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TECHNICAL REPORT FOR PROJECT FOUR

BLOOMING CREST STUDENT PERFORMANCE ANALYSIS

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Introduction

The objective of this analysis is to thoroughly evaluate student performance while examining the various factors that may influence academic outcomes. Specifically, this study will assess the impact of peer pressure, the level of parental involvement, the quality of teachers, the presence of learning disabilities, and access to essential resources such as the internet and educational materials. By analyzing these key factors, the goal is to gain a deeper understanding of how they contribute to or hinder student success, ultimately providing insights that could help improve learning experiences and academic achievement.

The key datasets required for this analysis include:

1. **Student Performance Data** – Scores, grades, and overall academic performance metrics.
2. **Peer Influence Data** – Information on student social interactions, peer group behaviors, and academic motivation.
3. **Parental Involvement Data** – Level of parental supervision, participation in school activities, and support for homework.
4. **Teacher Quality Data** – Teacher qualifications, experience, student feedback, and teaching effectiveness ratings.
5. **Learning Disability Data** – Records of diagnosed learning disabilities, accommodations provided, and their impact on performance.
6. **Internet & Resource Accessibility Data** – Student access to internet, study materials, and educational tools.
7. **Demographic Data** – Student age, gender, socioeconomic background, and school location.

For this analysis, Microsoft Excel was used as the primary tool for data processing and visualization. PivotTables were utilized to efficiently summarize and analyze large datasets, allowing for a structured examination of key factors affecting student performance. By leveraging PivotTables, trends and correlations within the data were identified, making it easier to draw meaningful insights.

Additionally, various charts were created to visually represent the findings, making complex data more accessible and interpretable. These visualizations helped illustrate the impact of peer pressure, parental involvement, teacher quality, learning disabilities, and resource accessibility on academic performance, enabling a clearer understanding of the underlying patterns and relationships.

Story of the Data

The dataset is downloaded from kaggle.com. The data tells a story of how different factors shape student performance, revealing key trends and insights about academic success. Through the analysis, patterns emerge that highlight the influence of peer

pressure, parental involvement, teacher quality, learning disabilities, and access to resources.

Key Data Variables

1. **Peer Influence:** The data may show that students surrounded by high-achieving peers tend to perform better, while those experiencing negative peer pressure struggle academically. Social dynamics play a crucial role in shaping study habits and motivation.
2. **Parental Involvement:** A strong correlation might be observed between parental support and student success. Students with active parental engagement—such as help with homework, participation in school activities, and encouragement—tend to achieve higher grades compared to those with little or no parental involvement.
3. **Teacher Quality:** The data could reveal that students taught by experienced, well-trained teachers perform better due to effective teaching methods and engagement strategies. Poor teaching quality might be linked to lower academic outcomes.
4. **Learning Disabilities:** The dataset may highlight the struggles of students with learning disabilities, showing that those who receive special accommodations and support perform better than those without adequate resources.
5. **Access to Resources:** The analysis could uncover disparities in academic performance based on access to resources such as the internet, textbooks, and study materials. Students with easy access to these tools may have an advantage over those facing resource limitations.

By examining these trends through PivotTables and visualizations in Excel, the data provides a deeper understanding of the challenges students face and the opportunities for improving education. The insights gained from this analysis can help educators, parents, and policymakers develop strategies to support students and enhance learning outcomes.

Data Splitting and Preprocessing

Data Cleaning

To ensure a well-organized and user-friendly dataset, several formatting enhancements were applied. The top row was frozen, allowing for seamless navigation when scrolling through large amounts of data. This feature ensured that column headers remained visible at all times, making it easier to reference specific fields without losing context.

Additionally, proper casing was applied to all column headers, creating a consistent and professional appearance. Standardizing capitalization improved readability and maintained uniformity throughout the dataset.

The data was structured using a standard Excel table, which provided several advantages, including built-in filtering, sorting, and dynamic referencing. This table format enhanced data management by making it easier to create PivotTables, and update information efficiently. These formatting improvements contributed to a more organized, accessible, and visually appealing dataset, facilitating accurate analysis and interpretation of key insights.

The data belongs to the education industry, specifically within the field of academic performance analysis and educational research. This industry focuses on understanding factors that influence student success.

