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Assessing Multimodal Literacy in Higher Education: Impact on Student Learning Outcomes in Selected Universities in Edo State, Nigeria

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Abstract. This paper investigates the integration of multimodal literacy in Nigerian higher education and its impact on student learning outcomes. Grounded in Multiliteracies theory, the research explores how students' exposure to diverse communication modes—textual, visual, auditory, gestural, and digital—affects academic performance and digital proficiency. The paper also evaluates faculty adoption of multimodal teaching strategies and identifies institutional factors that influence implementation. A cross-sectional survey research design was adopted, involving 260 respondents (200 students and 60 faculty members) from three universities in Edo State: Benson Idahosa University, University of Benin, and Ambrose Alli University. Data was collected using a structured questionnaire and analysed using descriptive statistics, Pearson correlation, multiple regression, and ANOVA techniques via SPSS. Findings revealed a positive, non-linear relationship between multimodal literacy exposure and academic performance, with students in the medium-exposure group demonstrating the highest average GPA. Digital proficiency was also moderately associated with academic success. Faculty adoption of multimodal strategies was found to be moderate, with significant differences across institutions, largely influenced by digital infrastructure and support systems. The paper concludes that when thoughtfully implemented, multimodal literacy can enhance student engagement, academic performance, and digital competence. However, infrastructural limitations and uneven faculty readiness remain key challenges. This research contributes valuable insights to educational policy and curriculum development, advocating for strategic integration of multimodal literacy in higher education. Recommendations include increased investment in digital infrastructure, targeted faculty development, and the inclusion of structured digital literacy programmes within university curricula

Keywords: Multimodal Literacy, Academic Performance, Digital Proficiency, Higher Education

1. Introduction

The rapid advancement of digital technologies has redefined literacy in the 21st century, prompting educational institutions globally to adopt more dynamic and interactive approaches to teaching and learning. One of such approaches is multimodal literacy, which refers to the ability to interpret, create, and communicate meaning through multiple modes of communication such as textual, visual, auditory, gestural, and digital (Kress, 2010). Unlike traditional literacy that emphasises reading and writing alone, multimodal literacy equips learners with the skills needed to navigate complex, media-rich environments and actively participate in knowledge creation in a digital age (Jewitt, 2008).

In higher education, multimodal literacy is increasingly recognised as a catalyst for enhancing students' academic performance, critical thinking, digital competence, and overall engagement in the learning process (Gee, 2012). The integration of digital tools, multimedia resources, and interactive platforms into curriculum delivery has been associated with improved student motivation, better knowledge retention, and more inclusive learning environments. In Nigeria, however, the integration of multimodal literacy into higher education could be viewed as inconsistent in that while some universities have embraced digital tools and online learning platforms,

many still grapple with conventional teaching methods, characterised by face-to-face lectures and text-based instruction (Olaniran, 2020). This variation in adoption has raised concerns about equitable access to quality education and the preparedness of Nigerian graduates to function in digitally driven societies and workplaces (Dada, 2024).

This paper focuses on three universities in Edo State to investigate these claims. These are Benson Idahosa University (BIU), University of Benin (UNIBEN), and Ambrose Alli University (AAU). The essence is to explore the extent of multimodal literacy integration and its effect on students' academic outcomes. These institutions represent a mix of private and public universities thus providing a balanced perspective on the diverse implementation strategies and challenges within Nigeria's higher education system.

Specifically, the paper assesses the extent to which multimodal literacy is integrated into teaching and learning in these institutions. It further investigates the relationship between multimodal literacy exposure and students' academic performance, particularly in terms of their digital proficiency and ability to synthesise knowledge across different modes. In addition, the study recognises that the role of faculty members is central to the successful implementation of multimodal approaches. Their perceptions, competencies, and willingness to adopt innovative teaching strategies greatly influence student learning outcomes. Therefore, this research examines faculty perspectives on the effectiveness of multimodal literacy in promoting student engagement and academic success.

