Introduction: Addressing Academic Performance in Nigerian Secondary Education

In recent years, Nigeria's education sector has undergone significant transformations, particularly in its approach to standardized testing. The shift towards Computer-Based Testing (CBT) for critical examinations like the Unified Tertiary Matriculation Examination (UTME) marks a pivotal change in the country's educational landscape. This transition, while aimed at reducing examination malpractice and streamlining the assessment process, has inadvertently highlighted persistent challenges in the quality of secondary education across the nation.

The Joint Admissions and Matriculation Board (JAMB), Nigeria's pre-tertiary examination governing body, recently released statistics that paint a concerning picture of student performance. In the 2024 UTME, a staggering 76% of participants – approximately 4 out of every 5 students – scored below 200 points, which represents less than 50% of the total achievable score. This alarming figure serves as a clarion call for immediate and decisive action to address the underlying issues affecting student performance.

While it might be tempting to attribute this underperformance to recent technological distractions or the shift to computer-based testing, our analysis reveals a more complex and long-standing problem. The challenges facing Nigerian secondary education are multifaceted, encompassing issues of digital literacy, socioeconomic factors, the quality of educational resources, and the often-overlooked aspects of student mental health and special needs support.

This report aims to dissect these challenges and propose data-driven solutions to improve academic outcomes for Nigerian secondary school students. By leveraging advanced data analytics and predictive modeling, we seek to provide schools, educators, and policymakers with the tools and insights necessary to make informed decisions and implement targeted interventions.

Our objectives are threefold:

1. To identify and analyze the key factors influencing student performance in standardized examinations like JAMB and WASSCE.
2. To develop a comprehensive data solution that enables schools to collect, manage, and utilize student data effectively.
3. To create a predictive model that assesses a student's likelihood of success in upcoming examinations, taking into account a wide range of academic and non-academic factors.

Through this analysis and the resulting recommendations, we aim to contribute to the ongoing efforts to enhance the quality of secondary education in Nigeria. Our goal is to ensure that an overwhelming majority of students not only pass their examinations but excel, setting them on a path to success in their tertiary education and beyond.

Background Analysis: Debunking Misconceptions and Examining Long-Term Trends

The TikTok Fallacy: Social Media's Perceived Impact on Academic Performance

Recent discussions on social media platforms, particularly Twitter, have pointed to the rise of TikTok and other social media apps as a primary culprit for declining JAMB pass rates. This narrative suggests that increased screen time and digital distractions are directly responsible for poor academic performance. However, a closer examination of historical data reveals a different story.
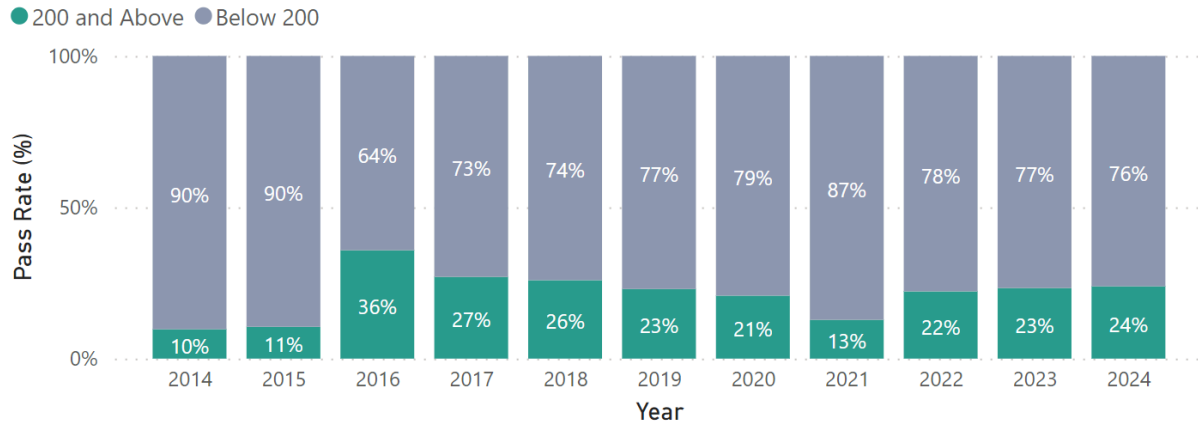
"There are so many things to blame for this JAMB mass failure but what tops the list for me is social media. Children who should be busy with studying are always on social media as contents creators on different platforms, while neglecting their education or giving little time for it." Twitter user @egi_nupe__

"Tiktok is dealing with our teens and youths, Dem no fit write and pass jamb again smh" Twitter user @Wizebaba

Long-Term Trends in JAMB Performance

However, data from the past decade tells a different story. The pass rate for students scoring above 200 in JAMB has consistently struggled, with this year's pass rate of **24%** being the highest since **2018**. In fact, the problem of low pass rates predates TikTok's rise in popularity among teenagers. Historical data shows that **since 2014**, only one year—2016—had a pass rate **above 30%**, with a high of **36%**. Therefore, the argument that social media platforms are solely to blame for the mass failure **is not supported by the data.**

Jamb Pass Rate since 2014

● 200 and Above ● Below 200

Pass Rate (%)

Year	200 and Above	Below 200
2014	10%	90%
2015	11%	90%
2016	36%	64%
2017	27%	73%
2018	26%	74%
2019	23%	77%
2020	21%	79%
2021	13%	87%
2022	22%	78%
2023	23%	77%
2024	24%	76%

This graph illustrates the fluctuation in JAMB pass rates over the past decade, demonstrating that the current challenges are part of a long-standing trend rather than a recent phenomenon attributable to TikTok or other social media platforms.

