student's SES		1.988**	1.366
		(0.85)	(0.853)
School SES			15.063***
			(2.525)
Urban			18.529*
			(10.375)
Public			-20.850
			(15.875)
Principal's training			-0.562
			(7.946)
Autonomy			-2.742
			(11.066)
Information sharing			1.765
			(2.561)
Participation			4.923**
			(2.172)
Constant		615.660***	636.471***
		(13.856)	(21.491)
ICC	0.54	0.52	0.41
AIC	32511	32309	32261
Number of Groups	153	153	153
N	2939	2939	2939

Notes: 1) * $p < .1$, ** $p < .05$, *** $p < .01$
2) Standard errors in parentheses
Source: Calculated by the authors based on PASEC (2019)

4.2. Influences of SBM Characteristics on Learning Achievements by Student Gender Status

Table 4 presents the results of the relationships established between SBM characteristics and students' reading scores by student gender status. In terms of gender differences, students with a high SES tended to achieve better reading scores, and especially for males. This implies that parents are aware of the importance of sending male children to school despite the associated economic hardships. However, there was no discernable difference in terms of the students' age, labor experience, or grade repeating. Those who have experienced labor (working) and repeated grades tended to receive lower reading test scores. With regards to model 2, schools located in urban areas had a positively correlation to reading scores, with students in urban areas receiving higher reading scores, especially for males. Considering the social situation in Senegal, male children in urban areas may be less likely to be sent to work on the family farm. There was no considerable gap noted by gender status concerning school SES, which might promote reading scores.

The participation index was shown to be positively related and statistically significant to reading scores by gender status. This implies that parental and community participation might mitigate the learning achievement gap between male and female students. However, school autonomy and information sharing with parents were not found to be statistically significant concerning test scores, even though these were positive or negative correlations.

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

Table 4. Influences of SBM Characteristics on Reading Scores by Gender Status

	Null Model		Model 1		Model 2	
	Female	Male	Female	Male	Female	Male
Age			-5.370***	0.742	-5.698***	0.006
			(1.456)	(1.608)	(1.449)	(1.598)
Repeat			-26.492***	-33.507***	-25.634***	-31.784***
			(3.05)	(3.571)	(3.041)	(3.553)
Labor			-6.912**	-13.545***	-7.008**	-13.682***
			(3.404)	(3.715)	(3.384)	(3.685)
Student's SES			2.958***	4.451***	1.779	2.958**
			(1.139)	(1.275)	(1.149)	(1.282)
School SES					14.441***	14.390***
					(2.604)	(2.475)
Urban					14.218	23.333**
					(10.698)	(10.094)
Public					-25.519	-17.809
					(16.296)	(15.723)
Principal's training					-0.533	0.94
					(8.196)	(7.849)
Autonomy					-1.086	-1.465
					(11.356)	(11.235)
Information					3.285	-1.612
					(2.672)	(2.551)
Participation					5.094**	4.941**
					(2.258)	(2.143)
Constant			650.288***	573.156***	675.607***	592.897***
			(18.402)	(20.132)	(24.798)	(25.402)
ICC	0.54	0.51	0.51	0.48	0.42	0.36
AIC	17965	14789	17857	14684	17815	14638
Schools	153	153	153	153	153	153
N	1617	1322	1617	1322	1617	1322

Notes: 1) *** $p < .01$, ** $p < .05$, * $p < .1$
2) Standard errors in parentheses
Source: Calculated by the authors based on PASEC (2019)

5. Discussion

School autonomy was shown to have a negative association, but that it was not significant. This result is consistent with a previous study showing a negative relationship between school autonomy and quality of education, such as dropout rates, repetition, and learning outcomes (Shimada, 2018). Leer (2016) found that decentralization policy had no positive impact on educational outcomes; instead, it was shown to be negatively correlated with teachers' efforts and a tendency for local SMCs not to function. The present state of local government features indicates that developing countries are not always ready for decentralization in education (Papadopoulou & Yirci, 2013). It is conceivable that this reflects the disparity in the capacity of the school management system between urban and rural schools. Moreover, management training for school principals was not found to significantly correlate with learning achievement, implying low management capacities of school principals in terms of school management. School principals are the leaders of each school and direct

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

management of the whole school, and it is therefore essential to consider in the institution's leadership management whether or not SBM can function (Botha, 2006).