The key stakeholders and teams who will benefit from or be impacted by the findings of this analysis include:

1. Students – Understanding the factors that influence their performance can help students adopt better study habits, seek necessary support, and make informed decisions to improve their academic success.
2. Parents/Guardians – Insights into the impact of parental involvement will help parents understand how their support and engagement affect their child's education, encouraging them to take a more active role.

3. Teachers and Educators – Findings on teaching quality can help educators refine their teaching strategies, improve student engagement, and address challenges that hinder academic performance.
4. School Administrators – School leadership can use this analysis to assess areas needing improvement, such as teacher training, student support programs, and resource allocation.

Pre Analysis

1. Peer Pressure and Academic Performance – Positive peer influence can enhance study habits and motivation, leading to better performance, while negative peer pressure may contribute to distractions and lower scores.
2. Parental Involvement and Student Success – Active parental support, such as monitoring homework and encouraging learning, is expected to improve student motivation and academic outcomes, whereas minimal involvement may lead to weaker performance.
3. Teacher Quality and Learning Outcomes – Experienced and well-trained teachers positively impact student performance through effective teaching methods, while inadequate instruction may hinder academic success.
4. Learning Disabilities and Performance – Students with learning disabilities may struggle in traditional learning environments, but targeted support and specialized instruction can significantly improve their outcomes.
5. Access to Internet and Resources – Students with reliable access to study materials and online learning tools are likely to perform better than those with limited access, as digital resources enhance self-learning and comprehension.
6. Study Habits and Academic Achievement – Consistent and structured study routines contribute to better retention and higher exam scores, whereas last-minute cramming and poor time management may lead to lower performance.
7. Attendance and Academic Performance – Regular attendance ensures continuous learning and better understanding of subjects, while frequent absences often result in knowledge gaps and lower scores.

8. Family Income and Educational Outcomes – Higher-income students may have better academic support, such as private tutoring and access to resources, while lower-income students may face challenges that impact their performance.

In Analysis

1. Most students have medium parental involvement (18,166), while fewer have high (8,617) or low (6,827) involvement, indicating moderate parental engagement in education.
2. Students with positive peer influence scored the highest (13,874 total exam scores), followed by those with neutral peer influence (12,364), while those negatively influenced by peers had the lowest scores (7,372).
3. The majority of students have medium access to resources (17,015), followed by high (10,297), with a smaller portion having low access (6,298), which may impact learning outcomes.
4. Students without learning disabilities performed significantly better, with a total exam score of 29,491, compared to students with learning disabilities, who scored only 4,119.
5. A trend was observed where students who studied for longer hours performed better—students who studied 22 hours had 2,584 exam scores, 20 hours had 2,506, and 21 hours had 2,283.
6. Students from medium-income families had the highest total exam scores (15,126), followed by low-income students (12,784), while high-income students had the lowest scores (5,700).
7. Most students received medium-quality teaching (20,221), followed by high-quality teaching (10,067), while a smaller group had low-quality teachers (3,121).

