

Financial Inclusion and Technological Influence on SDG 4 - Quality Education Attainment in Africa: A Case Study of Gombe State

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The pursuit of Sustainable Development Goal 4 (SDG 4) - Quality Education, remains a critical imperative for African nations, particularly in the context of fostering inclusive and equitable education systems. This study aims to address the gaps in understanding the relationship between financial inclusion, technological advancements, and the achievement of SDG 4 in Africa, focusing specifically on Gombe State. Questionnaires were distributed to 700 respondents, with 580 valid responses collected. Data was collected on access to financial services, awareness and usage of educational technology, financial behavior, and attitudes towards education financing. Data analysis was conducted using Covariance-Based Structural Equation Modeling (CB-SEM) with AMOS. The study found a significant positive relationship between access to financial services and attitudes towards education financing. Additionally, awareness and usage of educational

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technology were found to positively influence attitudes towards education financing. Finally, positive financial behaviors, such as savings and prudent financial management, were associated with supportive attitudes towards education financing. The study suggests integrating financial inclusion, educational technology, and promoting positive financial behaviors, in order to advance inclusive and equitable quality education in Gombe State, thereby fostering sustainable development in the region.

Keywords: Financial inclusion; technological influence; sustainable development goal 4; quality education; Africa.

1. INTRODUCTION

The aim of sustainable development is to ensure that societal, economic, and environmental requirements are met in a way that does not jeopardise future generations' ability to do the same. To accomplish the Sustainable Development Goals (SDGs), Africa needs considerable investments in infrastructure, education, healthcare, and job creation. Goal No. 4, "Quality Education," is crucial because getting an education is still a struggle for many people in Africa. Half of Africa's 59 million children of primary school age were not enrolled in school in 2010 (UIS, 2013), making it the continent with the highest rate of out-of-school children worldwide.

Regrettably, Africa has made only modest strides towards this objective. One simple approach used was the implementation of community-based education programs. These programs have shown success in reaching marginalized populations and improving access to education. For instance, initiatives like the "Community Learning Centers" in Nigeria, as reported by national news outlets such as The Guardian Nigeria, have been instrumental in bringing education to underserved communities and reducing the number of out-of-school children.

However, a recent analysis by UNESCO revealed that a large proportion of children across the continent lack access to basic education, with approximately 40% of children in Eastern and Southern Africa reported to be out of school, according to a UNICEF report. Furthermore, according to a recent report by the United Nations Development Programme (UNDP), access to quality education remains a significant challenge in many African countries, with millions of children out of school and dropout rates remaining alarmingly high. In order to improve educational possibilities across

Africa, it is essential to expand financing for education facilities, especially for pre-primary and primary education, as well as prioritise teacher training and internet connectivity.

The World Bank Group [1] has emphasised the importance of financial inclusion in Africa's pursuit of the SDGs. It helps households manage financial shocks and ensure stable consumption patterns by making affordable financial services available to individuals excluded from traditional systems. In this context, fintech stands out as a potentially useful tool for expanding access to banking services. Danladi et al. [2], suggest a multi-stakeholder framework that can enhance fintech use in Africa, aiming to improve financial inclusion and achieve the SDGs. To effectively promote financial inclusion, Walker et al. [3] also argue that economies should prioritise policies that enable digital financial transformation through the use of Fintech. Building on the studies by Adenikinju and Ogunleye [4], Chowa et al. [5], Zheng et al. [6], and Warschauer [7], which explore the impact of financial inclusion and educational technology on educational outcomes, this study aims to investigate the interplay of financial access, educational technology, and financial behavior in shaping attitudes towards education financing. By delving into these factors, the study seeks to contribute to the realization of SDG 4 on Quality Education in Gombe State, ultimately aiming to fill the gap in understanding how these elements collectively drive educational advancement and sustainable development.

The main objective of the study is therefore to investigate the role of financial access, educational technology, and financial behavior in shaping attitudes towards education financing, with the overarching goal of understanding how these factors contribute to achieving Sustainable Development Goal 4 (SDG 4) on Quality Education in Gombe State.