Information sharing with parents and the community was found to have a positive association, but one that was not statistically significant. Previous studies have emphasized a one-way path between the relationship of parents and community participation and quality of education, but there may be a more complex two-way path between participation and quality of education in recent debates. In other words, information on education quality, such as learning environment and teaching interactions can trigger greater participation from parents and the community because of expectations after seeing an improved performance by the school (Andrabi et al., 2017). In many Sub-Saharan Africa (SSA) countries, including Senegal, students must pass the national primary leaving exam in order to continue on to their secondary education studies. The results of the primary leaving exam are therefore vital to the ability of schools to attract more students, since greater numbers of new students would likely want to attend a school with a higher exam performance rate. This implies that gaining interest from parents to become involved in education, thus creating a more effective school management system, especially in terms of accountability to both parents and the community, is critical to seeing improvements in educational quality.

Parental and community participation were shown to have a positive and statistical significance against learning achievement for both male and female students. This finding is consistent with a previous study that argued that parents and communities share information with schools, and suggested a shared attitude of thinking and cooperating together on school-related issues (Nishimura, 2017). There is a possibility that minority or disadvantaged people may participate in school management, hence the process of electing members from parents and the community to assist in a school's management is also important in order to improve education quality in schools. In a previous study, Sanfo (2020) indicated that female participation in schools has a positive association. Therefore, planning and monitoring school plans among parents and the community can help establish more effective solutions to lower test scores and on issues of gender equality. However, it is also necessary to consider which specific interventions from parents and the community can best promote both quality and gender equality in education, and how they may negotiate with schools to ensure their actual voices are heard.

6. Conclusion and Future Research

This study investigated the relationship between SBM characteristics and learning achievement in Senegal's primary school system. Specifically, the study revealed how the gaps are generated and which characteristics relate to reading scores by student gender status through multilevel analysis of Senegal's primary schooling. Previous studies have presented mixed results on how SBM is associated with educational quality, and additional analysis is therefore needed in order to determine empirical evidence.

As a result, using the SBM framework, the current study showed that parental and community participation in school management has a positive and statistically significant association against student learning achievement with gender status. The study proposes that participation from parents and communities can help to improve students' learning achievement and might go some way to mitigating the learning gap by gender status. On the other hand, information sharing with parents and the community and school autonomy were not found to have a significant relationship in terms of student reading scores.

Promotion of SBM in school for effective school management can lead to improvements in students' learning achievement. However, the SBM approach may not always function according to the SBM framework, except for the concept of parental and community participation in the context of Senegal's primary education system. Further investigation of why school autonomy and information sharing for parents with accountability and assessment have not led to improved school

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

effectiveness, at least in Senegal, is necessary in order to be promoted in other developing countries and neighboring countries in particular. This would likely lead to policy suggestions for the SBM approach that has been implemented.

Finally, quantitative data used in the current study precluded causal inferences, and these results cannot therefore always clarify the influences of SBM characteristics. Further investigation into this topic is required in order to add more important variables and to treat several potential areas of bias through the use of richer datasets. Moreover, an analysis of SBM on education quality beyond Senegal to other neighboring countries would enable further development of educational quality in Africa.

Declarations

Author Contributions. All authors contributed to the literature review, conceptualization, methodology, data analysis, review-editing and writing, and original manuscript preparation. All authors have read and approved the published final version of the article.
Ethical Approval: No ethical approval was sought as the article does not present any study of either human or animal subjects.
Data Availability Statement: To review the data from this study, contact the primary author for more discussion about the request. The data are not publicly available due to privacy or ethical restrictions.
Conflicts of Interest. The authors declared no potential conflicts of interest.
Funding. This work was supported by the Japan Society for the Promotion of Science under KAKENHI Grant Number JP22H00079.

References

Andrabi, T., Das, J., & Khwaja, A. I. (2017). Report Cards: The Impact of Providing School and Child Test Scores on Educational Markets. *American Economic Review*, *107*(6), 1535-1563. https://doi.org/10.1257/aer.20140774

Aryeh-Adjei, A. (2021). Community Participation in the Management of Ghanaian Schools. *Journal of Interdisciplinary Studies in Education, 10*(SI), 79-95. https://www.ojed.org/index.php/jise/article/view/2873

Beasley, E., & Huillery, E. (2017). Willing but unable: Short-term experimental evidence on parent empowerment and school quality. *The World Bank Economic Review, 31*(2), 531-552. https://doi.org/10.1093/wber/lhv064