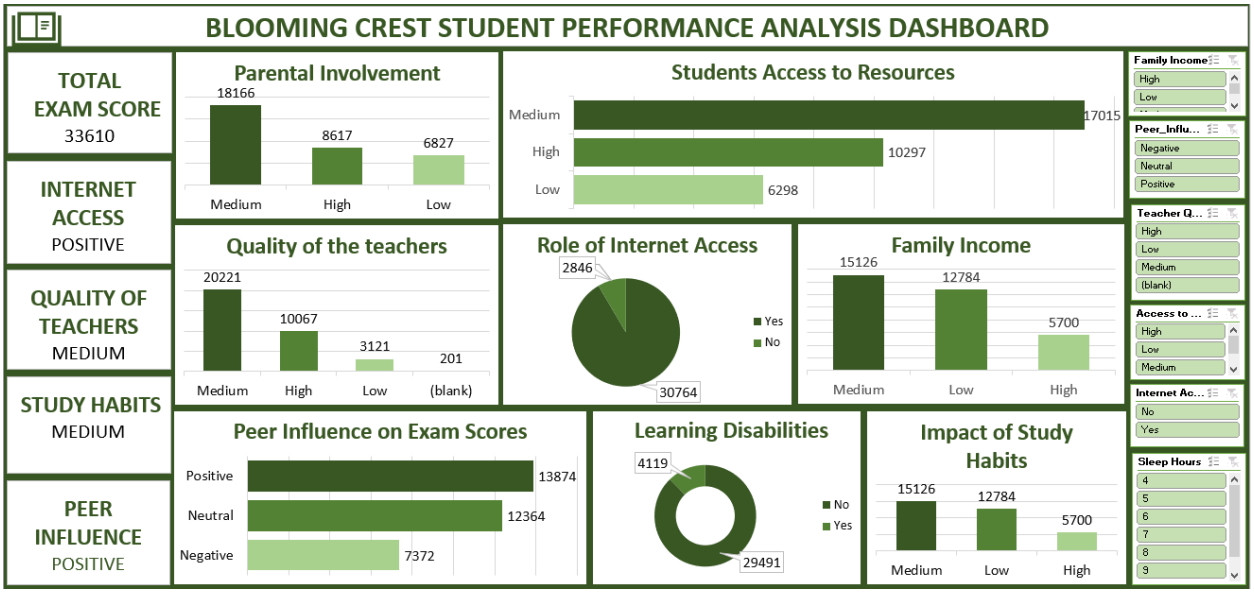
Recommendations

1. Increase parental engagement through workshops, progress tracking, and communication with teachers to support student success.

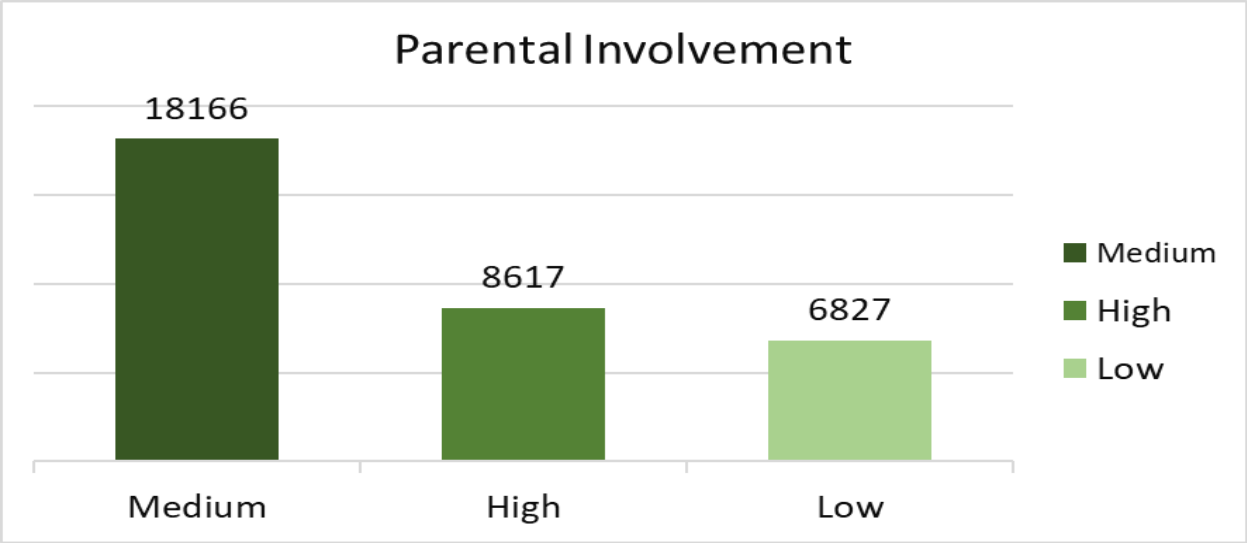
2. Encourage positive peer influence through mentorship programs, group study sessions, and anti-bullying initiatives.
3. Enhance access to educational resources by improving library facilities, providing digital tools, and offering financial aid for students with limited access.
4. Provide better support for students with learning disabilities through specialized teaching methods, assistive technologies, and inclusive learning environments.
5. Promote effective study habits by encouraging structured study schedules, time management techniques, and balanced rest periods.
6. Address the income-based performance gap by offering financial aid, free tutoring, and scholarships for students from disadvantaged backgrounds.
7. Improve teacher quality by investing in professional development, mentorship programs, and regular teacher evaluations to ensure better educational outcomes.