While it's true that social media platforms like TikTok may influence how students allocate their time, attributing poor academic performance solely to these platforms oversimplifies a complex issue. Our analysis suggests that the root causes of declining JAMB performance are multifaceted and deeply ingrained in the educational system.
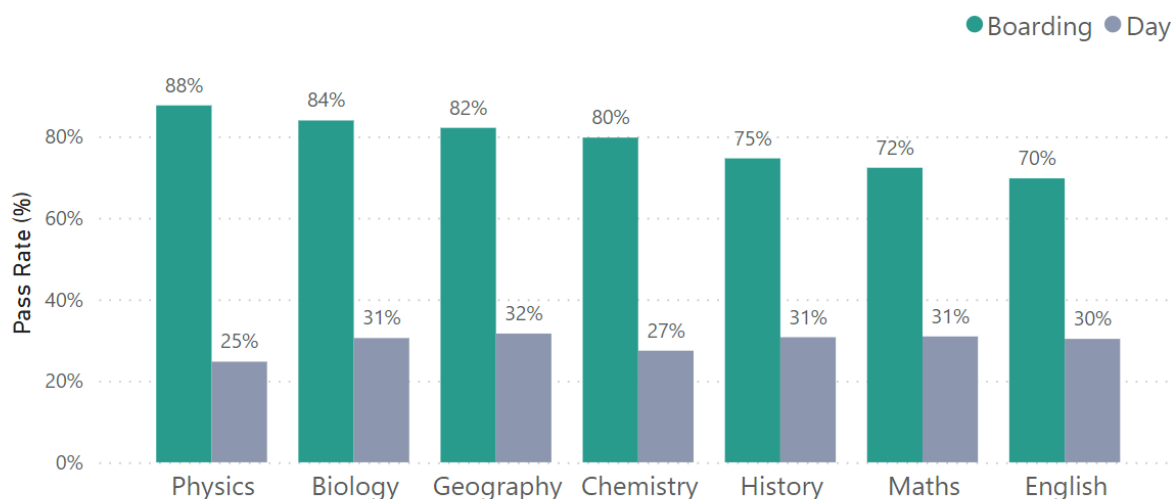
Key Factors Affecting Student Performance

Our comprehensive analysis has identified several critical factors that significantly impact student performance in JAMB and other standardized examinations. These factors extend beyond simple explanations and reveal the complex interplay of various elements within the Nigerian educational ecosystem.

Boarding Students vs Day Students: The Impact of Balanced Routine

Research indicates that boarding students significantly outperform day students in exams. This study, conducted in Kano Metropolis, analyzed West African Senior Secondary Certificate Examinations **(WASSCE) results from 2005 to 2011**, highlighting the consistent advantage boarding students hold over their day counterparts.

The chart below visually underscores the stark difference in pass rates between boarding and day students across various subjects. Boarding students show higher pass rates in all subjects, with Physics having an 88% success rate compared to only 25% for day students. This trend holds across other key subjects like Biology, Geography, and Chemistry.

Pass Rates by Residency

● Boarding ● Day

Subject	Boarding	Day
Physics	88%	25%
Biology	84%	31%
Geography	82%	32%
Chemistry	80%	27%
History	75%	31%
Maths	72%	31%
English	70%	30%

So, what's driving this difference?

Key contributing factors include:

- **More Study Time:** Boarding students often have extended hours dedicated to studying without distractions from social media or commuting.

- **Balanced Routine:** With a structured schedule, students in boarding schools can allocate time to academics, co-curricular activities, and rest in a balanced manner.
- **Less Distraction:** Day students may face distractions such as commuting, home responsibilities, or access to social media, which limits their focus on studies.
- **Better Facilities:** Boarding schools typically provide better academic resources, libraries, and quiet spaces conducive to learning.

This difference in performance is concerning, as the study found that day students in Kano never exceeded a **50%** pass rate in any subject throughout the examined years. The study calls for reforms to the education system, particularly in day schools, to provide more resources, reduce classroom congestion, and improve the learning environment.

Ultimately, while the boarding school system fosters an environment tailored to academic excellence, day schools require a focused intervention to level the playing field.

Digital Literacy and CBT Readiness

The introduction of Computer-Based Testing (CBT) for the Unified Tertiary Matriculation Examination (UTME) in 2013, fully enforced by 2015, was a strategic move to curb examination malpractice and ensure more valid results. However, while this shift has successfully reduced cheating, it has inadvertently revealed a pressing issue: the significant decline in students' pass rates, largely due to their low digital literacy.

Before the implementation of CBT, between 2010 and 2013, when Paper-Based Testing (PBT) was still in use, pass rates averaged 43%. In stark contrast, since the switch to CBT, pass rates have dropped dramatically to an average of 23% between 2015 and 2024—an almost 50% reduction.

