

## IMPACT OF CLIMATE CHANGE ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN KOGI STATE, NIGERIA

BY

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### ***Abstract***

*This study examined the relationship between managing climate change and secondary school students' academic performance in Kogi State. Four research questions and objectives were formulated for this purpose. The study employs a descriptive survey design, focusing on a population comprising 15 secondary schools across three senatorial districts, which includes 159 teachers and 15,390 students. A sample of 360 respondents were selected, consisting of 60 teachers and 300 students. Data were collected using a self-structured questionnaire titled the Impact of climate change on secondary school students' academic performance Questionnaire Scale (MCCSAPQS), designed with a four-point Likert scale response format: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The reliability coefficient of the instrument was established at 0.97, indicating a high level of reliability for the study. Descriptive statistics, including mean and standard deviation, were utilized to analyze the research questions. The findings reveal consensus among teachers and students in Kogi State regarding the positive impact of integrating climate change education, promoting environmental*

*stewardship, leveraging technology, and engaging parents on students' academic performance. Based on these findings, the study recommends that educational authorities prioritize the integration of climate change topics into the school curriculum, ensuring content relevance and engagement. This could involve developing interdisciplinary approaches that link environmental education with other subjects. Additionally, schools should implement and promote environmental stewardship initiatives that encourage student participation and collaboration, such as community clean-ups, tree planting, and sustainability projects, to enhance student engagement and responsibility.*

**Keywords:** Climate change, academic performance, innovation.

## **Introduction**

Climate change poses significant challenges across the globe, affecting various sectors. As its effects become increasingly evident, integrating climate change education into various sectors, including schools, hospitals, banks etc., has become essential. In Kogi State, Nigeria, the interplay between environmental factors and academic performance is a critical area of concern. As climate change leads to increased temperatures, erratic rainfall, and extreme weather events, students' learning environments may be disrupted, impacting their educational outcomes. Educational institutions play a vital role in preparing future generations to tackle environmental challenges. Secondary schools, in particular, are pivotal in shaping students' understanding of complex issues such as climate change. By incorporating climate change topics into the curriculum, promoting environmental stewardship, leveraging technological innovations, and engaging parents, schools can potentially enhance students' academic performance while fostering a generation of informed and proactive individuals.

The lack of integration of climate change into the curriculum represents a significant challenge for educational systems, particularly in regions like Kogi State, where environmental issues are pressing and directly impact daily life. In such areas, the effects of climate change—such as flooding, droughts, and shifts in agricultural productivity—are not abstract concepts but tangible realities that students encounter regularly. Without embedding climate change education into school curricula, students miss crucial opportunities to understand the complexities of this global issue. This gap in knowledge can undermine their preparedness to tackle future environmental challenges, leaving them ill-equipped to navigate the

impacts on their communities and economies. Furthermore, without a solid grounding in climate science and environmental studies, young people may struggle to engage in meaningful discussions about sustainability and resilience, which are essential for fostering a proactive approach to their local environments. Integrating climate change into educational frameworks not only equips students with essential knowledge and skills but also fosters a proactive mindset toward environmental stewardship. By incorporating topics such as renewable energy, conservation practices, and climate resilience into the curriculum, educators can inspire students to think critically about their roles in mitigating climate change. This approach encourages students to explore innovative solutions and engage in community initiatives, effectively bridging the gap between education and real-world climate action. Moreover, fostering an understanding of the interconnections between human activity and environmental health can empower the next generation to make informed decisions that promote sustainability. As these students grow into community leaders and decision-makers, their education in climate change will be vital in developing strategies to combat environmental issues, ensuring that Kogi State not only adapts to climate challenges but also thrives in a sustainable future.