Data Visualization and Charts

Dashboard

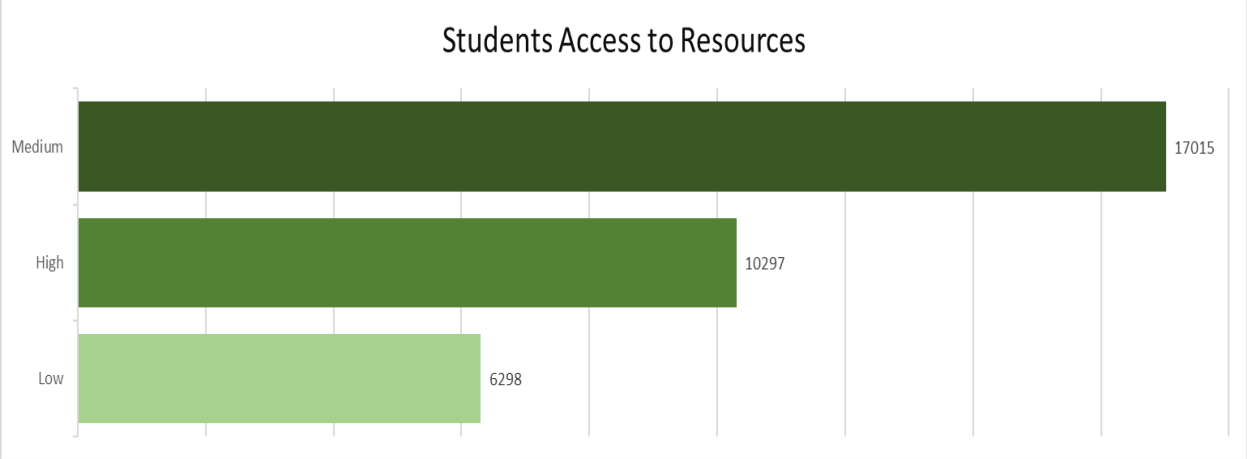


Parental Involvement



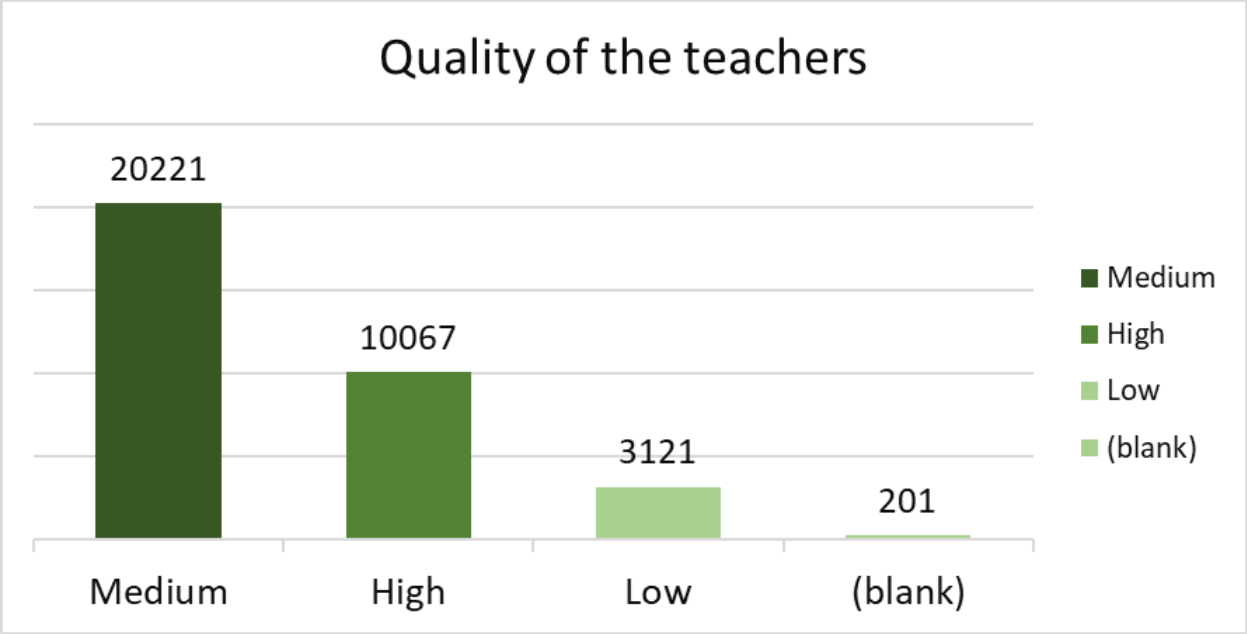
Most students have medium parental involvement (18,166), while fewer have high (8,617) or low (6,827) involvement. This suggests that a significant portion of parents are only moderately engaged in their child's education.

