Improving Academic Performance of Students in General Statistics using Project HELPS-KITA (Helping and Edifying Low-Performing Students in Statistics: Knowledge, Integration of Technology and Attitude Development)

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ABSTRACT

The aim of the study is to improve the academic performance of the students in Statistics using Project HELPS-KITA (Helping and Edifying Low Performing in Statistics-Knowledge acquisition, Integration of Technology and Attitude development). This intervention program focused on knowledge acquisition, Integration of technology and attitude development. This research employed both qualitative and quantitative methods to gather data that will answer the problems of the study. The experimental research approach was used to determine the improvement in the academic performance of the students in Statistics. Purposive sampling technique was used in the selection of the participants. The researcher used a teacher-made test in order to measure the pre-test and post-test percentage performance of the students in Statistics. The researcher uses Likert-scale survey questionnaire in order to asses students' level of satisfaction in the implementation program. Weighted mean and standard deviation were used to describe the degree of satisfaction of the students with the project's implementation; t-test was used to determine if there is a significant difference between the pre-test and post-test percentage performance of the students in Statistics before and after exposure to Project HELPS-KITA. According to the study's findings, that the percentage scores on the pre- and post-tests in Statistics before and after being exposed to Project HELPS-KITA differ significantly, which implies that the program is successful in resolving the students' challenges with learning Statistics. Overall, the program has shown to be quite helpful, especially for students who consistently miss class and struggle with Statistics.

Keywords: Academic Performance, Project HELPS-KITA, Statistics

INTRODUCTION

Background of the Study

Statistics plays an important role in many disciplines The world's modern life is fueled by information and technology, and a large portion of this knowledge is derived mathematically by Statistics. Statistics is a branch of science that deals with collection, organization and analysis of data from the sample to the whole population (Sirsisilla, 2023). Statistics plays an important role in many disciplines including mathematics, economics, social sciences, natural sciences, business, medicine, and engineering. Understanding statistics is helpful for gathering data in the right ways, doing accurate analysis, and effectively communicating the findings. The practice of using statistics is essential to scientific discovery, data-driven decision-making, and prediction (Frost, 2024).

The offering of statistics and probability in the Senior High school provide students' knowledge and prepares them for their future learnings in college (Calma, et al, 2022). Statistics helps students more understand the info world and be able to make correct explanations, conclusions or predictions. Despite the fact that Statistics are vital to our society, many students struggle to comprehend it. This is mostly because statistics is a broad topic with a wide range of ideas, approaches, and strategies. Several abstract ideas, including probability,

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sampling, hypothesis testing, and confidence intervals, are used in statistics. For novices, comprehending these ideas and how they relate to one another may be difficult. Understanding these ideas' fundamental ideas, their mathematical underpinnings, and their relationships with one another is necessary for mastery. Beginners often struggle with these abstract concepts because they may involve mathematical formulas, symbolic notation, and complex reasoning.

Numerous studies support that learning statistics is difficult for students. According to Kandeel (2019) students face an academic difficulty in learning statistics and probability due to the weakness of their mathematical and statistical background. The majority of these academic challenges are found in the permutation, combination, probability, and random variable classes. Research carried out by Puspitasari, et al. (2019) states that students struggle with probabilistic reasoning, combinatoric reasoning, and demonstrating the variability of random variables. Based on the findings, strong mathematical logical reasoning skills are required in order to correctly understand statistics and probability. Kurniawan (2018) also discovered on his study on analysis of student difficulties in Statistics courses that inherent flaws are primarily to blame for students' struggles with statistics. The findings of study revealed that there were mistakes in notation usage, comprehension of queries, and process skills. tutoring in Statistics. In the study conducted by Alegre, et al. (2021) titled “Learning Statistics and Probability through Peer Tutoring: A Middle School Experience, they cited that using peer tutoring for learning statistics and probability could be academically beneficial for middle school students.

Given the numerous concerns regarding students' challenges in studying statistics, it is imperative to address these difficulties to increase students’ performance of the course. Despite the widespread emphasis on reform in the teaching of statistics and the increase in the number of papers about statistics education in the research literature, statistics is still regarded as a discipline requiring significant improvement in terms of how students are educated (Kandeel, 2019). There are limited studies discusses intervention on Statistics and most of the interventions focus on Mathematics. Given that statistics and probability are already covered in senior high school curricula, it is imperative that the difficulties students have in learning statistics be addressed.