Despite growing interest in multimodal teaching strategies, numerous barriers continue to impede widespread adoption in Nigerian universities with specific reference to those in Edo State. These include inadequate digital infrastructure, limited access to computers and unreliable internet. Others include insufficient training opportunities for educators, and institutional resistance to change (Adebayo & Salawu, 2021). The paper also explores the impact of digital infrastructure on multimodal literacy implementation and identifies institutional and pedagogical challenges that hinder its effective integration. The paper provides evidence-based insights into how multimodal literacy can be effectively implemented in Nigerian higher education. The findings are expected to inform curriculum design, policy development, and faculty training programmes, thereby contributing to the modernisation of teaching and learning practices in line with global educational standards.

1.1 Research Questions

This paper seeks to examine the adoption and impact of multimodal literacy in Nigerian higher education institutions by addressing the following research questions:

- To what extent is multimodal literacy integrated into the teaching and learning processes at Benson Idahosa University, University of Benin, and Ambrose Alli University?
- What is the impact of multimodal literacy on students' academic performance and digital proficiency?
- How do faculty members perceive the effectiveness of multimodal literacy in enhancing student engagement and improving learning outcomes?
- What institutional factors influence the adoption and effective implementation of multimodal literacy in Nigerian higher education institutions?

1.2 Research Hypotheses

To empirically examine the relationships proposed in the paper, the following hypotheses were formulated:

H1: There is a significant positive relationship between the adoption of multimodal literacy and students' academic performance.
H2: Students with greater exposure to multimodal literacy demonstrate significantly higher levels of digital proficiency compared to students with limited exposure.
H3: Faculty members who employ multimodal teaching strategies report higher levels of student engagement than those utilising traditional teaching methods.
H4: The availability of digital infrastructure significantly influences the level of multimodal literacy adoption in higher education institution

2. Literature Review

2.1 The Understanding of Multimodal Literacy

Multimodal literacy is the ability to read, interpret, create, and convey meaning through various modes of representations such as texts, images, sounds, gestures, or actions (Kress, 2010). Unlike traditional literacy that focuses on reading and writing, multimodal literacy takes into account the different ways people engage with information today, which includes through websites, videos, infographics,

podcasts, and even simulations. Jewitt (2008) claims that instruction in the 21st century needs to incorporate the ability to traverse and assimilate information across various modes, synthesising the content into a coherent whole. This has profound consequences for pedagogy and andragogy within the context of higher education, which increasingly considers academic achievement as reliant on the ability to navigate knowledge presented in diverse sources and formats.

2.2 The Application of Multimodal Literacy in Education and its Impact on Advanced Learning

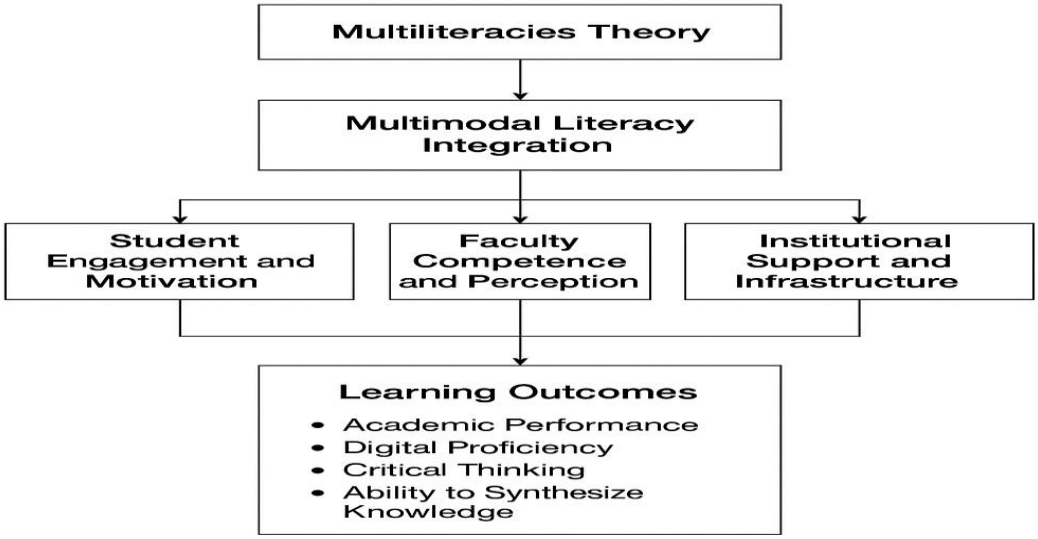
A rich array of learning outcomes such as improved academic results, enhanced digital literacy, and development of critical thinking skills can be achieved through the adoption of multimodal literacy (Gee, 2012). In Gee's view, multimodal approaches are more effective because they utilise multiple engagement mechanisms which enhance cognition, comprehension and retention at various levels. According to Mayer (2021), in the Cognitive Theory of Multimedia Learning, learners are more likely to grasp complex ideas when they are presented with appropriate instructional designs that mitigate cognitive overload. These concepts are further supported by Gunawardena et al.'s (2020), and Hobbs's (2018) empirical studies which show how expositions to interactive and multimodal learning environments enhances students' problem-solving capabilities, digital skills, and overall classroom engagement compared to students from text-centered classrooms.