Student Access to Resources



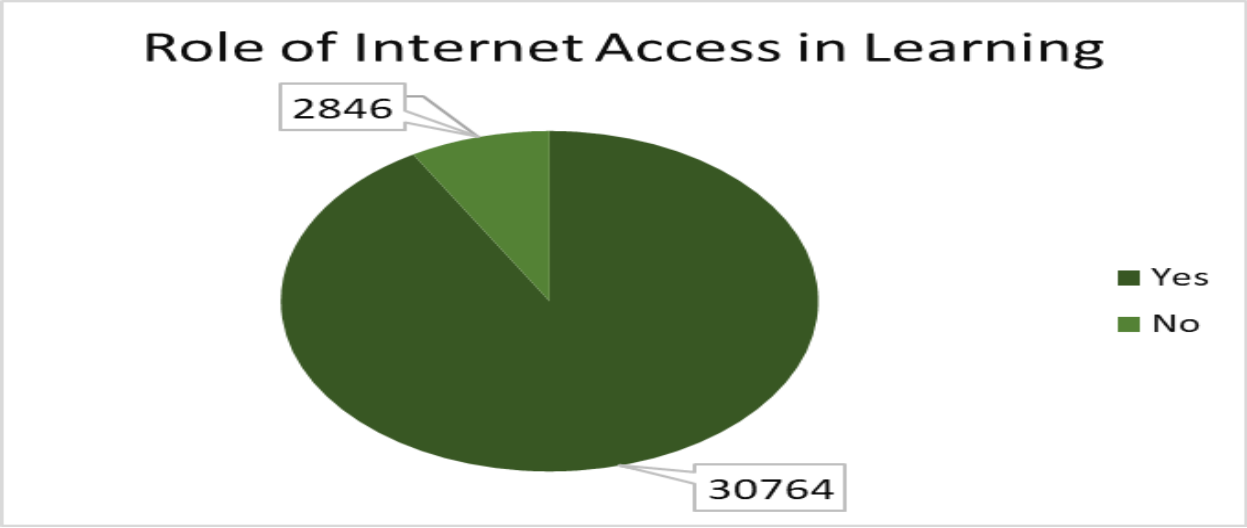
The majority of students have medium access to resources (17,015), followed by high access (10,297), while a smaller portion has low access (6,298). Limited access to educational resources can negatively impact learning outcomes and student performance.

Quality of Teachers



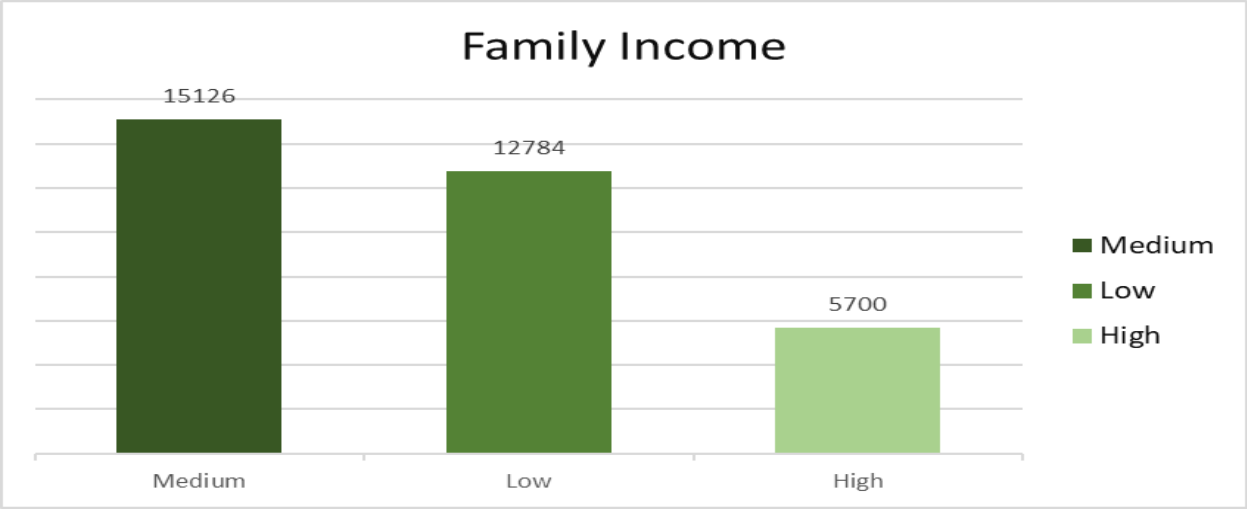
The majority of students experience medium-quality teaching (20,221), followed by high-quality teaching (10,067), while a smaller group is taught by low-quality teachers (3,121). There is also a small number of missing data points (201).