Average Pass Rates for different UTME formats
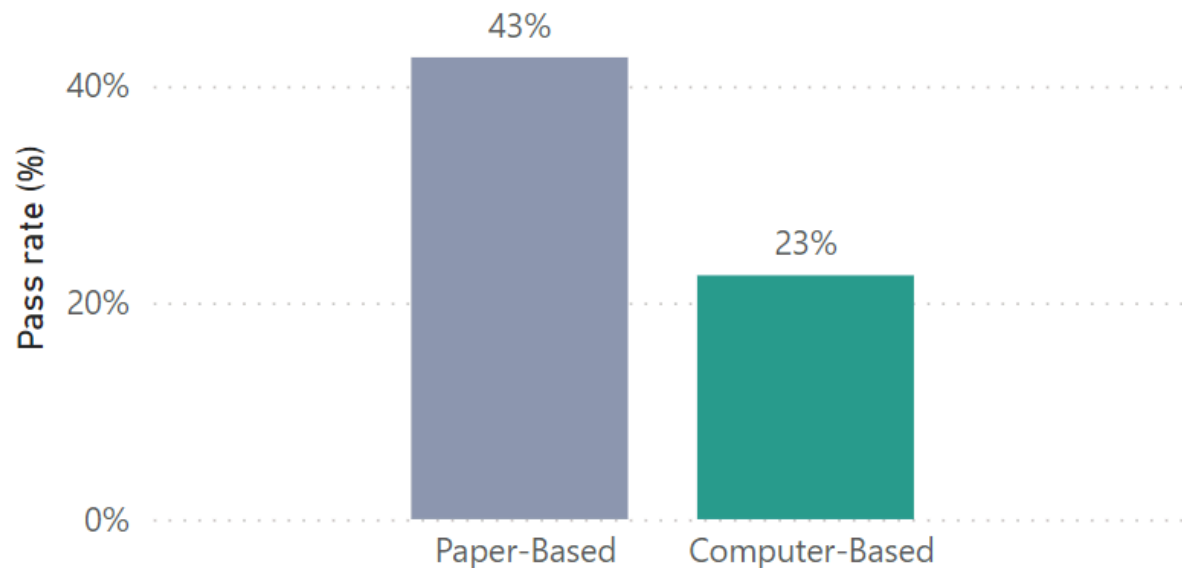
This sharp decline isn't entirely surprising. Many Nigerian students, particularly those in rural areas, lack access to computers and, as a result, struggle with basic digital skills. In fact, many students report negative attitudes toward CBT due to their unfamiliarity with computers and the pressure of time constraints during exams. According to a recent study, 46% of respondents felt the time allotted for CBT exams was disproportionately short compared to paper-based tests, limiting their ability to carefully review their work. Students from rural areas, in particular, expressed frustration with the speed required for CBT, indicating that they often feel rushed and unable to properly think through their answers. One respondent remarked, "I prefer paper exams... I would have more time to solve more questions and cross-check my work" [R14, Urban-Private School].

Furthermore, students believe their performance suffers in CBT due to the inability to brainstorm as effectively as they would in a paper-based test. Respondents noted that during CBT exams, the pressure of the ticking clock often forces them to make rushed decisions, resulting in lower scores. One student commented, "You just pick any answer and get out" [R39, Rural-Private School].

Technical difficulties also compound the issue. In some cases, students experienced power outages, computer malfunctions, and connectivity issues that disrupted their exams, further exacerbating their negative experiences with CBT. For instance, a student reported that "the generator went off during my exam, and we had to wait for 1 hour and 30 minutes before continuing" [R35, Rural-Private School].

While CBT practice apps such as Educare, TestDriller, and Myschool.ng have shown promise in improving student performance, the widespread issues of digital literacy and infrastructure

challenges remain prevalent. Efforts from organizations like the Centre for Digital Development and Innovation Research (CDDIR) are making strides in bridging the digital divide, but these initiatives fall short in reaching the most vulnerable populations, particularly in rural areas.

To truly bridge the gap in CBT performance, it is imperative that we not only improve digital accessibility and education but also address the negative attitudes and technical challenges students face during computer-based exams. Without a concerted effort to provide equitable access to digital tools and enhance students' comfort and competence with CBT, the full benefits of this testing format may never be realized.

Guardian's Impact: The Crucial Role of Family Background

Guardians indeed play a significant role in shaping a student's academic performance. Numerous studies have shown that factors such as a guardian's income, educational background, and the nature of their relationship with their wards directly influence student outcomes.

1. Guardian's Income: The financial resources of a guardian can significantly affect a student's academic performance. Higher income often means access to better educational resources—such as private tutoring, learning materials, and stable learning environments—that can enhance student success. For example, research by **Kellaghan et al. (1993)** found that socio-economic status, including household income, is one of the most consistent predictors of student achievement globally. Similarly, a study conducted in Nigeria by **Egunsola (2014)** found that the income level of parents/guardians had a direct impact on students' academic performance, especially in science subjects.

2. Guardian's Educational Level: The educational attainment of a guardian influences their involvement in their child's education. Guardians with higher levels of education are more likely to help with homework, encourage learning, and have higher expectations for their children. A study by **Haveman & Wolfe (1995)** highlighted that children with better-educated parents generally have higher educational aspirations and performance. In Nigeria, **Omoruyi and Osunde (2014)** revealed that parental education has a strong positive effect on students' achievement in secondary schools, particularly when guardians are actively engaged in their child's academic life.

3. Guardian-Student Relationship: A supportive and positive relationship between a guardian and a student fosters a conducive learning environment. According to **Epstein's (2001)** theory of overlapping spheres of influence, family involvement in schooling is a key factor in student success. A warm, caring relationship builds emotional stability and encourages academic effort, while a strained relationship can lead to emotional and psychological issues, negatively affecting a child's school performance. In Nigeria, **Okeke et al. (2012)** emphasized that parental involvement, specifically through emotional support and guidance, improves students' academic engagement and outcomes.

These studies underscore the importance of guardian-related factors in academic achievement. The socio-economic status, educational background, and relational dynamics between guardians and students are all vital areas where interventions can be made to enhance the academic success of students.

Special Needs and Mental Health Support

Research has consistently shown the significant impact of mental health and special needs on a student's academic performance and overall well-being. Students with conditions such as **ADHD, autism, dyslexia**, and other neurodivergent conditions require specialized support, which, unfortunately, is often insufficient in Nigeria. The lack of adequate care for these students widens the educational achievement gap between them and their peers.