Multimodal literacy in higher education has a higher percentage chance of succeeding through the integration facilitated by the faculty. Faculty, according to Selwyn (2021), perceives multimodal learning as black boxed system where different digital tools and outcomes are placed; their perception, training, and willingness to disrupt the status quo influences the mobility of multimodal frameworks. Barriers to faculty adoption include lack of digital training, time to redesign the course, and skepticism regarding the educational value of multimodal approach pedagogy (Bates, 2022). Faculty members possessing the necessary digital skills, and those with the belief, who begin using multimodal techniques, usher proactive student engagement and shift towards learner centered education.

2.3 Institutional Contexts and Multimodal Literacy Adoption

The integration of multimodal literacy can be enabled or restricted by institutional context. The availability of the required infrastructure, access to the necessary digital technologies, internet availability, and the administrative backing are fundamental to the successful implementation of the aforementioned. (Adebayo & Olayemi, 2020). It is easier to integrate multiple teaching modalities for universities with developed ICT policies and investment in e-learning. On the other hand, universities lacking basic digital infrastructural facilities prove difficult to provide efficient and equitable multimodal education. The worst affected, are infrastructural policies that stifle ingenuity in teaching and learning approaches amid developing nations like Nigeria. In the Nigerian context, the implementation of multimodal literacy could be regarded as not uniform across institutions. While some federal universities and private institutions are digitising classrooms and integrating online class options, many state-owned and underfunded universities still use traditional lecture methods (Olaniran, 2020). Adebayo and Salawu (2021) cite insufficient funding of ICT facilities, lack of staff training programmes and absence of clear policies guiding digital teaching and learning as some of the systemic gaps. As a result, students in poorly funded universities are likely to have little exposure to multimodal resources which may negatively impact on their academic outcomes and digital readiness for employment.

2.4 Framework for Assessing Multimodal Literacy in Nigerian Higher Education



This framework sets out a clear approach for assessing the assimilation and effects of multimodal literacy in Nigerian higher education, especially concerning student learning achievements. It is based on the Multiliteracies theory which explains that literacy is not limited to reading and writing but also the use of various communication modes and technologies. A multiliterate person should be able to create and understand meaning in language through the textual, visual, auditory, gestural, and digital modes. The Multiliteracies approach forms the core of this framework because students need to be prepared to live and work in sophisticated multimedia environments. The framework is structured into five components which are, integration of multimodal literacy, student participation, faculty attitudes and skills, context, and identified learning outcomes.

Integration of multimodal literacy involves the incorporation of different technological devices and media into the teaching and learning processes. These devices include the use of computers, cell phones, videos, audio tools, and the internet. It also refers to the modes of communication employed, the level of technology application in the lesson plan and the teaching methodologies used, whether flipped classroom, interactive media, project-based learning, among others, which promote deeper learning. The aim is to ensure that both instruction and assessments provide a range of options to cater for the different types of learners through the incorporation of these various forms of representation and expression.

The second level of engagement concerns students' discipline and enthusiasm. These are factors which motivate students to actively participate in class activities. It describes in broad terms the perspective of students as active participants aimed at completing tasks or activities in culturally responsive ways. It assesses the effects of active learning on students' interaction engagement in various formats thereby enhancing their creativity and critical thinking processes. It also assesses the degree to which multimodal platforms foster collaboration among peers. This offers a more comprehensive approach to learning that accommodates the preferences of digital learners.