Botha, N. (2006). Leadership in School-Based Management: A Case Study in Selected Schools. *South African Journal of Education*, *26*(3), 341-353. https://www.ajol.info/index.php/saje/article/view/25074

Burhanuddin, B. (2018). The Influence of School Principal's and Teacher's Performance on Students' Learning Achievement. *Journal of Innovative Studies on Character and Education*, *2*(1), 136-152. http://www.iscjournal.com/index.php/isce/article/view/28

Carr-Hill, R., Rolleston, C., Pherali, T., & Schendel, R. (2015). The effects of school-based decision making on educational outcomes in low-and middle-income contexts: A systematic review. *Campbell Systematic Review, 12*(1). https://doi.org/10.4073/csr.2016.9

Demas, A., & Arcia, G. (2015). *What matters most for school autonomy and accountability: A framework paper*. SABER Working Paper Series, 9. World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/385451468172788612/what-matters-most-for-school-autonomy-and-accountability-a-framework-paper

Dhrymes, P. J. (1970). *Econometrics: Statistical foundations and applications*. Harper & Row.

Garnier, M., & Schafer, M. (2006). Educational model and expansion of enrollments in sub-Saharan Africa. *Sociology of Education*, *79*(2), 153-176. https://doi.org/10.1177/003804070607900204

Hanushek, E. A., Link, S., & Woessman, L. (2013). Does school autonomy make sense everywhere? Panel estimates from PISA. *Journal of Development Economics, 104*, 212-232. https://doi.org/10.1016/j.jdeveco.2012.08.002

Joshi, D. P. (2018). Does School-Based Management Help to Improve Quality of Education? A Case of Student Achievement in Nepal. *Education Process: International Journal*, *7*(4), 228-236. http://dx.doi.org/10.22521/edupij.2018.74.1

Leer, J. (2016). After the Big Bang: Estimating the Effects of Decentralization on Educational Outcomes in Indonesia through a Difference-in-Differences Analysis. *International Journal of Educational Development, 49*, 80-90. https://doi.org/10.1016/j.ijedudev.2016.02.005

Masue, O. S., & Askvik, S. (2017). Are School Committees a Source of Empowerment? Insights from Tanzania. *International Journal of Public Administration*, *40*(9), 780-791. https://doi.org/10.1080/01900692.2016.1201839

Mortimore, P. (1997). Can Effective Schools Compensate for Society? In A. H. Halsey, P. Brown, H. Lauder, & A. S. Wells (Eds.), *Education: Culture, Economy, and Society.* Oxford University Press.

Munawaroh. (2017). The Influence of Teaching Methods and Learning Environment to the Student's Learning Achievement of Craft and Entrepreneurship Subjects at Vocational High School. *International Journal of Environmental & Science Education*, *12*(4), 665-678. http://www.ijese.net/makale/1836.html

Ngom, D. F. (2013). *USAID basic education project mid-term evaluation: A committed and successful educational community*. Final report. USAID/EDB Project. https://pdf.usaid.gov/pdf_docs/pdacx672.pdf

Nishimura, M. (2017). *Effect of School Factors on Gender Gaps in Learning Opportunities in Rural Senegal: Does School Governance Matter?* JICA-RI Working Paper No. 141. https://www.jica.go.jp/jica-ri/publication/workingpaper/l75nbg000005i1nh-att/JICA-RI_WP_No.141.pdf

Nnebedum, C., & Akinfolarin, A. V. (2018). Extent of Parent-Teacher Association Involvement in the Implementation of Universal Basic Education Program in Primary Schools in Northern Senatorial District of Ondo State, Nigeria. *Educational Process: International Journal, 7*(2), 106-117. http://dx.doi.org/10.22521/edupij.2018.72.1

Odden, A., Borman, G., & Fermanich, M. (2009). Assessing teacher, classroom, and school effects, including fiscal effects. *Peabody Journal of Education, 79*(4), 4-32. https://doi.org/10.1207/s15327930pje7904_2

Ogawa, K., & Nishimura, M. (Eds.). (2015). *Comparative analysis of universal primary education policy and practice in sub-Saharan Africa: The cases of Ghana, Kenya, Malawi, and Uganda*. Sense Publishers.