1.1 Research Objectives

The main objective of the study is to investigate the role of financial inclusion, educational technology, and financial behavior in shaping attitudes towards education financing, with the overarching goal of understanding how these factors contribute to achieving Sustainable Development Goal 4 (SDG 4) on Quality Education in Gombe State.

Other specific objectives include;

- i. Investigate the Impact of Access to Financial Services on Attitudes towards Education Financing
- ii. Explore the Relationship between Awareness & Usage of Educational Technology and Attitudes towards Education Financing
- iii. Examine the Link between Financial Behavior and Attitudes towards Education Financing

1.2 Research Questions

In order to achieve the objectives of the study, the following research questions are developed.

- i. Does increased access to financial services lead to more positive attitudes towards education financing?
- ii. How does awareness and usage of educational technology influence individuals' attitudes towards education financing
- iii. What is the relationship between individuals' financial behavior and their attitudes towards education financing?

1.3 Research Significance

The importance of this study rests in the fact that it could offer useful information and suggestions to a wide range of interested parties, such as government officials, educators, bankers, FinTech developers, and foreign aid groups.

- i. *Educators*: A better knowledge of how financial inclusion affects educational access, equity, and results can be gained by educators according to the study's findings. i. With this information in hand, they will be better able to devise plans to aid underprivileged kids in overcoming economic obstacles to receiving a high-quality education.

- ii. *Policymakers*: The findings can educate policymakers on how financial inclusion contributes to achieving Sustainable Development Goals. Fourth, the proposals can help policymakers leverage the potential of financial inclusion and Fintech to design and implement effective policies and initiatives that promote inclusive and high-quality education.
- iii. *Financial institutions and Fintech firms*: This study can shed light on the possibilities and pitfalls of using Fintech solutions to expand access to financial services for students. Improved educational outcomes can be a byproduct of collaboration between traditional financial institutions and innovative Fintech firms that better understand the financial needs of kids, parents, and schools.
- iv. *International Development Organizations*: The findings can help international development organisations make more informed decisions on how to best spend in programmes that provide access to high-quality education and financial stability for all citizens. Sustainable Development Goal 4 aims to promote inclusive and equitable educational systems worldwide, and these groups can coordinate their efforts to help countries reach this goal.

2. LITERATURE REVIEW

2.1 Significance of SDGs to Africa

Meeting the needs of the present without sacrificing the ability of future generations to do the same is at the heart of sustainable development [8]. They worry about the impact that depleting or destroying today's resources will have on the people of the future. The economic, environmental, and social components are commonly used to examine sustainable development [9].

Realizing the Sustainable Development Goals (SDGs) in Africa is crucial for the continent's development, addressing poverty, education, gender equality, and energy access. The SDGs build on the success of the Millennium Development Goals (MDGs) and aim to go further to end all forms of poverty especially on the african continent, while recognizing that ending poverty must go hand-in-hand with strategies that build economic growth and address social issues, including education, health, social protection, and job opportunities,

while tackling climate change and environmental protection [10].

The fact that these goals are especially relevant to Africa due to the continent's daunting development challenges, Investments in infrastructure, education, healthcare, and job development, as well as focused programmes to protect the most disadvantaged people, therefore became necessary. Among the SDGs that are most relevant to Africa are,

Chart 1. Most relevant SDGs in Africa

No.	Goals Description
Goal 1	No poverty
Goal 2	Zero Hunger
Goal 3	Good Health and Well-being
Goal 4	Quality Education
Goal 5	Gender equality
Goal 6	Clean water and sanitation
Goal 7	Affordable and clean energy

Source: United Nations [11]

According to the AU Report [12], however, the spread of the Coronavirus, the conflict in Ukraine, and the effects of climate change have all impeded Africa's efforts to reach the SDGs. major African countries are still failing to reach major SDG targets halfway to 2030.

2.2 SDG 4 (on Quality Education) and Africa

In Africa, the educational system has taken the biggest impact. Africa has the highest rate of out-of-school children in the world; of the 59 million children of primary school age who were not in school in 2010, half were from Africa (UIS, 2013 in The Sustainable Development Goals Centre for Africa, [13]). Girls are disproportionately impacted by educational impediments in low-resource and hard-to-reach communities such

those experiencing poverty, cultural barriers, violence, and humanitarian situations (Save the Children International, 2013). According to UNESCO [14], in sub-Saharan Africa, 12 million females (compared to 7 million boys) would never go to school.