Although the Nigerian government has introduced policies aimed at promoting **inclusive education**, the **implementation** of these policies remains weak. **Infrastructural support** for students with special needs is severely lacking due to issues such as **insufficient funding**, **inadequate teacher training**, and a **lack of resources** to foster inclusive learning environments. As a result, students with disabilities or neurodivergent conditions face greater challenges in accessing quality education and achieving academic success.

Mental health support in Nigerian schools is similarly neglected. Despite growing awareness of conditions such as **anxiety, depression,** and **confidence issues**, many schools lack **psychologists or counselors** to address these problems. This absence of mental health resources contributes to higher rates of **absenteeism, poor academic performance,** and even **school dropouts** among students struggling with mental health challenges. Studies highlight the detrimental impact of untreated mental health conditions on a student's academic journey.

The few initiatives currently addressing these issues are insufficient. Many schools, especially those in **rural areas**, remain **understaffed and under-equipped** to provide the necessary support for mental health and special needs. This failure to address such critical issues exacerbates **inequalities** within the education system and prevents many students from reaching their full academic potential.

Our Solutions

In response to the challenges identified in the Nigerian secondary education system, particularly in the areas of student performance, special needs support, and mental health, we have developed a set of solutions aimed at improving academic outcomes. These solutions leverage data analytics, predictive modeling, and digital tools to offer actionable insights for students, educators, and policymakers.

Student's Pass Likelihood Predictor

To address the challenges in student academic performance, we developed the **Student's Pass Likelihood Predictor**. This model estimates the likelihood of a student passing based on various factors, which include demographic information, academic performance, and external influences. These factors were selected through research insights and tailored for the Nigerian educational system.

Data Generation Process

Due to the lack of real-world data, synthetic data was generated to simulate the conditions faced by students in Nigerian schools. This process ensured that the generated data closely mirrored the realities of the school environment, providing a reliable foundation for analysis. The key features used in the model include:

1. **Student Attributes**

- **Age & Gender**: Basic demographic factors that help identify trends in performance based on maturity and subject preferences.
- **Department**: Students in different departments (Science, Arts, Commerce) face unique academic challenges, which are reflected in their performance.
- **Boarding or Day Student**: Boarding students generally have structured schedules, whereas day students might encounter external distractions.
- **Attendance Score**: Strong attendance often correlates with better academic engagement, making this a key predictor of performance.
- **Computer & Lesson Hours**: The amount of independent study and extracurricular lessons a student participates in plays a critical role in their exam readiness, particularly for computer-based exams.
- **Mental Health**: As mental health directly affects academic performance, a mental health score was included to account for students facing anxiety or other challenges.

2. **Guardian's Data**
   - **Income**: Guardian income impacts access to educational resources, such as private tutoring and study materials.
   - **Relationship & Education Level**: The level of family involvement and guardian education can greatly affect a student's success, making this an essential factor in the model.

3. **School Features**
   - **Computer Lab Access**: Given the rise of computer-based testing (CBT), access to a computer lab can significantly improve a student's familiarity with digital tools and thus their exam performance.
   - **Teacher Qualifications**: More experienced and better-qualified teachers tend to improve student performance, which is why this feature was included in the model.

student_data.csv

ID	Age	Gender	Department	Boarding_or_Day	Attendance_Score	Computer_Hours	Lesson_Hours	Mental_Health	Guardian_Income	Guardian_Education	Guardian_Relationship	Computer_Lab	Avg_Computer	Min_
1	17	Male	Commerce	Day	75.48	6	1	73.03	249624.86	Tertiary	Single Mom	1	2	Maste
2	16	Female	Science	Boarding	85.77	19	15	2.08	348283.29	Primary	Single Mom	1	5	Bache
3	17	Male	Science	Boarding	87.58	6	1	67.38	270478.94	Secondary	Grandparent	1	5	Bache
4	18	Female	Science	Day	72.58	8	12	49.86	280954.19	Primary	Other Relative	1	2	Bache
5	16	Male	Commerce	Boarding	88.34	0	13	55.24	229401.64	Tertiary	Both Parents	1	5	Bache
6	16	Male	Commerce	Boarding	83.45	5	4	31.18	50000	Secondary	Both Parents	1	4	Bache
7	18	Male	Science	Boarding	65.92	5	9	5.95	95533.35	Primary	Both Parents	1	1	Bache
8	17	Male	Science	Boarding	76.4	11	9	15.04	245487.58	Tertiary	Single Mom	1	2	Bache
9	16	Female	Science	Day	80.86	11	11	100	198906.09	Secondary	Both Parents	1	4	Bache
10	17	Male	Commerce	Boarding	100	9	9	36.78	243984.29	Tertiary	Both Parents	1	4	Bache
11	16	Female	Arts	Boarding	90.57	5	15	44	367642.34	No Formal Educa	Both Parents	1	4	Bache
12	16	Male	Science	Day	71.65	16	7	3.79	272603.6	Secondary	Single Mom	1	3	Bache
13	17	Male	Science	Day	89.86	18	10	2.68	325888.62	Secondary	Both Parents	1	2	Bache
14	15	Male	Science	Boarding	69.53	17	14	88.41	209468.14	Secondary	Both Parents	1	2	Bache
15	15	Female	Arts	Day	95.83	5	8	54.07	119278.43	Secondary	Both Parents	1	2	Diplo
16	16	Male	Commerce	Boarding	80.29	18	1	49.75	194213.38	Tertiary	Single Mom	1	1	Bache
17	15	Female	Science	Boarding	84.06	9	4	19.5	119524.82	Secondary	Both Parents	1	4	Maste
18	17	Male	Science	Day	98.26	7	13	95.59	355829.5	Tertiary	Both Parents	1	2	Maste
19	16	Female	Science	Day	72.13	20	6	12.89	279039.11	Primary	Single Mom	1	5	Bache
20	15	Female	Commerce	Boarding	71.03	5	14	14.74	252051.25	Primary	Both Parents	1	3	Bache
21	18	Female	Science	Day	79.16	20	5	43.23	323594.32	No Formal Educa	Both Parents	1	1	Diplo
22	16	Female	Commerce	Day	95.38	6	5	23.61	50000	Secondary	Single Mom	1	3	Maste
23	17	Female	Arts	Day	69.81	0	6	19.9	258813.8	Secondary	Both Parents	1	4	Bache
24	15	Female	Science	Day	56.68	17	2	72.54	68935.42	Tertiary	Single Mom	1	5	Bache
25	16	Female	Science	Boarding	80.49	19	12	73.68	199274.43	Secondary	Both Parents	1	4	Bache
26	17	Male	Science	Day	90.52	11	2	100	168829.24	Secondary	Both Parents	1	2	Maste