Role of Internet Access in Learning



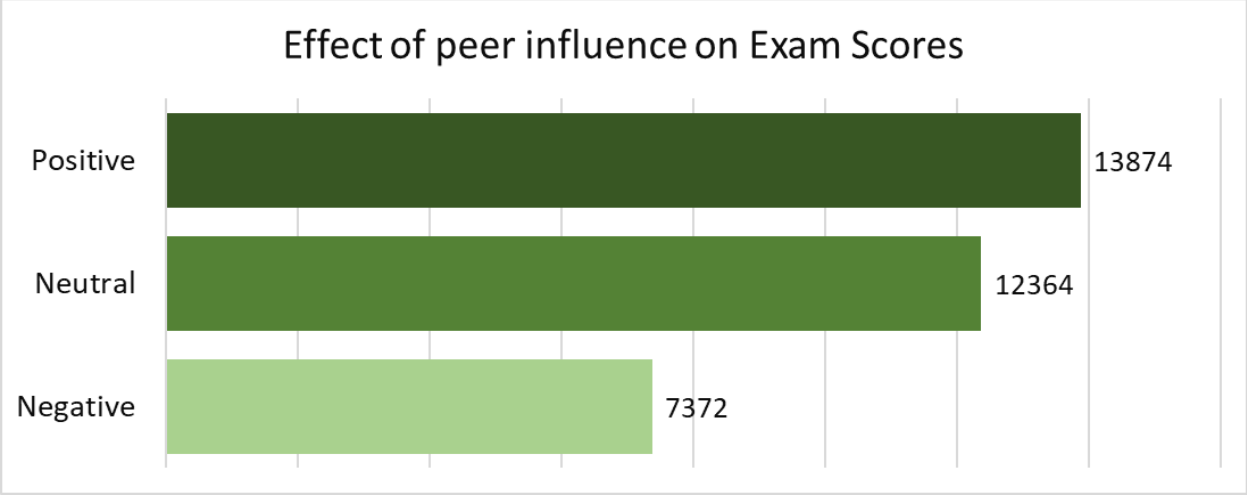
In present day, the internet plays a crucial role in learning and it comes in handy for students, in this chart, the students that have access to internet , their total exam score is 30764 while the exams scores of students who do not have access to internet is very low and the exam score is 2846.

Family Income



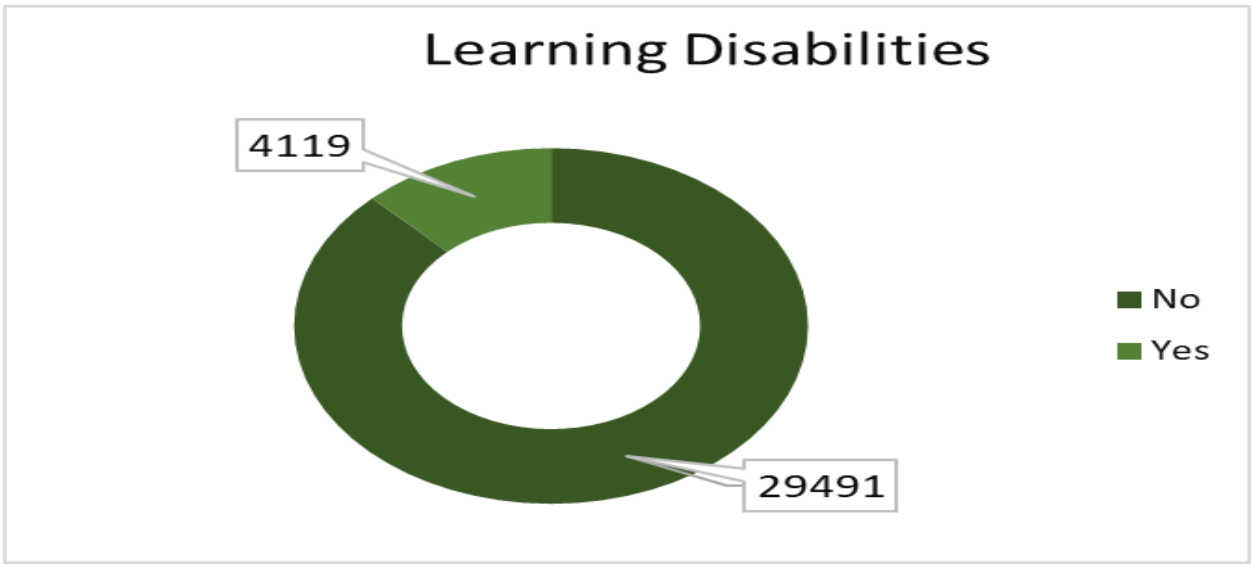
students with medium family income tops the chart with 15126 sum of total exam scores, students with low family income performed well next with the total exam scores of 12784, students with high family income is the least on the chart and the total exams scores is 5700 which is relatively low compared to others.

