

**PROJECT DATA (DATA ANALYSIS TOOLS ASSESSMENT): ENHANCING
STUDENTS' ACADEMIC PERFORMANCE IN RESEARCH AT BARAS PINUGAY
INTEGRATED HIGH SCHOOL**

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ABSTRACT

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This study investigates the effectiveness of the Data Analysis Tools Assessment DATA Laboratory as an intervention for Grade 11 and Grade 12 students enrolled in Practical Research and mathematics subjects at Baras-Pinugay Integrated High School during the 2022–2023 school year. The 30 participants were purposively selected, 15 from Grade 11 and 15 from Grade 12, who initially had low scores in assessments. They were exposed to the project DATA (Data Analysis Tools Assessment) to improve their mathematical skills, data analysis, and research skills.

To measure the impact, a pre-test and post-test method was used. The results showed a significant improvement in students' academic performance after the intervention.

These findings highlight the effectiveness of the Project DATA (Data Analysis Tools Assessment) in enhancing the academic performance of students in mathematics and research-related subjects based on the competencies. The study highlights the importance of using Project DATA as an intervention to enhance or improved the academic performance of students.

1. Background of the Study

For many new researchers, one of the biggest challenges is recognizing the need for a study. Identifying a problem is the first step; it doesn't automatically mean it is worth researching. Research is valuable when it adds to or enhances knowledge in a specific field. This existing knowledge consists of past studies conducted by other researchers, forming the foundation for further investigation. By understanding the context of what has already been studied, researchers can identify gaps or areas that need more exploration, ensuring their work contributes meaningfully to the field and is not merely repeating what is known.



Another hardest part of conducting research is determining the methods and mathematical tools/ treatments used after the problem is identified. Several studies have confirmed that such learning difficulties are frequently experienced by Filipino students, highlighting a recurring challenge in their academic performance, particularly in subjects that involve statistics and research-related skills.

In Senior High, research is one of the core subjects in education. It involves collecting, analyzing, interpreting, and presenting information to create new knowledge. In the past, research was mainly used to address social issues and solve practical problems. Today, the need to make sense of large amounts of data from various fields has driven improvements in research methods. These advancements help turn complex information into useful insights. Research has become vital for answering important questions, solving problems, and developing new ideas. Its growth and importance continue to shape how we understand and address challenges in different areas of life and society. This subject also challenges our students in Baras Pinugay Integrated High School who are enrolled in research-related subjects, especially when numbers appear in their research. The entire process of collecting data, analyzing it, obtaining results, and interpreting them is becoming overwhelming for them, leading to frustration and a sense of giving up. The complexity and demands of each step are making it difficult for them to continue effectively with the research process.

Ponce and Pagan-Maldonado (2017) explain that many students find research difficult because they don't know how to use tools like Microsoft Excel, SPSS, or R. For senior high school students, not having the basic skills to use these tools makes the process confusing and stressful. Without proper help or guidance, students often must figure things out on their own, which makes it even more challenging.

Knowing how to use data analysis tools well has a big impact on the quality of a student's research. Rahman (2019) pointed out that students who are skilled in analyzing data are more likely to produce reliable and accurate results. For senior high school students, learning these skills early can prepare them for future academic and career opportunities where data interpretation is important.

The researcher observed that students enrolled in research-related subjects were struggling, as reflected in their academic performance in these subjects. In response, the DATA (Data Analysis Tools Assessment) initiative was created to assist these students. The project aims to enhance students' mathematical skills and improve their performance in research-related subjects. This will be achieved by increasing engagement through interactive tutorial materials and boosting their confidence in research. The program focuses on helping students build a solid foundation in research through personalized support and instruction. It targets Grade 11 and Grade 12 students enrolled in Practical Research.

The DATA (Data Analysis Tools Assessment) program aims to help students better understand the research process through tutorials led by both peers and teachers. By combining help from classmates and teachers, the project focuses on improving students' knowledge of collecting data, analyzing it, using tools, interpreting results, and understanding data treatment. The study creates a teamwork-focused learning environment that helps students understand research methods better. Through these tutorials, students will learn how to use research tools and methods. This approach not only supports their academic progress but also creates a positive atmosphere that encourages problem-solving and skill development in research.