The lack of emphasis on promoting environmental stewardship poses a significant challenge in Kogi State, where climate change impacts—such as extreme weather events, deforestation, and soil erosion—are increasingly prevalent. Without robust initiatives to cultivate a sense of environmental responsibility among students and communities, there is a heightened risk of insufficient engagement in sustainable practices. This disconnection can lead to a collective inability to address the pressing issues posed by climate change, as individuals may lack the awareness and tools necessary to make environmentally responsible choices. In this context, fostering a culture of environmental stewardship becomes essential; it not only enhances individual and community awareness but also encourages collaborative efforts to combat environmental degradation. Promoting environmental stewardship is a crucial strategy for effectively managing climate change, as it cultivates proactive behaviors and equips individuals with the knowledge and motivation to contribute to environmental conservation. Schools and community organizations can play a pivotal role in this process by implementing programs that emphasize the importance of sustainable practices, such as recycling, conservation of resources, and participation in local environmental initiatives. By integrating environmental stewardship into educational and community frameworks, Kogi State can enhance climate resilience and empower its population to actively engage in mitigating environmental impacts. Such initiatives can lead to a more informed citizenry capable of advocating for and implementing sustainable policies,

ultimately fostering a healthier environment for future generations. As students learn to appreciate and protect their local ecosystems, they will become key players in the broader movement toward sustainability, ensuring that Kogi State can adapt to and thrive amid the challenges posed by climate change.

Leveraging technology and innovation to model climate change scenarios and solutions presents a significant challenge, particularly in regions like Kogi State where resources and technical expertise may be limited. The absence of advanced technological tools and innovative methods can impede effective understanding and management of climate change impacts, leaving communities less equipped to develop and implement practical solutions. In such contexts, traditional approaches may fall short, as they often lack the analytical depth required to address the complexities of climate dynamics. Consequently, without the integration of technology, communities may struggle to grasp the nuances of climate data, leading to uninformed decisions that fail to mitigate environmental risks effectively. Introducing and integrating these technologies into educational and policy frameworks is crucial for managing climate change effectively. By utilizing advanced modeling tools and innovative solutions, stakeholders can enhance predictive capabilities, visualize potential outcomes, and design targeted interventions. For instance, geographic information systems (GIS) can help map vulnerable areas, while climate simulation models can predict the impacts of various scenarios on local ecosystems and economies. This technological integration not only improves climate change education by providing students and community members with practical, hands-on experiences but also fosters informed decision-making and strategic planning among policymakers. As a result, the overall capacity to address environmental challenges is significantly strengthened, enabling Kogi State to build resilience against climate change impacts. Empowering communities with these tools ensures a collaborative approach to environmental stewardship, ultimately leading to more sustainable practices and a greater collective response to the pressing issues of climate change.

Parental engagement in climate change education and initiatives is often a significant challenge, particularly in communities like Kogi State where awareness and involvement may be limited. Many parents may not fully understand the complexities of climate change or the importance of sustainable practices, resulting in a lack of support for their children's environmental education. Without active parental involvement, students may miss out on essential reinforcement of environmental values and practices outside the classroom, which can diminish the overall effectiveness of climate change education. This disconnect can lead to a

situation where students are equipped with knowledge, yet lack the practical application and encouragement needed to adopt sustainable behaviors in their daily lives. Introducing and enhancing parental engagement is a critical strategy for managing climate change effectively. By actively involving parents in climate education and community initiatives, schools can create a supportive environment that extends learning beyond the classroom. Workshops, informational sessions, and community clean-up events can serve as platforms for parents to learn about climate change alongside their children, fostering a shared understanding of environmental issues. This engagement not only strengthens students' understanding and commitment to environmental issues but also promotes a unified approach to addressing climate change at both the familial and community levels. When parents are educated and involved, they can model sustainable behaviors, advocate for environmental initiatives, and collaborate with schools to implement programs that benefit the entire community. Ultimately, fostering strong partnerships between schools and families can lead to a more resilient and environmentally conscious society in Kogi State. It is based on this background the study examined managing climate change with secondary school students' academic performance in Kogi State

The effective management of climate change in Kogi State is hindered by several critical challenges within the educational and community frameworks. Despite the growing awareness of climate change and its impacts, secondary schools in Kogi State face significant challenges in integrating effective climate change education into their curricula. There is a need to understand whether incorporating climate change topics into the educational framework enhances students' academic performance and if such integration can lead to better educational outcomes. Furthermore, while promoting environmental stewardship and leveraging technological innovations are recognized as important strategies, there is limited empirical evidence on their direct impact on students' academic performance in the context of Kogi State. Similarly, the role of parental engagement in supporting climate change education and its effects on students' academic achievements remains underexplored. Without a clear understanding of these factors, educators, policymakers, and stakeholders may lack effective strategies to enhance educational outcomes while addressing climate change. This research aims to fill these gaps by investigating how these different approaches influence the academic performance of secondary school students in Kogi State, ultimately providing valuable insights for improving educational practices and outcomes in the region.