Anchored on the MATATAG: Bansang Makabata, Batang Makabansa agenda, the Department of Education (DepEd) adopted the implementation of the National Learning Recovery Program (NLRP) through DepEd Order 13, Series 2023 in order to enhance students' literacy and numeracy skills and enhance their academic progress. The department is constantly looking for methods to raise students' academic achievement, particularly in Mathematics. In year 2023, the Department of Education, Division of Rizal launched the National Mathematics Program through Division Memorandum 517, Series 2023 which aims to improve students’ learning, enhance teacher capacity, and support learning recovery of the students. This is very relevant and timely on the students of San Mateo Senior High School who are struggling in the learning competencies in Statistics. This motivates the researcher to use Project HELPS-KITA to assist struggling students in studying statistics.

The purpose of this study is to improve the academic performance of the students in Statistics through Project HELPS-KITA. Additionally, the purpose of this study is to determine how well Project HELPS-KITA works to enhance students' statistical performance through knowledge acquisition, technology integration, and attitude development.

Statement of the problem

The objective of the study is to help and edify the academic performance of Low-Performing Students in Statistics through Knowledge, Integration of Technology and Attitude Development (HELPS-KITA) vis-à-vis peer tutoring.

Specifically, this study aims to answer the following questions.

[1]. What is the academic performance of the students in Statistics based on the pre-test and post test results before and after exposure in Project HELPS-KITA?

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[2]. Is there a significant difference between the academic performance of the students in Statistics based on the pre-test and post test results before and after exposure in Project HELPS-KITA?

[3]. In what extent that the students are satisfied in the implementation of Project HELPS- KITA in improving students' performance in Statistics in terms of acquisition of knowledge, integration of technology and attitude development?

[4] In what area the program may be improved in the future?

Significance of the Study

The purpose of this study is to help and edify the academic performance of the students in Statistics through Project HELPS-KITA. The following are the beneficiaries of the study.

Teachers. The findings of this study will assist educators in creating future intervention programs for other mathematics courses that are related to it, such as calculus, general mathematics, and other disciplines that incorporate statistical and mathematical ideas.

School Administrator. This study will serve as basis of school administrators in developing policies that are based on empirical evidence which can also be helpful in allocating resources more effectively to areas that need the most attention. Administrators can also assess the effectiveness of this intervention programs through rigorous statistical analysis, ensuring that only the most effective strategies are continued and shall be escalated to other department of the school.

Local Government Unit. The results of this study may be used by the local government of San Mateo in Rizal by giving support to schools which focus on improving performance of the students in mathematics and statistics through its School Education Funds (SEF).

Division of Rizal. The results of this study may help official of the department particularly Education Program Specialists in Mathematics to craft policies and programs in conducting intervention programs in mathematics and statistics.

Department of Education. The study's findings may be taken into account by the Department of Education (DepEd) when developing policies and initiatives to aid in students' learning, including the provision of technology and educational resources for students enrolled in math and statistics intervention classes.

Future Researchers. Future researchers may consider the results and recommendations presented in this study to in developing new intervention programs in mathematics and statistics.

METHODOLOGY

Research Design

This study employs quantitative experimental method. According to Sirisilla (2023), experimental research design relies on statistical analysis to prove or disprove a researcher's hypothesis. This method establishes a cause-effect relationship within a group. In this study, identified participants were encouraged to attend Project HELPS-KITA an intervention class in Statistics.

The Participants

Purposive sampling was performed in selecting the participants. The participants of the study are the Grade 11 students of San Mateo Senior High School for SY 2023-2024. The identified participants are students who scored 70% and below during the conduct of summative assessment in Statistics.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

Project HELPS-KITA is running with the help of the officers, members of the Math club and other volunteer students who has outstanding performance in Statistics class. These volunteers served as the student-teacher of the low performing students in Mathematics.

The Instrument

The researchers used a teacher-made test based on the learning competencies that the students should learned in Statistics. The test is a 15-20 item test. A pre-test and post-test will be administered prior to the start and end of Project HELPS-KITA. A Google Forms survey-questionnaire was distributed to the student in order to gauge the program's impact on knowledge acquisition, technological integration, and attitude development.

Data Collection Procedure

Prior to the conduct of the study, the researcher wrote a letter of intent to conduct the study to the school heads of San Mateo Senior High School. Teachers of statistics assisted the researcher in identifying the students following the administration of various summative evaluations.

The teachers in statistics follows the Guided-Engaging Activities, Assessment and Remediation (GEAR) Framework in identifying its target beneficiaries. This framework used 4+1+1 strategy. The students in each class were given a 4-day guiding and engaging lessons, one day was given for assessing of student's skills and another day for remediation. After the administration of the summative test, students who got percentage score of 70% and below will attend Project HELPS-KITA.

During the intervention program the researcher used guided-instruction learning strategy as supported by peer learning. The researchers also teach the students on how scientific calculator and Microsoft Excel can be a great help in statistical computation task.