Academic achievement in Africa has fallen to new lows. Students performed below the international average in both mathematics (62.6% on average) and reading (61.4%). This applies to a wide range of programmes, all the way through college and beyond.

Government neglect may be to blame for the decline of education. According to the African Union and the UNICEF [15], the majority of African countries continue to allocate less than 20 percent of their national budget to education, with roughly one-third allocating less than 15 percent.

Covid-19 school closures, together with other obstacles such as cost, child labour, dropout rates (particularly among girls), and accessibility issues for children with disabilities, kept around 69 million African children out of school that year [15].

The absence of qualified teachers and outdated facilities also have a negative impact on student learning. The percentage of teachers in sub-Saharan Africa who possess the bare minimum of credentials has remained relatively constant at roughly 68% between 2017 and 2019, well below the global average of 81%. However, by 2020, 86.5% of educators in Northern Africa met the minimum qualification standard.

Goal 4 of the SDGs aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" and has 10 associated targets that must be accomplished.

Table 1. Goal 4 targets

Targets	Description
4.1	"By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes"
4.2	"By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education"
4.3	"By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university"
4.4	"By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship"

Targets	Description
4.5	“By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations”
4.6	“By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy”
4.7	“By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.”
4.a	“Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all”
4.b	“By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries”
4.c	“By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States.”

Source: United Nations [16]

According to the African Union, the United Nations Economic Commission for Africa, the African Development Bank, and the United Nations Development Programme [17], fulfilling SDG 4 is crucial because it is linked to most SDGs, including SDGs 3, 5, 8, 12, and 13. Positive health-promoting practises and routines can be fostered through learning. When they grow up, children who have completed their primary school are better prepared to care for their own children and make better use of health and social services. By learning to spot the warning symptoms of disease and acting quickly to get medical attention, moms can reduce their children’s risk of morbidity and mortality [18].

UNDP data from 2022 shows, however, that Africa has made only modest progress towards its goal of providing quality education to all of its citizens. While enrollment has increased significantly, there are still some 288 million children of school age who are not in school, particularly in countries experiencing conflict. The report suggests that more money should be allocated to education infrastructure, with a special emphasis on early and primary schooling, teacher preparation, and digital connectivity.

2.3 Hypothesis Development

2.3.1 Financial inclusion, technology influence and access to quality education

Attitudes towards education financing influence individuals' willingness to invest in education and support educational initiatives. Studies by Lusardi and Tufano (2015) emphasize the role of financial literacy and attitudes in shaping individuals' financial decisions, including investments in human capital development. Positive attitudes towards education financing are essential for overcoming financial barriers to education, promoting access to education, and achieving Sustainable Development Goal 4 objectives.

However, a number of factors may be responsible for students' attitude toward education financing. One of such include access to financial services as a critical factor in promoting economic development and improving individuals' well-being. According to the World Bank's Global Findex Database [19], access to financial services, such as savings, credit, insurance, and payment services, is essential for individuals to manage risks, invest in education,

and smooth consumption. Lack of access to financial services can exacerbate poverty and hinder individuals' ability to invest in education. Bridging the gap in financial inclusion is crucial for achieving Sustainable Development Goal 4 (United Nations, 2015), which aims to ensure inclusive and equitable quality education for all. Thus, the following hypothesis is developed;

H1 Access to financial services significantly influence students' attitudes towards education financing.

Similarly, educational technology also plays a crucial role in expanding access to quality education and improving learning outcomes. As emphasized by Mlambo-Ngcuka (2017), leveraging technology can help address educational challenges by providing innovative learning tools, resources, and platforms. The integration of educational technology in teaching and learning processes has the potential to enhance access to educational resources, facilitate personalized learning experiences, and foster digital literacy skills. Embracing educational technology aligns with the objectives of Sustainable Development Goal 4, as it promotes inclusive and equitable quality

education for all learners. In line with this, the following hypothesis is arrived at;

H2 Awareness and usage of educational technology significantly influence students' attitudes towards education financing.