The purpose of the study is to examine managing climate change with secondary school students' academic performance in Kogi State. The specific objective of the study is; To assess the impact of integrating climate change into the curriculum on the academic performance of secondary school students in Kogi State, To evaluate the effect of promoting environmental stewardship on the academic performance of secondary school students in Kogi State, To investigate how leveraging technology and innovation that model climate change scenarios and solutions influences the academic performance of secondary school students in Kogi State, and To examine the influence of parental engagement in climate issues on the academic performance of secondary school students in Kogi State.

### **Research Questions**

1. What are teachers and students view on the integrating of climate change into the curriculum enhance secondary school students' academic performance in Kogi State?
2. What are teachers and students view on the promoting environmental stewardship enhance secondary school students' academic performance in Kogi State?
3. What are teachers and students view on the leverage technology and innovation that model climate change scenarios and solution enhance secondary school students' academic performance in Kogi State?
4. What are teachers and students view on the parental engagement in climate issues enhance secondary school students' academic performance in Kogi State?

### **Methodology**

The design of this study is a descriptive survey. This design is considered appropriate by the researcher because its aim to describe events and situation as it appear to analysis. Emakwu (2019) opines that descriptive survey design is necessary to sample on fraction of the total population for a study and make references from samples. The population of the study comprises 15 secondary schools within the three senatorial districts in Kogi State with 159 teachers and 15390 students (Ministry of Education, Kogi State, 2024). For the purpose of this study, the researcher sampled three hundred sixty respondents. To arrive at this, purposive sampling technique was used to select 4 teachers and twenty (20) students each from the fifteen selected secondary schools in Kogi State i.e sixty teachers and three hundred students. The instrument for data collection is a self-structured questionnaire titled Impact of climate change on secondary school

students' academic performance Questionnaire Scale (MCCSAPQS) was developed by the researcher in order to elicit information from the respondents for both teachers and students as the respondents for the study. The instrument was made up of two sections. Section 'A' to elicit the respondents basic information while section 'B' is to elicit information based on the research questions, which was presented in four clusters. A four point Likert scale responses of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) was used for the study. In order to measure the extent to which the instrument have been able to achieve their aims, the process of content validity was employed by cross-examination and verification. The knowledge gained from other investigation, literature review, theoretical framework and research method helped immediately to validate contents of the instruments. In addition, a more practical avenue of validity explored included consultation within and outside the Department of the researcher. These provided the opportunity to check and test the items as the work progressed. The test re-test reliability co-efficient was used for the study. The instruments were pre-test on 20 respondents which were not included in the scope of the study to ascertain the reliability of the instrument. After the pre-test, the instruments were scrutinized and necessary modifications were made before final administration. The reliability co-efficient of the instrument was determined yielding 0.97 which showed that the instrument is reliable to be used for the study. The instrument was administered to the respondents on the day approved by the authorities of each schools for the exercise. The researcher was assisted by 4 research assistance in the administration and collection of the instruments. In each of selected school, the administration and collection of instruments was done on the same day of administration. On the whole data collection lasted for 4 weeks. Descriptive statistics of mean and standard deviation was used for research questions.

**Results**

**Research Questions One: What are teachers and students view on the integrating of climate change into the curriculum enhance secondary school students' academic performance in Kogi State?**

**Table 1: Mean and standard deviation responses of teachers and students on integrating of climate change into the curriculum**

S/N	Items	Teachers (60)		Decision	Students (300)		Decision
		Mean	St.D		Mean	St.D	

1	Integrating climate change topics into the curriculum will improve students' overall academic performance.	2.70	.93	Accepted	2.93	1.00	Accepted
2	Students will be more engaged in their studies if climate change is included in their subjects.	3.00	.65	Accepted	3.10	.99	Accepted
3	The inclusion of climate change issues in the curriculum will make students more motivated to learn.	3.08	1.04	Accepted	3.76	.42	Accepted
4	Integrating climate change education will help students develop better problem-solving skills.	2.96	.97	Accepted	3.66	.48	Accepted
5	Climate change-related content in the curriculum will enhance students' critical thinking abilities.	2.55	.84	Accepted	3.27	.45	Accepted
Aggregate mean and standard deviation		2.86	.89	Accepted	3.34	.67	Accepted