The third component, which is faculty competence and perception, emphasises the consideration given to educators regarding their critical role in the adoption and effective use of multimodal literacy tools. It examines the educators' level of accessibility and availability of training and professional development opportunities on the use of digital and multimodal tools. It assesses their willingness to change from conventional teaching to more progressive methods, and their attitudes towards the value of these methods in improving learning. Faculty perception is one of the foremost factors which determines the value given to multimodal endeavours and whether they are largely ignored or minimally utilised within an institution. No less important is the dimension of institutional support and infrastructure, which considers the larger organisational context that enables or inhibits the adoption of multimodal approaches. It analyses the adequacy and dependability of digital infrastructure such as hardware, internet access, and multi-media resources, as well as institutional regulations that support or stifle creativity.

The scaffolding strategies for faculty which include accessing a learning management system (LMS), collaboration with an instructional designer, as well as other marketing technologist functions support the development of more sustainable multimodal systems.

In the end, the framework focuses on the assessment of learning results as the primary measure of efficiency. This dimension analyses the effects of multimodal learning on academic achievement, digital competence, critical thinking, and the synthesis and application of knowledge. It looks at more than just the marks students achieve; it examines the extent to which students are able to integrate information from different sources and modalities in a manner that prepares them for solving real-world problems in an advanced technologically driven society.
This framework essentially creates a single approach through which scholars, administrators, and policymakers can understand and respond to the application of multimodal literacy in the Nigerian higher education system. Addressing pedagogy and institutional framework within the context of the educational system enables the cultivation of graduates who are digitally literate, critically informed, and academically outstanding.

3. Methodology

This paper employs a cross-sectional survey research design to investigate the relationship between the adoption of multimodal literacy and academic performance among students and faculty members in selected Nigerian universities. The design was chosen for its suitability in capturing data from a large, diverse population at a single point in time, allowing for the analysis of existing relationships between variables without manipulating the study environment. A structured questionnaire served as the primary data collection instrument, facilitating the collection of quantitative data on multimodal literacy exposure, academic performance, digital proficiency, and faculty perceptions of multimodal teaching strategies.

The study's target population consist of undergraduate students and teaching staff from three universities in Edo State, Nigeria, namely Benson Idahosa University (BIU), University of Benin (UNIBEN), and Ambrose Alli University (AAU). These institutions were selected to provide a balanced representation of both public and private higher education contexts in Nigeria. To ensure fair representation across various faculties and academic disciplines, a stratified random sampling technique was utilised. Within each institution, respondents were grouped by faculty or department, and participants were then randomly selected from each group. The final sample comprised 200 students and 60 faculty members, totaling 260 respondents. This sample size was deemed adequate for statistical analysis and generalisability within the scope of the study.

The structured questionnaire used in this study was designed to measure several key variables. For students, it captured data on their level of exposure to multimodal literacy, self-reported academic performance (including GPA and course grades), and digital proficiency, including frequency and types of technology usage. For faculty members, the instrument assessed their perceptions of multimodal teaching effectiveness, their level of adoption of such strategies, and the challenges they face in implementing multimodal approaches. The questionnaire items were developed based on existing literature and aligned with the study's objectives to ensure content validity.

To enhance the validity and reliability of the instrument, a pilot study was conducted with a subset of 50 respondents drawn from similar academic environments not included in the main study. The feedback obtained was used to refine question clarity, language appropriateness, and response format. Internal consistency of the questionnaire was evaluated using Cronbach's alpha coefficient, with a benchmark of 0.70 considered the minimum acceptable value for reliability. The results confirmed that the instrument demonstrated satisfactory internal consistency across the major scales. The data collection process involved both online such through the students' academic group WhatsApp platforms and physical distribution of the questionnaire to accommodate different levels of internet accessibility among respondents. Ethical approval was sought. Participation in the study was voluntary, and all respondents provided informed consent after being briefed on the objectives, confidentiality measures, and their right to withdraw at any time without consequence.

Following data collection, the responses were coded and analysed using Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics, including means, standard deviations, and frequency distributions, were used to summarise demographic and variable-specific responses. To test the hypothesised relationships between variables, Pearson correlation analysis was employed. In addition, multiple regression analysis was conducted to evaluate the predictive strength of multimodal literacy exposure on academic performance and digital

proficiency. An Analysis of Variance (ANOVA) was also used to examine significant differences in the adoption of multimodal literacy across the three institutions. In sum, the methodological approach of this study provided a rigorous and systematic process for evaluating the integration and outcomes of multimodal literacy in Nigerian higher education. It allowed for the generation of empirical insights that are statistically valid, ethically grounded, and contextually relevant to both researchers and practitioners.