Effect of Peer Influence



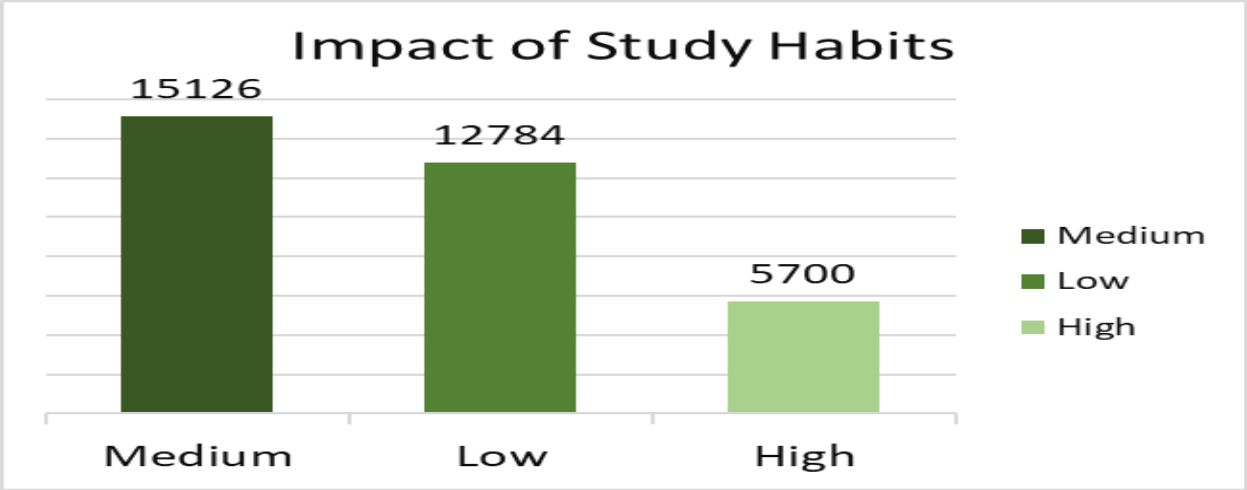
Students with positive peer influence tops the chart with the highest total exam scores of 13874, students with neutral peer influence have a total of 12364 exam scores and the students that were influenced with peer pressure negatively had the least exam score of 7372.

Learning Disability



Students without learning disabilities performed better and the sum of the exam scores is 29491, while students with learning disabilities did not perform well, the sum of their exam score is 4119.

Impact of Study Habits



According to the study habit of the top 6 students, students that studied for 22 hours a day had 2584 exam scores, students that studies for 20 hours had a total exam scores of 2506, students that studied for 21 hours had 2283 exam scores in total, so it can be said that students who study for longer hours perform better

Observations and Recommendations

Observations

1. Students with higher attendance tend to perform better in exams. The data indicates that the student with the highest attendance (77 recorded instances) also had a total exam score of 1,111. This suggests that regular class attendance plays a crucial role in academic success. Additionally, students in the medium study category outperformed those in both the low and high study categories, with scores of 586, 389, and 136, respectively. This may imply that excessive studying without balance can be counterproductive.
2. A significant 1,004 students had access to the internet, while only 67 students did not. The performance gap between these two groups highlights the advantages of internet access in education. Online learning provides students with a wealth of resources, including digital textbooks, video tutorials, and interactive study tools, which may contribute to their academic success.