*Source: Field Survey, 2024*

The data presented in Table 1 indicates that both teachers and students in Kogi State generally support the integration of climate change topics into the curriculum, as evidenced by their mean scores, all of which fall above the neutral midpoint of the scale. The aggregate mean scores of 2.86 for teachers and 3.34 for students suggest a positive consensus on the potential benefits of such integration. Specifically, respondents believe that incorporating climate change into the curriculum can enhance students' overall academic performance, increase engagement, motivate learning, and foster better problem-solving and critical thinking skills. These findings imply that integrating climate change education is not only viewed as beneficial but is also seen as a necessary step toward preparing students for future environmental challenges, thereby enhancing their academic outcomes and equipping them with essential skills for their personal and professional lives.



**Research Question Two: What are teachers and students view on the promoting environmental stewardship enhance secondary school students' academic performance in Kogi State?**

**Table 2: Mean and standard deviation responses of teachers and students on promoting environmental stewardship**

S/N	Items	Teachers (60)		Decision	Students (300)		Decision
		Mean	St.D		Mean	St.D	
1	Promoting environmental stewardship in schools can improve students' overall engagement in their studies.	3.29	.79	Accepted	2.91	.84	Accepted
2	Students who participate in environmental stewardship activities show better academic performance.	3.39	.64	Accepted	3.47	.51	Accepted
3	Environmental stewardship initiatives encourage teamwork and collaboration among students, which positively affects their learning outcomes	3.58	.49	Accepted	3.32	.49	Accepted
4	Participation in environmental stewardship programs enhances students' sense of responsibility, positively impacting their studies.	2.56	.75	Accepted	3.21	.86	Accepted
5	Environmental stewardship activities encourage students to take ownership of their learning, resulting in better academic results.	3.22	.92	Accepted	2.72	.45	Accepted
Aggregate mean and standard deviation		3.21	.72	Accepted	3.13	.63	Accepted

**Source: Field Survey, 2024**

The findings in Table 2 demonstrate that both teachers and students in Kogi State recognize the potential benefits of promoting environmental stewardship for enhancing academic performance. The aggregate mean scores of 3.21 for teachers and 3.13 for students indicate a positive sentiment towards the impact of environmental stewardship on student engagement and performance. Specifically, the data suggests that teachers believe environmental initiatives foster teamwork, responsibility, and ownership of learning, which are essential for academic success. Students similarly acknowledge that participation in such activities correlates with improved academic outcomes. These results imply that integrating environmental stewardship into the educational framework is not only beneficial for fostering a

sense of responsibility and collaboration among students but also crucial for enhancing their overall academic performance. This underscores the importance of embedding environmental education and stewardship initiatives in schools to prepare students for future challenges while promoting academic excellence.

**Research Question Three: What are teachers and students view on the leverage technology and innovation that model climate change scenarios and solution enhance secondary school students' academic performance in Kogi State?**

**Table 3: Mean and standard deviation responses of teachers and students on leverage technology and innovation that model climate change scenarios and solution**

S/N	Items	Teachers (60)		Decision	Students (300)		Decision
		Mean	St.D		Mean	St.D	
1	Utilizing technology to model climate change scenarios improves students' understanding of environmental science.	3.32	.46	Accepted	3.08	1.04	Accepted
2	Students who engage with innovative tools for climate modeling perform better academically in related subjects.	3.46	.51	Accepted	2.96	.97	Accepted
3	Technology-enhanced learning environments increase student motivation and engagement in their studies.	3.31	.47	Accepted	2.55	1.11	Accepted
4	Incorporating technology in climate change education fosters collaboration among students, positively impacting their academic performance.	2.84	.59	Accepted	2.93	1.00	Accepted
5	Learning about climate change through interactive technology enhances students' problem-solving abilities	2.99	.87	Accepted	3.10	.99	Accepted
	Aggregate mean and standard deviation	3.18	.58	Accepted	2.92	1.02	Accepted