Action Research Questions

This study aims to assess the impact of implementing the Project DATA (Data Analysis Tools Assessment) as tools in research on enhancing students' academic performance in research at Baras Pinugay Integrated High School during the academic year 2023-2024

Specifically, this study sought to answer the following questions:

1. What was the academic performance of Grade 11 and Grade 12 of Baras Pinugay Integrated High School before the implementation of Project DATA?
2. What is the academic performance of Grade 11 and Grade 12 students of Baras Pinugay Integrated High School after the implementation of Project DATA?
3. Is there a significant difference in learners' academic performance as compared after exposure to Project DATA implementation?

Proposed Innovation, Intervention, and Strategy

Project DATA (Data Analysis Tools and Assessment) will use a new approach by combining peer-led and teacher-led tutorials on data analysis tools. This will give students hands-on experience with important research tools like Excel, Data Analysis, and Google Docs while also encouraging teamwork and collaboration.

The researcher conducted a briefing at a teacher conference to update the school principal, subject group head, and colleagues about the planned activities. Their feedback was gathered to enhance the intervention. In addition, orientations were held for both students and parents to provide guidance to learners and keep parents informed about the program

The researcher created a validated 20-item test to focus on key research steps, including collecting data, analyzing it, using tools or treatments, generating results, and interpreting data. This particular skill was found to be the least understood by students based on how often it was correctly applied. The test will be used as both a pre-test and post-test to measure how much students understand and improve in these areas. By comparing results before and after the intervention, the tool will help assess students' progress and understanding of these key research skills, guiding them toward better mastery of data analysis.

The 20-item test was given to Grade 11 and 12 students, and the results were recorded. It measured their performance in tasks such as collecting data, analyzing it, using tools or treatments, generating results, and interpreting data. These results were gathered before the implementation of the DATA laboratory project and teacher-led tutorial strategy to assess their initial understanding of these key research skills.

During the implementation of the study, the following steps were done:

First, Identifying Students. Students will be selected for the intervention based on the results of their quarterly exams. This initial identification helps in determining those who require additional support in understanding research concepts, specifically in collecting data, analyzing it, using tools or treatments, generating results, and interpreting data.

Next, a preliminary assessment was conducted with the identified students through a pre-test. This test will assess their current understanding of data collection, analysis, using tools or treatments, generating results, and interpreting data. The results of this assessment were used to customize the upcoming tutorials, focusing on areas where students need the most improvement. By identifying specific challenges, the tutorials were better structured to meet the individual learning needs of each student.

Then, a series of peer and teacher-led tutorials was conducted, focused on assisting students with the processes of data collection, analysis, tool/application usage, result generation, and data interpretation. These sessions emphasized not only the technical skills involved but also the conceptual understanding of the research process and its significance. Throughout the tutorials, students were equipped with the necessary skills to effectively analyze data and make evidence-based decisions grounded in research findings.

Finally, a post-test was administered at the end of the tutorials. This test assessed the students' performance and progress after the intervention. The results showed how well students have understood the concepts taught and their ability to collect data, analyze it, use tools or treatments, generate results, and interpret data.

This structured approach aimed to measure the effectiveness of the instructional intervention. By comparing pre-test and post-test results, the researcher sought to determine the impact of the tutorials on students' comprehension and application of statistical concepts. The pre-test served as a baseline assessment, identifying initial levels of understanding, while the post-test measures improvements or changes resulting from participation in the tutorials. These assessments not only provided valuable feedback on individual student progress but also inform future instructional strategies and interventions aimed at enhancing statistical literacy among learners.

The researcher collected and analyzed the pre-test and post-test results to examine their significant relationship and effectiveness. Comparative analysis and interpretation were conducted to assess the impact of the project DATA (Data Analysis Tools Assessment) before and after its implementation. These findings served as the basis for the study's analysis and interpretation, providing insights that can inform future research in similar areas.