Pass Likelihood Calculation

The **Pass Likelihood** is determined by combining the various student, guardian, and school features. Each feature contributes a specific weight toward the final likelihood score. Continuous features such as **Attendance Score** and **Lesson Hours** are normalized to ensure consistency across different scales. Categorical features such as **Guardian Education** and **Boarding Status** are converted into numeric values, allowing for an effective combination of all factors.

The overall **Pass Likelihood** is calculated based on the following components:

- **Attendance Score**
- **Computer Hours**
- **Lesson Hours**
- **Mental Health Score**
- **Guardian Income**
- **Guardian Education Level**
- **Teacher Experience**
- **Boarding Status**
- **Teacher Education Level**

Each of these components is assigned a predefined weight, which contributes to the final score, reflecting the importance of that factor in predicting academic success.

Adding Realism through Noise

To simulate real-world uncertainties, small variations are introduced:

- **Normal Distribution Noise**: This accounts for minor fluctuations in performance, such as day-to-day differences in student concentration or effort.
- **Exponential Distribution Noise**: This accounts for significant real-life challenges, such as socio-economic barriers or unexpected events, that might negatively impact performance.

Pass/Fail Threshold

A threshold of **0.6** is used to classify the student's outcome. If the pass likelihood score is greater than or equal to 0.6, the student is predicted to pass. Otherwise, they are predicted to fail.

Model Training and Evaluation

The model was trained using a **logistic regression classifier**:

- **Train-Test Split**: The dataset was divided into 70% training data and 30% testing data to evaluate the model's performance.

- **Model Accuracy**: The model achieved an accuracy of **89%**, indicating a high level of reliability in predicting student outcomes.

Confusion Matrix
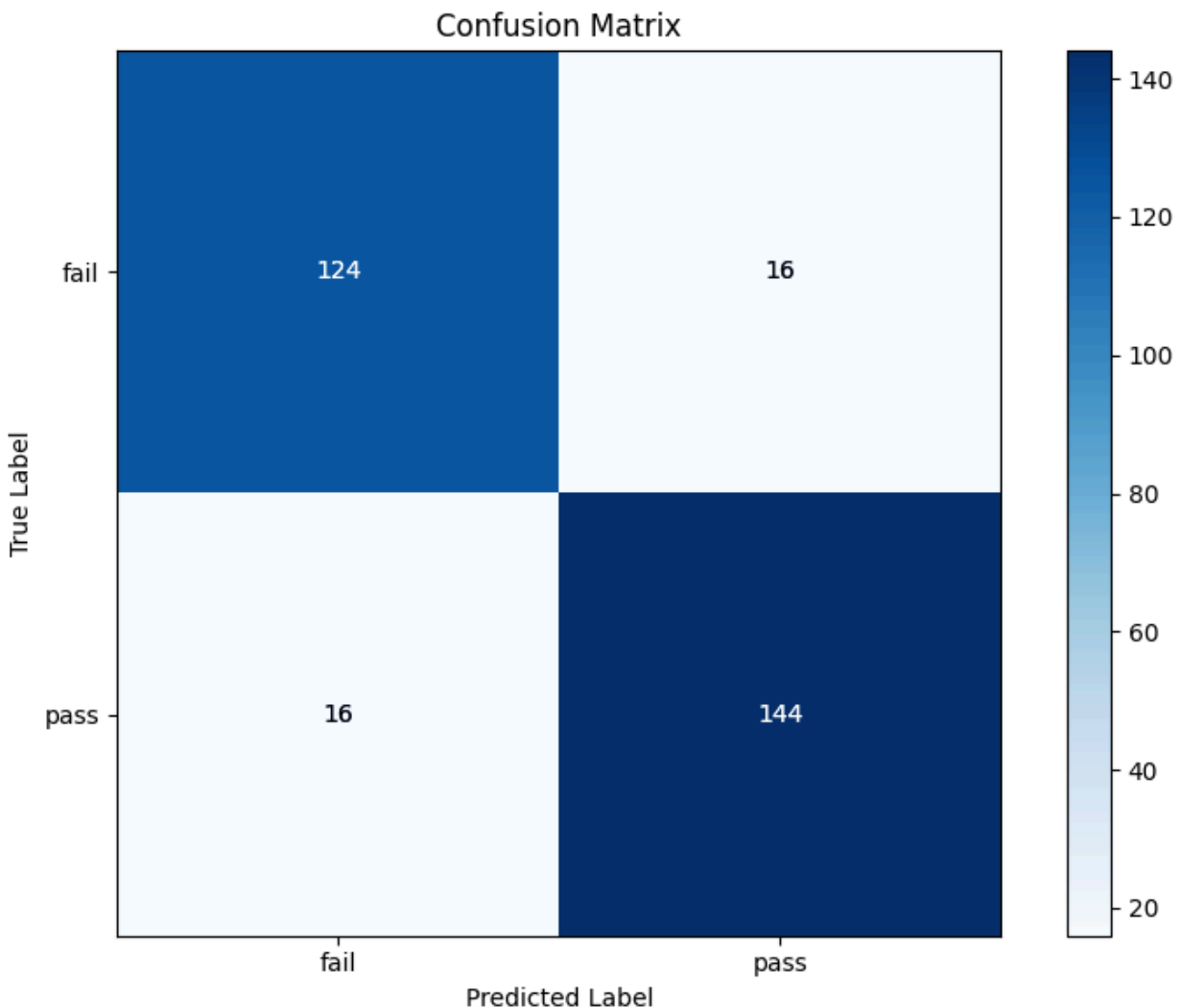
Web Application Interface