Another crucial factor is financial behavior, which encompasses individuals' attitudes, beliefs, and actions related to money management and financial decision-making. Research by Duflo, Kremer, and Robinson (2011) highlights the importance of understanding financial behavior in promoting financial well-being and achieving developmental goals. Positive financial behaviors, such as savings habits and responsible financial management, contribute to financial resilience and enable individuals to invest in education and human capital development. Enhancing financial behavior aligns with the goal of achieving sustainable development, particularly in ensuring access to quality education and economic empowerment. Similarly, the following hypothesis have been developed;

Ho3: Financial behavior does not significantly influence attitudes towards education financing.

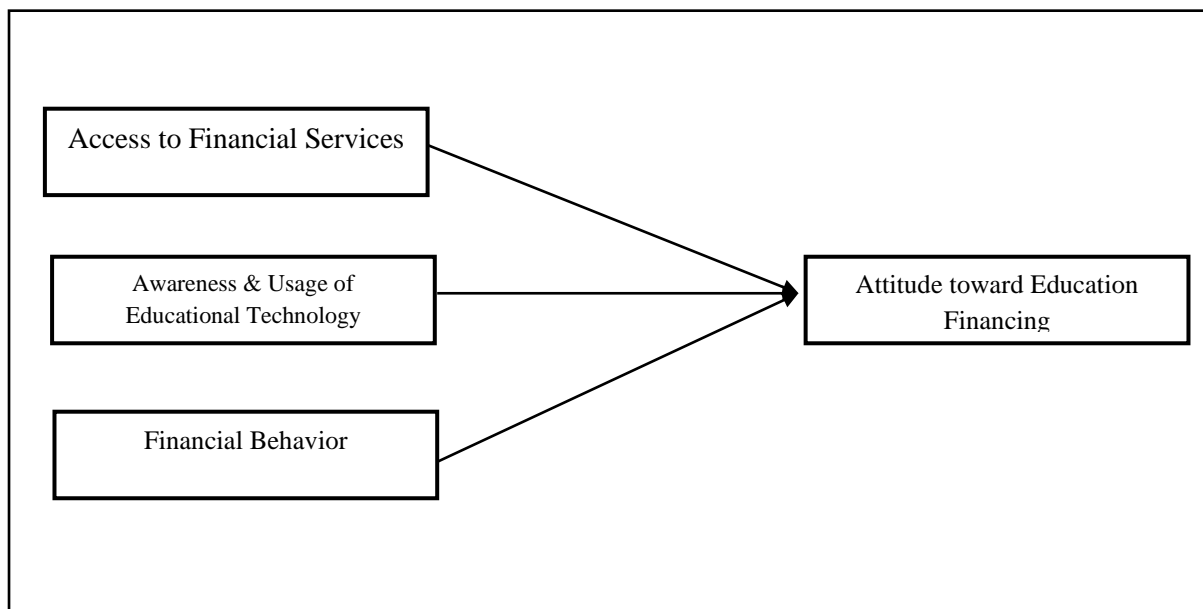


Fig. 1. Conceptual research model

3. METHODS

A total number of 700 students were used as sample, drawn from the universities, federal collages as well as the state colleges of education in the state. Quantitative method was used where a structured survey questionnaires (on a scale of 1 – 5, strongly Agree to Strongly Disagree) were administered to these respondents. Out of the questionnaires issued, 580 respondents completed the questionnaire (with 262 being “MALE” and 318 being “FEMALE”) and this number serve as the basis of our analysis.

For the data analysis, the CB-SEM was employed, with the aid of AMOS software. The analysis was classified into measurement model assessment (validity and reliability of the research items) and the structural model assessment (including path coefficients).

4. RESULTS AND DISCUSSION

4.1 Measurement Model Assessment

This assessment is done purposely in order to assess the validity and reliability of the research instruments.

The item loadings represent the strength of the relationship between each observed variable (survey question) and its underlying latent construct. It will be used in determining the reliability of the measuring constructs.