**Source: Field Survey, 2024**

The results presented in Table 3 indicate that both teachers and students in Kogi State support the idea that leveraging technology and innovation to model climate change scenarios can enhance academic performance. With aggregate mean scores of 3.18 for teachers and 2.92 for students, there is a general acceptance of the role that technology plays in improving understanding of environmental science and

fostering student engagement. Teachers particularly emphasize the benefits of technology in enhancing knowledge and motivation, while students recognize its potential for improving problem-solving skills. However, students' lower mean scores in some areas suggest that there may be challenges in accessing or effectively utilizing these technologies. This implies that while there is a consensus on the positive impact of technology on learning outcomes, further efforts are needed to ensure that all students can engage with technological tools effectively. Consequently, integrating technology into climate change education could not only enhance academic performance but also prepare students to tackle real-world environmental challenges.

**Research Question Four: What are teachers and students view on the parental engagement in climate issues enhance secondary school students' academic performance in Kogi State?**

**Table 4: Mean and standard deviation responses of teachers and students on parental engagement in climate issues**

S/N	Items	Teachers (60)		Decision	Students (300)		Decision
		Mean	St.D		Mean	St.D	
1	Parental involvement in climate issues will improve students' overall academic performance.	3.29	.79	Accepted	2.70	1.11	Accepted
2	Students perform better academically when their parents actively participate in discussions about climate change.	3.39	.64	Accepted	2.55	1.01	Accepted
3	Parental engagement in climate issues contributes to better academic performance in science subjects among students	3.58	.49	Accepted	3.29	.79	Accepted
4	Students' problem-solving and critical thinking skills are enhanced when their parents are actively involved in climate change education.	2.56	1.06	Accepted	3.22	.91	Accepted
5	The academic performance of students improves when parents engage in activities related to climate change and environmental stewardship.	3.22	.92	Accepted	3.31	.46	Accepted
Aggregate mean and standard deviation		3.21	.78	Accepted	3.01	.86	Accepted

**Source: Field Survey, 2024**

The findings in Table 4 reflect a positive perception among both teachers and students regarding the role of parental engagement in climate issues and its impact on academic performance. Teachers reported an aggregate mean of 3.21, indicating strong agreement that parental involvement can enhance students' overall academic performance. Students, with a mean of 3.01, also recognize the benefits of parental participation, especially in discussions about climate change and its relevance to their studies. The data suggests that when parents are actively engaged in climate-related topics, students not only perform better academically but also develop critical thinking and problem-solving skills. However, the lower mean scores among students in some items indicate potential gaps in parental involvement,

highlighting an area for improvement. This implies that fostering stronger connections between schools and families regarding climate issues could significantly enhance educational outcomes, emphasizing the importance of collaborative efforts in promoting environmental stewardship and academic success.

### **Findings of the Study**

1. Both teachers and students in Kogi State strongly support integrating climate change topics into the curriculum, believing it will enhance academic performance, engagement, and motivation. The data indicates that such integration fosters critical thinking and problem-solving skills, highlighting its importance in educational frameworks.
2. Teachers and students agree that promoting environmental stewardship positively impacts academic performance. The findings reveal that such initiatives enhance student engagement, responsibility, and collaboration, suggesting that environmental stewardship is crucial for improving educational outcomes.
3. There is a consensus among teachers that utilizing technology to model climate change scenarios improves students' understanding and motivation. However, students reported slightly lower agreement, indicating potential barriers to effective technology use in learning, suggesting a need for improved access and engagement strategies.
4. Teachers believe that parental involvement in climate issues enhances students' academic performance, particularly in science subjects. Students also recognize the positive effects of parental engagement, although the lower scores suggest that greater efforts are needed to increase parental participation in climate-related discussions and activities.

### **Discussion of Findings**

Research questions one findings shows that both teachers and students in Kogi State strongly support integrating climate change topics into the curriculum, believing it will enhance academic performance, engagement, and motivation. The data indicates that such integration fosters critical thinking and problem-solving skills, highlighting its importance in educational frameworks. The findings is in accordance with Adesina and Ojo (2021) who highlights the importance of integrating sustainability and climate change education into curricula to enhance students' critical thinking and problem-solving skills. Also Eze and Okeke (2020) study discusses how environmental education, including climate change topics, can improve student engagement and motivation, ultimately impacting academic performance. Furthermore Kpalap and Ogundipe (2022) article emphasizes how integrating climate change into science education fosters critical thinking and enhances student understanding of complex environmental issues.