The **Student Performance Prediction App** provides an easy-to-use interface where users can input data related to a student's demographics, academic performance, and external factors. The app then predicts whether the student is likely to pass, displaying results with a probability score. This tool helps educators and parents identify students in need of support and guide targeted interventions.

SPSS Survey: Mental Health and Special Needs Assessment

As part of our comprehensive approach to improving student performance, we developed the **Student Mental Health and Special Conditions Questionnaire**. This tool is designed to collect detailed information on the mental well-being and special learning needs of students. By integrating this data into the broader model, schools can gain insights into how mental health and neurodivergent conditions impact academic outcomes.

Data Collection via SPSS Questionnaire

The questionnaire is divided into six sections, each addressing key areas of student well-being and learning conditions:

1. **Demographic Information (Section A)**
   - Basic student data such as **age**, **gender**, and **school type** (boarding or day) is collected to establish demographic trends.
   - Information about the student's **school location** (urban or rural) is included to assess how access to resources may differ based on geographic factors.
2. **General Well-Being (Section B)**
   - This section assesses students' general state of physical and mental health, including questions about **stress levels**, **sleeping habits**, and overall **mental well-being**. These factors are critical in understanding a student's readiness to perform academically.
3. **Anxiety and Confidence (Section C)**
   - Questions in this section target the student's **levels of anxiety**, **self-confidence**, and their ability to handle academic pressures. Data on exam-related

nervousness, avoidance of responsibilities, and academic self-perception is crucial for identifying students who may need additional emotional or psychological support.

4. **Neurodivergence and Special Learning Needs (Section D)**
   ○ This section identifies students with **diagnosed learning conditions**, such as **ADHD**, **autism**, or **dyslexia**, and assesses whether they receive adequate support. It also explores student awareness of the **accommodations** available to them, such as extra time during exams or specialized tutoring.

5. **Emotional and Psychological Support (Section E)**
   ○ Here, the focus is on students' access to and comfort with **mental health support**. It asks about feelings of isolation, the availability of school counselors, and whether students have someone to talk to when they are feeling overwhelmed or anxious. This information is vital for schools seeking to improve their **counseling and support services**.

6. **Perception and Awareness of Mental Health (Section F)**
   ○ This final section gauges student awareness of **mental health issues** and learning differences, as well as their perceptions of how well these topics are discussed and addressed in their school. Understanding how comfortable students feel seeking help allows schools to assess the **effectiveness of mental health programs** and identify areas for improvement.

Computing the Mental Health Score

The responses from this questionnaire are not merely analyzed for correlation—they are used directly to compute the **mental health score**, a critical feature in the predictive model. This score aggregates student responses related to anxiety, emotional well-being, sleep patterns, and other mental health factors.

For example, students who report frequent anxiety, inadequate sleep, or feelings of isolation receive a lower mental health score, which in turn may predict a lower likelihood of academic success. This enables schools to take proactive measures by offering counseling, additional support, or special accommodations where necessary.

Benefits to Stakeholders

1. **Students**: By filling out this questionnaire, students are empowered to share their challenges, which may lead to better-targeted interventions and accommodations.
2. **Educators**: Teachers and administrators can use this data to identify at-risk students and provide early interventions, whether through mental health support or tailored learning plans.
3. **Policy Makers**: The insights gained from analyzing this data can inform decisions on how best to allocate resources, improve school infrastructures, and support special needs education across different regions.