Papadopoulou, V., & Yirci, R. (2013). Rethinking Decentralization in Education in terms of Administrative Problems. *Educational Process: International Journal*, *2*(1-2), 7-18. https://doi.org/10.12973/edupij.2013.212.1

PASEC. (2020). PASEC2019 – Performances du système éducatif béninois : Compétences et facteurs de réussite au primaire [Performance of the Beninese education system: Skills and success factors at primary level]. PASEC, CONFEMEN, Dakar. https://pasec.confemen.org/ressource/pasec2019-performances-du-systeme-educatif-beninois-performances-et-environnement-de-lenseignement-apprentissage-au-primaire/

Raudenbush, S., & Bryk, A. (2002). *Hierarchical Linear models: Applications and data analysis methods.* Sage.

Sanfo, M. B. J.-B. (2020). Leaving no place behind: Community participation and primary school students' learning achievements in Burkina Faso's small-scale gold mining communities. *International Journal of Educational Research Open*, *1,* Article 100010. https://doi.org/10.1016/j.ijedro.2020.100010

Shala, A., & Grajcevci, A. (2018). Kosovo's Low Performance in PISA 2015: An Explanation From a Socio-economic Perspective. *Educational Process: International Journal*, *7*(1), 48-59. https://doi.org/10.22521/edupij.2018.71.4

Shibuya, K. (2020). Community participation in school management from the viewpoint of relational trust: A case from the Akatsi South District, Ghana. *International Journal of Educational Development*, *76*, Article 102196. https://doi.org/10.1016/j.ijedudev.2020.102196

Shimada, K. (2018). Influence of School-Based Management on Student Achievement in Indonesia: Multilevel Analyses Using PISA Surveys. *Kyoto University Research Studies in Education*, *64,* 15-27. http://hdl.handle.net/2433/231333

Sikora, J., M. R. Evans., & Kelly, J. (2019). Scholarly Culture: How Books in Adolescence enhance Adult Literacy, Numeracy and Technology Skills in 31 Societies. *Social Science Research*, *77*, 1-15. https://doi.org/10.1016/j.ssresearch.2018.10.003

Swift-Morgan, J. (2006). What community participation in schooling means: In- sights from Southern Ethiopia. *Harvard Educational Review,* *76*(3), 339-368. https://doi.org/10.17763/haer.76.3.e475j32j69q27x63

Tesema, M. T., & Braeken, J. (2018). Regional Inequalities and Gender Differences in Academic Achievement as a Function of Educational Opportunities: Evidence from Ethiopia. *International Journal of Educational Developmen*t, *60*), 51-59. https://doi.org/10.1016/j.ijedudev.2017.10.023

Tonegawa, Y., & Shoraku, A. (2016). Local Response to School-based Management Reforms: The Case of School Support Committees in Cambodia. *Journal of Asia-Pacific Studies*, *27,* 179-193.

United Nations Educational, Scientific and Cultural Organization. (2013). *The Global Learning Crisis: Why Every Child Deserves a Quality Education.* EFA Global Monitoring Report. https://unesdoc.unesco.org/ark:/48223/pf0000223826

Vyas, S., & Kumaranayake, L. (2006). Constructing socio-economic status indices: How to use principal components analysis. *Health Policy & Planning*, *21*(6), 459-468. https://doi.org/10.1093/heapol/czl029

Woltman, H., Feldstain, A., MacKay, J. C., & Rocchi, M. (2012). An introduction to hierarchical linear modeling. *Tutorials in Quantitative Methods for Psychology,* *8*(1), 52-69. https://doi.org/10.20982/tqmp.08.1. p052

World Bank. (2019). *Ending Learning Poverty: What Will It Take?* http://hdl.handle.net/10986/32553

Yamada, S. (2014). Determinants of community participation: The tradition of local initiatives and the institutionalization of school management committees in Oromia Region, Ethiopia. *Compare: A Journal of Comparative and International Education*, *44*(2), 162-185. https://doi.org/10.1080/03057925.2012.746899

Yuki, T., Igei, K., & Demas, A. (2016). *Measuring quality of policies and their implementation for better learning: Adapting World Bank's SABER tools on school autonomy and accountability to Senegal.* JICA-RI working paper. https://jicari.repo.nii.ac.jp/records/761