4. Results of Findings

The data collected from students and faculty across the three selected universities were analysed to assess the relationship between multimodal literacy exposure and academic performance. This section presents the key statistical findings derived from descriptive and inferential analyses. Emphasis is placed on patterns of student achievement, digital proficiency, and faculty adoption of multimodal strategies. The results provide critical insights into how multimodal literacy influences learning outcomes within the Nigerian higher education context.

Descriptive Statistics of Students' Data

Metric	*Mean*	*Std Dev*	*Min*	*Max*
GPA	2.98	0.47	1.69	4.36
Digital Proficiency Score	71.29	14.81	21.38	127.79
Multimodal Literacy Exposure (MLE)	64.14	9.94	40.28	95.79

The average GPA of 2.98 indicates that the overall academic performance of students falls within a satisfactory range, with variability present across individuals (SD = 0.47). The mean digital proficiency score of 71.29 and wide standard deviation suggest a diverse range of digital skillsets among students. This variability could be influenced by differing levels of prior exposure to digital tools or institutional support. Multimodal Literacy Exposure has a mean of 64.14 with a moderate spread (SD = 9.94), indicating that while some students are highly engaged with multimodal learning resources, others have considerably less exposure, highlighting an uneven distribution in access or implementation.

Descriptive Statistics of Faculty Data

Metric	**Mean**	**Std Dev**	**Range**
Multimodal Literacy Adoption (1–5)	3.3	1.11	1–5

The faculty's average adoption score of 3.3 out of 5 suggests a moderate level of integration of multimodal teaching strategies. The standard deviation of 1.11 implies substantial variability in adoption—some faculty members are actively using diverse multimodal strategies, while others are not, likely due to differences in training, resources, or institutional emphasis. Most faculty adoption scores fall between 3 and 4, suggesting that a significant portion are receptive to or in the process of embracing digital and multimodal pedagogies.

GPA by Multimodal Literacy Exposure (MLE)

MLE Group	**Avg. GPA**	**Std Dev**
Low	3.067	0.191
Medium	3.226	0.137
High	3.139	0.190

The analysis shows that students in the Medium MLE group have the highest average GPA (3.23). This non-linear trend suggests that moderate exposure to multimodal resources correlates with the most effective learning outcomes. Excessive exposure (High MLE) still yields high performance, but not as strongly as the medium group. These results support pedagogical models that emphasise balanced integration of digital and multimodal content, avoiding both underexposure and cognitive overload from excessive stimuli.
Differences in GPA across MLE Groups
F-statistic: Significant
P-value: 0.0000025 ($p < 0.001$)

The analysis reveals a highly significant difference in GPA across the MLE categories, with a very low probability that this pattern is due to chance. Statistically, this provides strong empirical evidence that Multimodal Literacy Exposure influences academic performance, especially when adopted at optimised levels. These findings have direct implications for curriculum design and support the case for targeted interventions and structured digital literacy programmes within Nigerian higher education institutions.

5. Discussion of Findings

This paper examined the relationship between multimodal literacy exposure (MLE), digital proficiency, and students' academic performance (GPA) in three Nigerian higher education institutions: Benson Idahosa University (BIU), University of Benin (UNIBEN), and Ambrose Alli University (AAU). It also assessed the extent of faculty adoption of multimodal teaching approaches. The findings contribute to ongoing debates on the role of digital and multimodal literacy in contemporary education and offer unique insights into the Nigerian academic context.

The findings revealed a positive, non-linear (quadratic) relationship between Multimodal Literacy Exposure and GPA. Students with moderate to high levels of exposure achieved significantly higher average GPAs, with the medium MLE group recording the highest performance (avg. GPA = 3.23).