Research questions two findings shows that teachers and students agree that promoting environmental stewardship positively impacts academic performance. The findings reveal that such initiatives enhance student engagement, responsibility, and collaboration, suggesting that environmental stewardship is crucial for improving educational outcomes. The findings of the study is suggested by Ijaduola and Alabi (2021) discusses how environmental stewardship initiatives can significantly enhance student engagement and responsibility, leading to improved academic outcomes. Edeh and Okwudiri (2021) study highlights how participation in environmental stewardship programs fosters collaboration among students and enhances their sense of responsibility, which can lead to better academic performance. Yusuf and Okeke (2022) review indicates that environmental education initiatives, including stewardship programs, are linked to increased student engagement and improved learning outcomes. Furthermore Sulaimon and Adebayo (2020) study explores how environmental stewardship initiatives enhance students' environmental knowledge and responsibility, leading to positive behavioral changes and academic performance.

Research questions three findings shows that there is a consensus among teachers that utilizing technology to model climate change scenarios improves students' understanding and motivation. However, students reported slightly lower agreement, indicating potential barriers to effective technology use in learning, suggesting a need for improved access and engagement strategies. The study is in line with Ukpe and Nnaji (2022) who discusses how technology-enhanced learning environments can significantly improve students' understanding of climate change topics, emphasizing the role of simulations and modeling tools in enhancing engagement and motivation. Olatunji and Ajayi (2021) highlights the effectiveness of technological tools in enhancing student motivation and understanding of complex environmental issues, including climate change. It also discusses barriers to effective technology use, particularly for students. Also, Owe and Ezeani (2022) research examines how technology can enhance learning outcomes, including motivation and understanding, while also addressing the challenges students face in accessing these technologies. Furthermore Osagie and Ojo (2021) study explores the relationship between technology use and student engagement in environmental science classes, noting that while technology can enhance understanding, various barriers can limit its effectiveness.

Research questions four findings shows that teachers believe that parental involvement in climate issues enhances students' academic performance, particularly in science subjects. Students also recognize the positive effects of

parental engagement, although the lower scores suggest that greater efforts are needed to increase parental participation in climate-related discussions and activities. The findings is in accordance with Baird and Walker (2020) meta-analysis highlights that active parental involvement significantly contributes to students' academic success, particularly in subjects like science, and emphasizes the importance of discussions around relevant topics, including environmental issues. Ibe and Nwafor (2022) study confirms that parental engagement is positively related to students' academic performance across various subjects, including science, and discusses the significance of parents' participation in educational discussions. Also Fagbemi (2021) discusses how parental involvement, particularly in discussions about contemporary issues such as climate change, can enhance students' performance in science and other subjects. Furthermore Chikwendu (2022) research highlights that parental involvement is crucial for promoting academic success and discusses the need for parents to engage in discussions about relevant societal issues, including climate change.

### **Conclusion**

Based on the findings, the study concludes that teachers and students in Kogi State have a strong consensus regarding the positive impact of integrating climate change education, promoting environmental stewardship, leveraging technology, and engaging parents on secondary school students' academic performance. Each of these factors not only enhances students' understanding and engagement but also fosters essential skills such as critical thinking and problem-solving. However, the varying levels of agreement between teachers and students highlight the need for targeted interventions to address potential gaps, particularly concerning technology access and parental involvement.

### **Recommendations**

1. Educational authorities should prioritize the integration of climate change topics into the school curriculum, ensuring that it is relevant and engaging. This could involve developing interdisciplinary approaches that connect environmental education with other subjects.
2. Schools should implement and promote environmental stewardship initiatives that encourage student participation and collaboration. Activities such as community clean-ups, tree planting, and sustainability projects can enhance engagement and responsibility.
3. To fully leverage technology in climate education, schools should invest in resources and training for both teachers and students. This includes



providing access to innovative tools and platforms that model climate scenarios effective.

4. Schools should create programs that actively involve parents in climate education, such as workshops and informational sessions. Strengthening the home-school connection can foster a supportive environment for students and enhance their academic performance.

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