Apendices

Appendix I. Results of PCA for Student SES Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.743	1.735	0.343	0.343
Comp2	1.007	0.057	0.126	0.469
Comp3	0.95	0.092	0.119	0.588
Comp4	0.858	0.054	0.107	0.695
Comp5	0.804	0.079	0.101	0.795
Comp6	0.725	0.199	0.091	0.886
Comp7	0.525	0.137	0.066	0.952
Comp8	0.388	.	0.049	1
Variable	Comp1	Comp2	Comp3	Comp4
Student_TV	0.466	-0.056	-0.066	-0.099
Student_Telephone	0.091	0.861	0.465	-0.097
Student_Refrigerator	0.447	-0.177	0.049	-0.053
Student_Fan	0.491	-0.066	-0.006	-0.102
Student_Gas	0.352	0.199	-0.187	-0.042
Student_Housetable	0.238	0.322	-0.559	0.612
Student_Iron	0.234	-0.267	0.652	0.612
Student_Car	0.313	-0.078	0.052	-0.466

Source: Created by the authors based on PASEC (2019)

Appendix II. Results of PCA for School SES Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.834	1.505	0.283	0.283
Comp2	1.329	0.248	0.133	0.416
Comp3	1.08	0.069	0.108	0.524
Comp4	1.012	0.12	0.101	0.625
Comp5	0.89	0.103	0.089	0.714
Comp6	0.788	0.122	0.079	0.793
Comp7	0.666	0.079	0.067	0.86
Comp8	0.587	0.031	0.059	0.919
Comp9	0.556	0.297	0.057	0.974
Comp10	0.259	.	0.026	1
Variable	Comp1	Comp2	Comp3	Comp4
School_Headoffice	0.324	-0.39	-0.224	-0.224
School_Library	0.227	0.231	0.505	0.505
School_Computerroom	0.358	0.404	0.047	0.047
School_Teacherroom	0.282	0.253	-0.158	-0.158
School_Playground	0.154	-0.226	0.519	0.519
School_Fence	0.321	-0.412	0.112	0.112
School_Pharm	0.254	0.002	0.485	-0.422
School_Nurseroom	0.081	0.579	-0.043	0.496

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

Component	Eigenvalue	Difference	Proportion	Cumulative
School_Photocopy	0.453	0.047	-0.316	-0.217
School_Computer	0.483	-0.089	-0.221	-0.144

Source: Created by the authors based on PASEC (2019)

Appendix III. Results of PCA for Information Sharing Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.208	1.408	0.552	0.552
Comp2	0.8	0.196	0.2	0.752
Comp3	0.604	0.216	0.151	0.903
Comp4	0.388	.	0.097	1
Variable	Comp1	Comp2	Comp3	Comp4
Information_Exam	0.447	0.622	0.641	0.039
Information_Management	0.472	0.445	-0.761	0.002
Information_Learning	0.542	-0.429	0.083	-0.718
Information_Performance	0.533	-0.479	0.052	0.695

Source: Created by the authors based on PASEC (2019)

Appendix IV. Results of PCA for Participation Index

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.174	1.611	0.265	0.265
Comp2	1.563	0.269	0.13	0.395
Comp3	1.293	0.176	0.108	0.503
Comp4	1.117	0.124	0.093	0.596
Comp5	0.993	0.167	0.083	0.678
Comp6	0.826	0.159	0.069	0.747
Comp7	0.666	0.045	0.056	0.803
Comp8	0.623	0.134	0.052	0.855
Comp9	0.488	0.012	0.041	0.895
Comp10	0.475	0.045	0.039	0.935
Comp11	0.43	0.078	0.036	0.971
Comp12	0.353	.	0.029	1
Variable	Comp1	Comp2	Comp3	Comp4
Participation_Finance	0.284	-0.307	0.234	-0.244
Participation_Construction	0.366	-0.369	0.021	-0.127
Participation_Classresource	0.238	-0.154	0.012	0.447
Participation_Maintain	0.344	-0.328	-0.053	-0.205
Participation_Text	0.349	0.205	-0.362	0.054
Participation_Supplygoods	0.311	0.069	-0.461	0.175
Participation_Feed	0.236	0.084	0.079	0.681
Participation_Teachertrain	0.25	0.232	-0.37	-0.385
Participation_Examfee	0.195	-0.375	0.303	0.06
Participation_Teachersalary	0.253	0.434	0.393	-0.163

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

Component	Eigenvalue	Difference	Proportion	Cumulative
Participation_Learnersupport	0.253	0.408	0.456	-0.008
Participation_Homework	0.328	0.186	0.033	-0.801

Source: Created by the authors based on PASEC (2019)