Action Research Methods

A. Participants and or other Sources of Data and Information

The participants of the study were 30 students from Baras Pinugay Integrated High School during the School Year 2023–2024. They were equally divided into two groups, with 15 students from Grade 11 and 15 students from Grade 12

The researcher chose the participants knowing best about the learning needs of the learners. The main source of the data was the least mastered skills reflected after having the frequency counts. It was found that the majority of the learners have difficulty in collecting data, analyzing it, using tools or treatments, generating results, and interpreting data.

Purposive sampling was the technique employed to select the participants and respondents for the study. This approach was used in a quantitative research setting, specifically a pre-experimental design, taking into account the respondents' ability levels.

B. Data Gathering Methods

This study utilized data from the second quarterly assessment in Practical Research during the 2023-2024 school year. Students who scored low on the assessment were identified as participants in the study. To evaluate their skills, the researcher developed a 20-item test focused on key research processes such as data collection, analysis, application of tools or treatments, result generation, and data interpretation. This test was used as both a pre-test and post-test to assess whether there was any improvement in the students' performance and understanding of these important research concepts throughout the intervention.

In this study, the researcher used a pre-experimental design with one group, pre-test, and post-test. This simply means that the same group of students was tested twice: first, before the intervention, and then again after it. This design was chosen because it clearly shows if there is an improvement in the students' performance after using Project DATA (Data Analysis Tools Assessment).

They were purposely chosen because they had difficulties in handling research tasks, especially when it comes to collecting data, analyzing results, and interpreting findings. Since the teacher already knew the students' challenges, it was easier to select who would benefit the most from the intervention. The 30 students identified were taking the pretest.

The intervention took place for three consecutive Fridays, from 12:00 pm to 1:00 pm, or at least one hour each week. The students were randomly grouped, with tutors rotating between the groups. After each tutorial session, a formative assessment was given to check their understanding. The students' performance was carefully recorded and monitored to track their progress throughout the intervention.

The post-test was administered, and all the gathered data were analyzed and interpreted. The findings from this analysis helped answer the research questions that were previously set. Based on the results, decisions were made to evaluate the effectiveness of the intervention. If proven successful, the intervention was considered for implementation across other grade levels in the school and potentially extended to the district. The goal was to assess whether the intervention can be applied more widely to improve student performance in research-related subjects.

After the gathering of data, tabulation, and analysis were applied to determine the outcomes of the study. Results were interpreted using the following scales:

Scale for Performance of Grade 11 Students in Mathematics

<i>Score Range</i>	<i>Verbal Interpretation</i>
16 – 20	Outstanding
12 – 15.99	Very Satisfactory
8 – 11.99	Satisfactory
4 – 7.99	Fair Satisfactory
0 – 3.99	Poor

Data Analysis Plan

The data were analyzed using the following tool and/or technique:

To determine the level of performance of Grade 11 Learners in Practical Research before the exposure to DATA, as revealed by a pretest, a mean was used.

To determine the level of performance of Grade 11 Learners in Practical research after the exposure to Project DATA as revealed by the posttest, the mean was used.

To determine the significant difference in the level of performance of the Grade 11 Learners in Practical

research before the exposure to Project DATA as revealed by pretest and posttest, paired t-test.

Table 1
Academic Performance of the Grade 11 and Grade 12 Learners in mathematics and research-related subjects before the exposure to Project DATA (Data Analysis Tools Assessment)

Respondents	N	Mean	SD	VI
Grade 11	15	7.26	2.55	FS
Grade 12	15	8.07	2.05	S

Table 1 presents the performance of Grade 11 learners based on the pre-test results before using the DATA (Data Analysis Tools Assessment) Laboratory. The Grade 11 learners had a mean score of 7.26 with a standard deviation of 2.55, which is interpreted as Fairly Satisfactory. Meanwhile, the Grade 12 learners had a mean score of 8.07 with a standard deviation of 2.05, interpreted as Satisfactory. These results show that learners find the competency challenging. Similar to this, Carmen Batanero and Manfred Borovcnik also found in their study that students had low scores in statistics and research-related subjects during pre-tests.