4.1.1 Validity

Validity was assessed in two ways; the convergent and discriminant validity. For convergent validity, all the standardized factor loadings for items must be above 0.5. The instruments are said to be valid as the factor loadings are above the 0.5 threshold. Likewise for discriminant validity measured by comparing square roots of AVE and correlation values of the constructs in the same column. It confirms validity of the constructs as the square roots of AVE for all the constructs is higher than the correlation values of the constructs in the same column.

4.1.2 Reliability

Measured with Composite reliability (0.83, 0.703, 0.716, 0.811) and the cronbatch alpha (0.811, 0.701, 0.711, 0.809) both with a threshold of 0.7. The result indicate that the constructs are reliable with values for both measures reading above the 0.7 threshold.

Table 2. Confirmatory factor Analysis – CFA

Variables	Items	Factor Loads
Access to Financial Services	AF1	0.711
	AF2	0.765
	AF3	0.723
Awareness & Usage of Edu. Tech.	ET1	0.649
	ET2	0.696
	ET3	0.711
Financial Behavior	FB1	0.727
	FB2	0.585
	FB3	0.625
<i>Attitudes towards Edu Fin.</i>	EF1	0.769
	EF2	0.821
	EF3	0.829

Attitudes towards Education Financing – EF, Access to Financial Services – AF, Financial Behavior – FB, Awareness and Usage of Educational Technology – ET

Table 3. Correlations, AVE & reliability

Variables	AF	ET	FB	EF
AF	(0.66)			
ET	0.332	(0.65)		
FB	0.478	0.649	(0.72)	
EF	0.483	0.526	0.583	(0.78)
Composite Reliability	0.831	0.703	0.716	0.811
Average variance Ext.	0.433	0.429	0.521	0.611
Cronbach a	0.811	0.701	0.711	0.809

4.2 Structural Model Assessment

This present the path coefficients, the R², the path diagram as well as the model fit results.

Table 4. Path coefficients

	P-Val	Remark
AF>EF	0.017	Supported
ET>EF	0.041	Supported
FB>EF	0.027	Supported
R ²		0.43

The path coefficients indicate the strength and direction of the relationships between the independent variables and the dependent variable (attitudes towards education financing). It first reveal that there is a statistically significant direct effect of Access to Financial Services (AF) on Attitudes towards Education Financing (EF), with a p-value of 0.017. The strong direct effect suggests that individuals' access to financial services significantly influences their attitudes towards education financing. This implies that improved access to financial services may positively impact how individuals perceive and approach education financing.

Similarly, the relationship between Awareness and Usage of Educational Technology (ET) and Attitudes towards Education Financing (EF) is

also statistically significant with a p-value of 0.041. The result also play a role in shaping the students attitudes towards education financing. This suggests that technological interventions in education may influence individuals' financial attitudes related to education.

Finally, the path coefficient between Financial Behavior (FB) and Attitudes towards Education Financing (EF) is also statistically significant, albeit with a slightly higher p-value of 0.027. This suggests that individuals' financial behaviors have a significant but slightly weaker effect on their attitudes towards education financing compared to AF and ET. Nonetheless, this relationship reveal the importance of financial behaviors in shaping attitudes related to education financing.

The R-squared value of 0.43 indicates that the three independent variables collectively explain 43% of the variance in Attitudes towards Education Financing (EF). While this suggests a moderate level of explanatory power, it also implies that there are other factors not accounted for in the model that influence individuals' attitudes towards education financing. To further improve the R², further research can be carried out to consider other factors not captured in our model.