Starlight School Management System

The **Starlight School Management System** is an intuitive platform designed to track student progress and identify at-risk students through **predictive analytics**. The system integrates data from various school operations, including academic performance, attendance, and behavioral reports, into a centralized platform that is easy to navigate for school administrators.
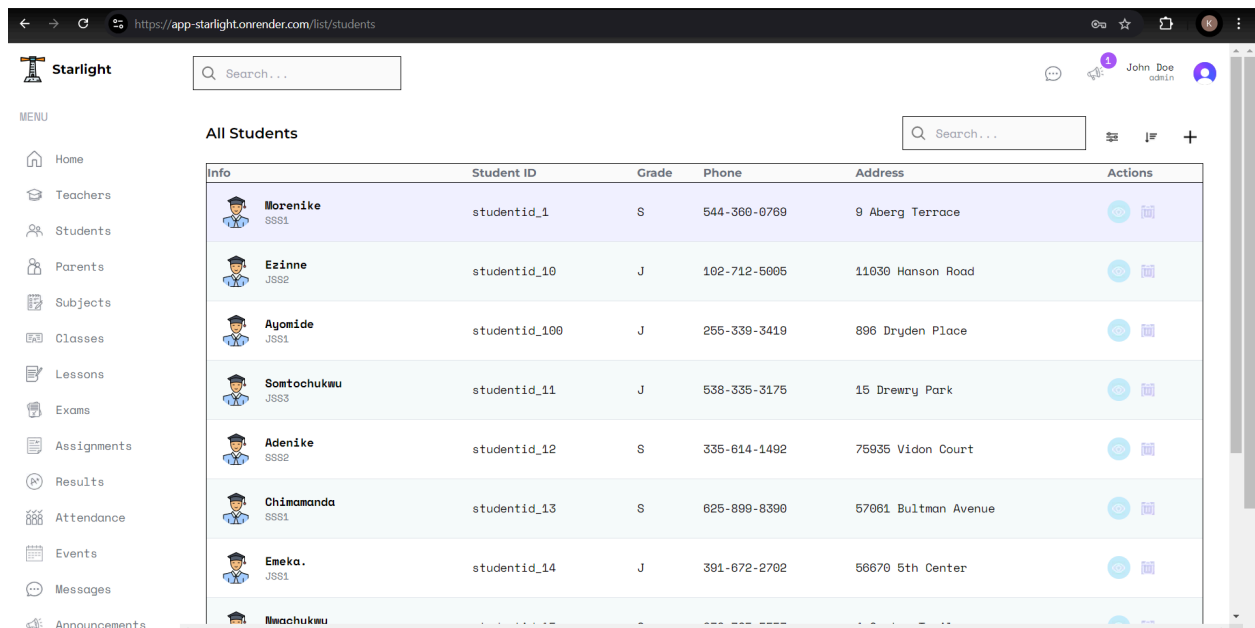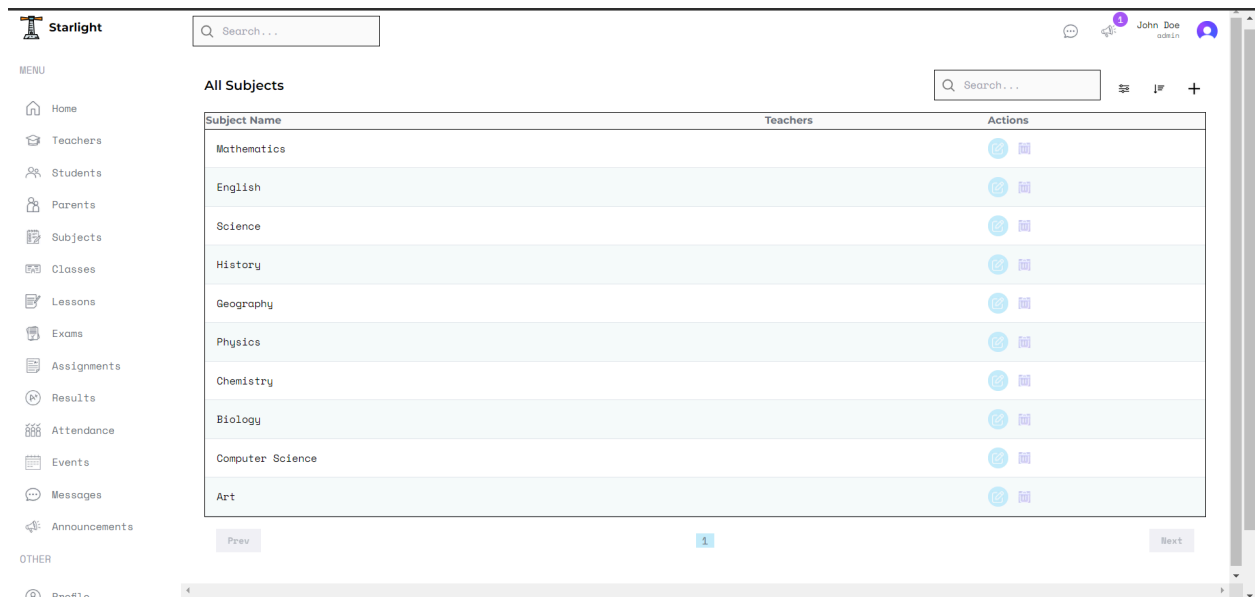
Data Collection Plan

Data from school operations is collected and stored in a **PostgreSQL database**, including:

- **Student Information**: Demographic details such as age, gender, and class level.
- **Academic Performance**: Exam results, assignment scores, and participation records.
- **Attendance Data**: Logs of student attendance, lateness, and absences.
- **Behavioral Data**: Reports on student behavior and engagement in class.
- **Special Needs and Mental Health Data**: Scores from mental health assessments and records of accommodations for students with learning needs.