Table 2
Academic Performance of the Grade 11 and Grade 12 Learners in mathematics and research-related subjects after the exposure to the Project DATA (Data Analysis Tools Assessment)

Respondents	N	Mean	SD	VI
Grade 11 Students	15	13.13	2.54	O
Grade 12 Students	15	13.20	3.20	O

Table 2 shows that after the Grade 11 and Grade 12 students were exposed to DATA, a notable improvement in their performance was observed. Grade 11 post-test results recorded a mean score of 13.13 with a standard deviation of 2.54, which falls under the Outstanding interpretation. In the same way, the Grade 12 learners also showed progress, achieving a post-test mean score of 13.20 with a standard deviation of 3.20, likewise interpreted as Outstanding. These results suggest that the use of DATA had a positive effect on the learners' understanding and mastery of the competency, as both groups moved from lower pre-test scores to higher post-test performance levels. Based on the results of the study, it can be concluded that the DATA helps enhance learners' mathematical skills. During the implementation, it was also observed that the learners are very participative in their activities; they enjoy every session with their tutors.

Table 3

Significant Difference on Academic Performance of the Grade 11 and Grade 12 Learners in mathematics and research-related subjects after the exposure to the Project DATA (Data Analysis Tools Assessment)

		n	Mean	Sd	t	df	Sig.	Ho	VI
Grade 11	Pre-test	15	7.26	2.05	-8.03	14	0.00	R	S
	Post-test	15	13.13	3.20					
Grade 12	Pre-test	15	8.07	2.55	-7.71	14	0.00	R	S
	Post-test	15	13.20	2.54					

As Table 3 shows, the pre-test and post-test performance of Grade 11 and Grade 12 learners after being exposed to the DATA (Data Analysis Tools Assessment) Laboratory. The Grade 11 mean score increased from 7.26 (SD = 2.05) in the pre-test to 13.13 (SD = 3.20) in the post-test. The computed t value of -8.03 with a significance level of 0.00 indicates that the improvement is statistically significant. This means the null hypothesis was rejected, confirming that the learners' performance improved after using DATA. Hence for the Grade 12, a similar pattern was observed. The mean score improved from 8.07 (SD = 2.55) in the pre-test to 13.20 (SD = 2.54) in the post-test. The t -value of -7.71 with a significance level of 0.00 also shows a significant difference between the two test results. Thus, the null hypothesis was likewise rejected.

In connection with the study of Ponce and Pagan-Maldado, which highlights that students need to be introduced to modern tools for learning, it is better to teach them how to use modern technology so that they will not only learn but also keep up with the demands of contemporary education. This implies that the academic performance of Grade 11 and Grade 12 before and after the exposure to DATA was improved.

Discussion of Results and Recommendations

Conclusions

The study found that exposing students to the DATA had a positive effect on their performance, demonstrating the effectiveness of targeted teaching strategies in improving learning outcomes in research-related subjects. By integrating personalized support and well-structured instructional methods, the intervention enhanced students' engagement and understanding of the material.

This project's success highlights the potential of specialized approaches to advance teaching practices. The insights gained from this initiative can guide the development and refinement of more effective strategies in the future. The findings show that well-planned interventions can significantly enhance students' learning experiences and academic outcomes.

Recommendations

The following recommendations are hereby forwarded:

1. Organize Learning Action Cell (LAC) sessions at the school level to offer benchmarking on teachers' technical support in developing innovative strategies to assist learners with challenges. Additionally, ensure that administrators establish a strong support system to motivate and encourage teachers in their efforts to benefit students.
2. The project may be used to all academic quarters to address the focus of intervention for the Student-At-Risk (STAR) learners.
3. The project can be enhanced based on the needs of the learners and teachers.

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