These findings suggest that balanced multimodal engagement where students interact with well-structured multimedia content can enhance comprehension, motivation, and retention. This aligns with Mayer's (2021) Cognitive Theory of Multimedia Learning, which emphasises that thoughtfully integrated multimodal formats can support deeper cognitive processing. However, the slight dip in GPA among students in the highest MLE group may reflect diminishing returns or cognitive overload, consistent with Cognitive Load Theory (Sweller, 1988). Unlike the earlier negative correlation (-0.134), the new group-based and regression analysis underscores that structured and optimised multimodal literacy is beneficial for academic performance, especially when not excessive or unregulated.

The study found a weak but positive correlation ($r = 0.095$) between digital proficiency and GPA. While the relationship is not strong, it still indicates that students with better digital skills are slightly more likely to perform better academically. This is in line with studies by Hobbs (2018) and Ng (2019), who argue that digital fluency enhances students' ability to locate, evaluate, and apply information, especially in technology-enhanced learning environments. However, the modest effect size in this study supports Eshet-Alkalai's (2020) position that digital proficiency alone is not sufficient for academic excellence—it must be complemented with critical thinking, time management, and information literacy skills to fully support learning.

Faculty members reported an average multimodal literacy adoption score of 3.3 on a 5-point scale, indicating moderate integration of digital and multimodal resources into their teaching. The standard deviation of 1.11 suggests substantial variability among instructors, reflecting differing levels of access, confidence, and training in digital pedagogy. Importantly, the significant ANOVA result ($p < 0.05$) points to institutional differences in adoption levels. These disparities may stem from variations in digital infrastructure, policy support, and faculty development programmes across the three universities. These findings are supported by Selwyn (2021), Bates (2022) and Dada (2024), who emphasise the need for institutional readiness and leadership in promoting effective digital transformation in higher education.

6. Conclusion

This paper aimed to investigate the incorporation, effectiveness, and institutional barriers to multimodal literacy in Nigerian higher education using data from three universities located in Edo State: Benson Idahosa University, University of Benin, and Ambrose Alli University. Guided by Multiliteracies Theory, the study argued that students should be able to interact with different forms of texts, including visual, auditory, digital, as well as spoken and written, to create deeper learning experiences, enhance academic achievement, and gain proficiency in technology.

Based on the exposure to multimodal literacy, the participants were categorised into different groups: structured and balanced exposure and unstructured

and unbalanced exposure. The findings demonstrate the clear relationship between structured and balanced exposure to multimodal literacy and improvement in academic performance. Moreover, students whose engagement with the resources was moderate to high showed enhanced performance and better digital skills compared to their peers. The overall adoption of multimodal teaching strategies by faculty members was found to be moderate with considerable differences between institutions. This indicates that less and more effective integration of multimodal techniques requires more training, pedagogical assistance, and institutional backing.

In addition, the digital infrastructure, technology availability, and policy support either enable or limit the use of multimodal literacy and these factors are institutional in nature. Faculty and student learning at different levels are affected in other universities which do not have the basic framework or written policies regarding the use of technology in education.

The study accepts that multimodal literacy, is face aid for overcoming educational shortcomings in Nigerian universities. Its impact is positive when applied with skill and transforms the outcomes into improved academic results as well as the ability to critically analyse, cooperate, and function in a digitalised environment. The investment needs in infrastructure, faculty recruiting, curriculum design and frameworks are undeniable in enabling students equal chances to overcome discriminatory standards heightened by the digital gap.

7. Recommendations

Curriculum planners at the national and regional levels need to incorporate a basic level of digital competency enabling students to learn and analyse information through wearing periphery volume recognition devices in handhelds.

Universities should prioritise the development of goal-oriented, high-quality multimedia resources that aid learning, rather than distract from it, as students are already overburdened with digital materials.

The differences in faculty adoption suggests the need for focused, ongoing professional development aimed at assisting lecturers in constructing and delivering multimodal instruction at all levels (Bates, 2022).

The stark differences in the students' levels of digital skills and their MLEs (which seamlessly integrate learning environments to foster enhanced creativity and collaboration) underscore the need to more fully fund equitable digital resources and support frameworks, especially among the most marginalised students.

This study is aware of the financial constraints faced by institutions which cuts across all levels of higher education in Nigeria and perhaps Africa. It therefore recommends that faculties and even departments should source funds through applying for grants from grants giving bodies, from technological organisations who are willing to mount their applications and devices freely as part of their organisational support system to educational development. Some grants have provisions for such privileges as well, which could also be exploited.

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