3. Students who studied for 22 hours per week achieved the highest total exam score of 2,584, indicating that a structured study schedule contributes significantly to academic success. However, excessive study beyond a certain threshold may not always yield better results, as seen in cases where students who studied too much or too little did not perform as well.
4. The data reveals that 6 hours of sleep is the optimal sleep duration for better academic performance, as students with this sleep pattern recorded the highest exam scores. This finding suggests that sleep plays a crucial role in cognitive function, concentration, and memory retention. In contrast, students with irregular sleep schedules or inadequate rest may experience diminished academic performance.
5. There is no definitive proof that tutoring significantly improves exam scores. Interestingly, students who attended only one tutoring session recorded a total exam score of 10,547, while those who attended up to five sessions had a significantly lower total score of 342. This suggests that self-study, critical thinking, and independent problem-solving may be more effective than excessive tutoring.
6. Students without internet access had a total exam score of 2,846. Among them, those with medium study habits performed the best, achieving 1,330 exam scores, followed by students in the low study category, while those in the high study category performed the worst. The absence of internet access likely limits students' ability to utilize digital resources, which can impact their overall performance.
7. Students with internet access outperformed their peers, with a total exam score of 30,764. Within this group, students with medium study habits achieved the highest scores (13,796), followed by those in the low category (11,794), while students in the high study category scored the lowest (5,174). This finding reinforces the importance of balance in study habits, as excessive studying does not necessarily lead to better results.
8. The data suggests that balanced study habits are the most effective for academic success, as excessive or insufficient studying yields lower scores. Internet access plays a critical role in student performance, emphasizing the need for equitable access to digital resources. Additionally, tutoring does not always guarantee better

results, implying that personalized learning strategies and independent study may be more effective for some students. Finally, sleep patterns and attendance also significantly impact exam scores, reinforcing the importance of maintaining a structured and healthy routine.

Recommendations

1. Schools should implement attendance incentive programs to encourage regular attendance, such as rewards for consistent participation. Additionally, educators should emphasize engaging teaching methods to make classes more interactive, ensuring students remain motivated to attend.
2. Schools should work towards providing free or subsidized internet access to students who lack connectivity at home. In cases where internet access remains limited, offline alternatives such as preloaded study materials on USB drives, printed educational content, and access to local libraries should be made available. Teachers should also guide students on how to effectively utilize online resources for self-directed learning.
3. Students should adopt balanced study routines, ensuring they dedicate enough time for revision while also engaging in breaks and other productive activities. Schools can introduce study planning workshops to help students develop time management skills and implement active learning techniques that optimize study efficiency.
4. Schools and parents should educate students on the importance of proper sleep hygiene and discourage habits such as late-night studying, which can lead to fatigue and reduced focus. Additionally, promoting a consistent bedtime routine can help students maximize their learning potential.
5. Instead of relying solely on frequent tutoring, students should focus on understanding concepts through self-study and practical application. Schools should assess the effectiveness of tutoring programs and introduce personalized learning plans that cater to individual student needs. Encouraging peer tutoring or mentorship programs may also enhance academic support.

6. To bridge the digital divide, schools should provide offline educational materials, such as textbooks, printed worksheets, and educational content stored on USB drives or tablets. Additionally, libraries and community centers can be equipped with free internet access and study spaces to support students from low-income backgrounds.
7. Schools should educate students on effective online learning strategies, ensuring they use the internet productively rather than relying on passive learning. Teachers can introduce structured e-learning modules that guide students on how to filter relevant content, engage in active learning, and balance screen time with offline study methods.

Conclusion

The analysis suggests that balanced study habits are the most effective for academic success, as excessive or insufficient studying yields lower scores. Internet access plays a critical role in student performance, emphasizing the need for equitable access to digital resources. Additionally, tutoring does not always guarantee better results, implying that personalized learning strategies and independent study may be more effective for some students. Finally, sleep patterns and attendance also significantly impact exam scores, reinforcing the importance of maintaining a structured and healthy routine.