Data Warehouse and Schema

To efficiently manage and analyze large volumes of data, the system employs **Google BigQuery** as a **data warehouse**. The data is structured using a well-designed **schema**, allowing for fast and efficient queries. Key tables include:

- **Student Info Table**: Contains demographic information linked by student ID.
- **Performance Table**: Records exam scores, assignment grades, and participation metrics.
- **Attendance Table**: Tracks student attendance, lateness, and absences.
- **Mental Health and Special Needs Table**: Includes data from mental health assessments and any accommodations provided to students.
- **Behavioral Table**: Logs behavior and engagement reports for each student.
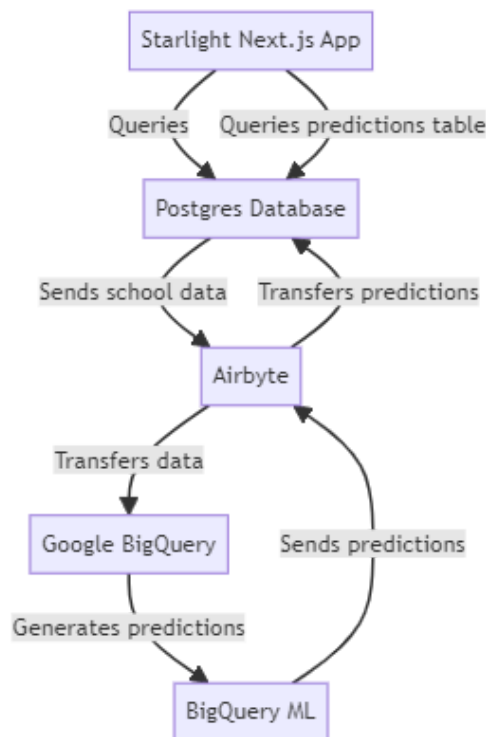
Data Transfer and Processing with Airbyte

The system uses **Airbyte** to transfer data from the **PostgreSQL database** to **Google BigQuery**, enabling real-time processing and analysis. The **machine learning model** is trained on this data to generate predictions about student performance. Once the model produces predictions, Airbyte syncs the results back into the school's database, ensuring that the data displayed in the admin dashboard remains up to date.

Predictive Analytics and Machine Learning

The **machine learning model** analyzes key features—such as academic performance, attendance, behavioral patterns, and mental health indicators—to predict which students are at risk of underperforming. These predictions allow schools to take proactive steps, offering early interventions to students in need of additional support.

Admin Dashboard

The **admin dashboard** serves as the central hub for school administrators. It provides a user-friendly interface that displays students' academic and behavioral data, allowing educators to monitor progress in real-time. Key features include:

- **Student Profiles**: View detailed information about individual students, including academic records, attendance, and behavior.
- **Subject Management**: Manage subjects and track which teachers are assigned to each subject.
- **Performance Insights**: Displays predictive insights for at-risk students, enabling early intervention.

Deployment and Hosting

The **Starlight School Management System** was built and deployed on **Render**, ensuring a reliable and scalable platform. It is hosted at the following link: [Starlight Academy Management System](#), where administrators can log in to access all features.

Recommendations

Our findings highlight several key areas where schools, educators, and policymakers can take action to improve student performance and support overall well-being. Based on the insights gathered from the analysis and the solutions implemented, we propose the following recommendations aimed at addressing the core challenges in Nigerian secondary education.

One of the most pressing issues is the lack of adequate **mental health support** in schools. Many students face challenges such as anxiety, depression, and emotional stress, which can significantly impact their academic performance. Schools should prioritize the establishment of mental health programs, making counseling services readily available to students. Incorporating mental health education into the curriculum would raise awareness and empower students to seek help when needed. Teachers should also be trained to recognize early signs of mental health issues, so they can provide timely interventions and direct students to the appropriate resources.

In addition to mental health, there is an urgent need to enhance support for students with **special learning needs**. Neurodivergent students, including those with ADHD, dyslexia, or autism, often do not receive the accommodations they require to succeed. Schools must ensure they are equipped with specialized educators and learning resources to support these students. Providing accommodations such as extra time during exams or tailored tutoring can help level the playing field. Regular assessments of inclusive education policies should be carried out to ensure that students with special needs have access to the necessary support.

Our **predictive analytics system**, built into the Starlight School Management System, highlights the importance of identifying at-risk students early. Schools should adopt data-driven strategies to track student performance in real time and use predictive models to identify students who may need additional support. By utilizing the insights generated from the Student Pass Likelihood Predictor, educators can offer tailored interventions such as personalized study plans, extra tutoring, or one-on-one mentoring for students who are at risk of underperforming. Schools must continuously update their models based on student feedback and evolving educational trends to ensure accuracy and effectiveness.

Another challenge identified is the struggle many students face with **digital literacy**, especially in rural areas. The introduction of Computer-Based Testing (CBT) has exposed the gap in technological access and preparedness for many students. Schools need to focus on expanding access to computer labs and providing digital literacy training to ensure students are prepared for CBT exams. By integrating digital literacy into the curriculum, students will become more comfortable with technology, which is crucial for their success in a world that is increasingly reliant on digital tools. Governments and schools should also work together to ensure students in rural areas have access to the same technological resources as their urban counterparts.

To make these recommendations work, schools need to embrace **comprehensive data management systems**. Implementing a platform like Starlight allows schools to efficiently

collect, store, and analyze student data. By training administrators and teachers to use data analytics tools effectively, schools can monitor trends in student performance, behavior, and engagement. Regular data audits will help maintain the accuracy of this information and improve decision-making processes.

Finally, we cannot overlook the critical role that **guardians** play in a student's academic journey. Schools should foster strong relationships with guardians, providing regular updates on their child's progress and offering guidance on how they can support learning at home. Hosting workshops or seminars for parents can equip them with the tools they need to assist their children academically, emotionally, and mentally. Increased engagement from families can significantly improve student outcomes, as guardians become active participants in their child's education.

In conclusion, improving student outcomes requires a holistic approach that encompasses mental health support, special needs accommodations, digital literacy, and active engagement from both educators and families. By leveraging the data-driven insights provided by the Starlight School Management System, schools can identify at-risk students early, provide timely interventions, and create an environment where every student has the opportunity to succeed.

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