Appendix V. Results of Cronbach α for Student SES Index

Items	S	it-cor	ir-cor	ii-cov	alpha
Student_TV	+	0.72	0.581	0.037	.637
Student_Telephone	+	0.243	0.098	0.056	.726
Student_Refrigerator	+	0.713	0.551	0.037	.641
Student_Fan	+	0.772	0.636	0.034	.618
Student_Gas	+	0.584	0.408	0.043	.677
Student_Housetable	+	0.422	0.258	0.05	.705
Student_Iron	+	0.451	0.252	0.049	.71
Student_Car	+	0.546	0.351	0.045	.69
Test Scale				0.044	.708

Source: Created by the authors based on PASEC (2019)

Appendix VI. Results of Cronbach α for School SES Index

Items	S	it-cor	ir-cor	ii-cov	alpha
School_Headoffice	+	0.539	0.374	0.029	.679
School_Library	+	0.434	0.264	0.032	.698
School_Computerroom	+	0.566	0.445	0.029	.671
School_Teacherroom	+	0.466	0.316	0.031	.689
School_Playground	+	0.262	0.186	0.035	.705
School_Fence	+	0.571	0.385	0.028	.678
School_Pharm	+	0.497	0.286	0.029	.7
School_Nurseroom	+	0.153	0.073	0.036	.712
School_Photocopy	+	0.725	0.575	0.023	.635
School_Computer	+	0.772	0.641	0.022	.619
Test Scale				0.029	.704

Source: Created by the authors based on PASEC (2019)

Appendix VII. Results of Cronbach α for Information Sharing Index

Items	S	it-cor	ir-cor	ii-cov	alpha
Information_Exam	+	0.651	0.429	0.075	.711
Information_Management	+	0.67	0.471	0.073	.693
Information_Learning	+	0.813	0.611	0.049	.603
Information_Performance	+	0.819	0.584	0.047	.626
Test Scale				0.061	.726

Source: Created by the authors based on PASEC (2019)

https://doi.org/10.22521/edupij.2024.132.5 Published online by Universitepark Press

Appendix VIII. Results of Cronbach α for Participation Index

Items	S	it-cor	ir-cor	ii-cov	alpha
Participation_Finance	+	0.535	0.379	0.029	.717
Participation_Construction	+	0.674	0.545	0.026	.691
Participation_Classresource	+	0.423	0.301	0.032	.725
Participation_Maintain	+	0.642	0.501	0.027	.698
Participation_Text	+	0.592	0.463	0.028	.705
Participation_Supplygoods	+	0.577	0.414	0.028	.712
Participation_Feed	+	0.403	0.298	0.032	.726
Participation_Teachertrain	+	0.421	0.294	0.032	.726
Participation_Examfee	+	0.43	0.254	0.031	.735
Participation_Teachersalary	+	0.365	0.304	0.034	.73
Participation_Learnersupport	+	0.377	0.285	0.033	.728
Participation_Homework	+	0.569	0.418	0.028	.711
Test Scale				0.03	.735

Source: Created by the authors based on PASEC (2019)

About the Contributor(s)

Yudai Ishii is a doctoral student at the Graduate School of International Cooperation Studies (GSICS) at Kobe University, Japan. He holds a bachelor's degree in policy studies from Chuo University, Japan, and two master's degrees in International Politics from the School of International Relations and Public Affairs (SIRPA) at Fudan University, China, and in Economics from GSICS, Kobe University, Japan. His research interests focus on education economics and policy, learning assessment, and primary education, and has gained practical experience both at the Center of Education Research and Training (CERT), the University of Malawi, and UNICEF in New York, United States.
Email: yuudai9120@gmail.com
ORCID ID: https://orcid.org/0000-0002-2358-557X

Keiichi Ogawa is a professor and department chair at the Graduate School of International Cooperation Studies at Kobe University, Japan, a governing board member of the UNESCO International Institute for Educational Planning (IIEP), an honorary professor at Kyrgyz National University, Kyrgyzstan, and University of Dhaka, Bangladesh, and an affiliate professor at The University of Hawai'i at Mānoa, United States. He is a former education economist at the World Bank, and his research interests lie in the economics of education, education finance, comparative international education, and public policy in the education sector. He holds his Ph.D. in comparative international education and economics of education from Columbia University, United States.
Email: ogawa35@kobe-u.ac.jp
ORCID ID: https://orcid.org/0000-0002-0089-6471