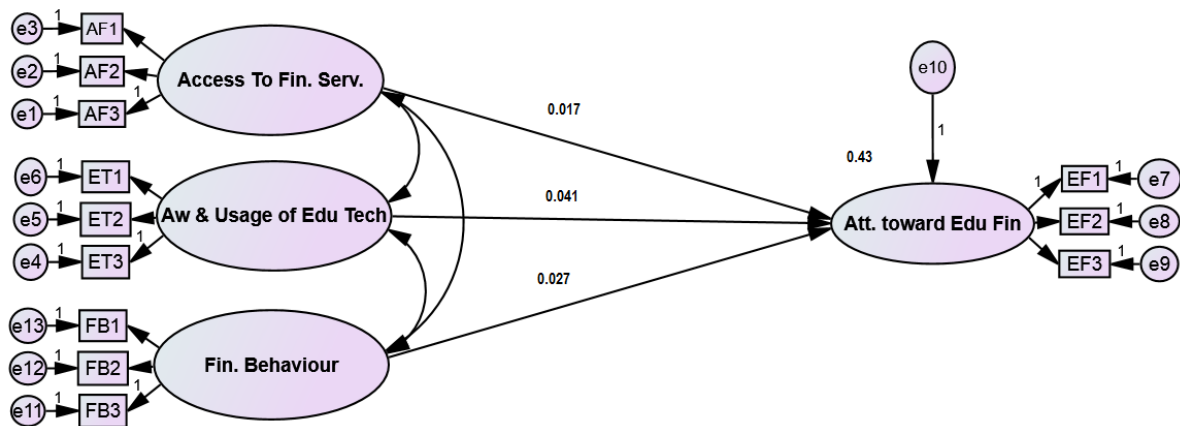


Fig. 2. SEM diagram

Table 5. Model fit

Fit Indices	Value
Chi ²	1.722
CFI	0.926
IFI	0.948
RMSEA	0.062

The fit indices revealed in the table above indicate that the proposed model fits the data reasonably well. The CFI and IFI values exceed the threshold of 0.90, suggesting a good fit. The RMSEA value, although slightly above the ideal threshold of 0.05, still indicates reasonable fit. The Chi-Square value, while statistically significant, is relatively small, which may be due to the sensitivity of Chi-Square to sample size. Based on these fit indices, it appears that the proposed model adequately represents the relationships between the variables.

4.3 Discussion of Results

The path coefficient indicating a significant relationship between access to financial services (AF) and attitudes towards education financing (EF) ($\beta = 0.017$, $p < 0.05$) aligns with prior research emphasizing the pivotal role of financial inclusion in education development [20]. This finding identifies the importance of addressing financial barriers to education, which is essential for promoting inclusive quality education, a cornerstone of Sustainable Development Goal 4 [16]. As argued by Arner et al. [21], increased access to financial services can empower individuals to overcome economic constraints and invest in education, thereby fostering social mobility and sustainable development.

Moreover, the significance of the path coefficient from awareness and usage of educational technology (ET) to attitudes towards education financing (EF) ($\beta = 0.041$, $p < 0.05$) underscores the complementary role of technological innovations in education financing [22]. Integrating educational technology with financial inclusion initiatives can enhance access to educational resources and improve learning outcomes, particularly in underserved regions like Gombe State [23]. This synergistic approach aligns with the principles of SDG 4, which emphasizes leveraging technology for inclusive and equitable quality education [16].

Lastly, the path coefficient indicating a significant relationship between financial behavior (FB) and attitudes towards education financing (EF) ($\beta = 0.027$, $p < 0.05$) highlights the importance of promoting positive financial habits to support education goals [24]. Responsible financial behaviors, such as savings and prudent financial management, can contribute to creating a conducive environment for education financing, thereby facilitating the realization of SDG 4 objectives [25].

5. CONCLUSION AND DIRECTION FOR FURTHER STUDIES

This study sheds light on the critical role of financial inclusion, educational technology, and financial behavior in achieving Sustainable Development Goal 4 (SDG 4) – Quality Education through Financial Inclusion in Gombe State. The findings highlight the significance of addressing financial barriers to education, as evidenced by the positive relationship between access to financial services and attitudes towards education financing. Integrating educational technology with financial inclusion initiatives emerges as a promising strategy to enhance access to educational resources and improve learning outcomes, particularly in underserved regions. Additionally, promoting positive financial behaviors, such as savings and responsible financial management, is essential for creating a conducive environment for education financing. Moreover, is very essential to address issues related to teacher training, infrastructure development, and curriculum reform can further strengthen the impact of financial inclusion and educational technology on learning outcomes. By adopting an approach that combines financial inclusion, educational technology, and promotion of positive financial behaviors, policymakers and stakeholders can advance the agenda of inclusive and equitable quality education in Gombe State, thereby contributing to sustainable development in the region.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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