The intervention program was conducted in the research learning facilities of the school; however, the researcher does not include the learning environment as a factor contributing to the academic performance of the students in Statistics.

The researcher personally retrieved the results of the pre-test and post-test. After the retrieval, the results were tabulated, computed, and interpreted to develop findings, conclusions, and recommendations. The test and survey results were consolidated, and their secrecy was maintained during analysis.

Data Analysis Plan

The student's academic performance as reflected by the pre-test and post-test results was expressed in mean percentage scores. The researcher employed the paired t-test to see whether there has been a significant change in the learners' mean percentage scores in statistics. The students' level of satisfaction on students' knowledge acquisition, technological integration, and attitude toward learning statistics was measured using the weighted mean and standard deviation. The computations were performed using Microsoft Excel. Text or Verbatim form will be used to enumerate recommendations of the students in the improvement of the program in the future.

RESULTS AND DISCUSSION

This section deals with the presentation and analysis of the results and findings of the study. This is sectioned into four (4) parts namely: academic performance of the students in Statistics, significant difference between the academic performance of the students in Statistics based on the pre-test and post test results before and after exposure in Project HELPS-KITA, level of satisfaction on the implementation of Project HELPS-KITA and recommendations too improved the program.

Problem No. 1: What is the academic performance of the students in Statistics based on the pre-test and post test results before and after exposure in Project HELPS-KITA?

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

Table 1

Pre-test and Post-Test Mean Percentage Score in Statistics Before and After Exposure to Project HELPS-KITA

Pre-Test Results				
Session	**f**	**Mean**	**StDev**	**Remarks**
A	10	58.67	5.26	Did Not Meet Expectation
B	20	43.00	24.52	Did Not Meet Expectation
C	7	41.90	32.47	Did Not Meet Expectation
D	13	35.33	15.41	Did Not Meet Expectation
Post-Test Results				
Session	**f**	**Mean**	**StDev**	**Remarks**
A	10	95.33	7.06	Outstanding
B	20	88.33	11.92	Very Satisfactory
C	7	97.14	5.24	Outstanding
D	13	91.33	8.92	Outstanding

Scale: Outstanding (90-100), Very Satisfactory, Satisfactory (80-84), Fairly Satisfactory (75-79), Did Not Meet Expectation (Below 75)

Table 1 shows the mean percentage performance scores of the students in Statistics based on the pre-test and post-test results. As data revealed, it was observed that the mean percentage performance of the students in Statistics after the taking the summative test (pre-test) are all below 70%. This implies that the students did not meet expectation on the learning competencies in in all learning sessions. These results served as the basis of the researcher to involved the selected students to attend the Project HELPS-KITA. Moreover, statistics also showed that, as seen by the post-test results, students' average performance in Statistics increased after participating in Project HELPS-KITA. Data indicates that every student's mean performance scores in statistics are more than 85% which implies that the students' academic performance improved after the conduct of the intervention program. Overall based on the results of the post-test, Project HELPS-KITA is an effective intervention strategy improving student's academic performance in Statistics.

Problem No. 2: Is there a significant difference between the academic performance of the students in Statistics based on the pre-test and post test results before and after exposure in Project HELPS-KITA?

Table 2

Comparison of Pre-test and Post-Test Percentage Scores in Statistics Before and After Exposure to Project HELPS-KITA

Session		**f**	**Mean**	**StDev**	**a**	**p-value**	**Remarks**
A	Pre-Test	10	58.67	5.26	0.05	0.0000	Significantly Different
	Post-Test	10	95.33	7.06			
B	Pre-Test	20	43.00	24.52	0.05	0.0000	Significantly Different
	Post-Test	20	88.33	11.92			
C	Pre-Test	7	41.90	32.47	0.05	0.0014	Significantly

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

	Post-Test	7	97.14	5.24			Different
D	Pre-Test	13	35.33	15.41	0.05	0.0000	Significantly Different
	Post-Test	13	91.33	8.92			

Table 2 shows the comparison of pre-test and post-test percentage Score in Statistics Before and After Exposure to Project HELPS-KITA. Data revealed that the all-computed p-value are less than 0.05 alpha which led the researcher reject all its null hypothesis. This implies that the percentage scores on the pre- and post-tests in Statistics before and after being exposed to Project HELPS-KITA differ significantly, which is also a sign that the program is successful in resolving the students' challenges with learning Statistics.

The study's findings are in line with other research on peer tutoring in statistics. In the study conducted by Alegre, et al. (2021) titled "Learning Statistics and Probability through Peer Tutoring: A Middle School Experience, using peer tutoring for learning statistics and probability is academically beneficial for middle school students. Study revealed that there are statistically significant improvements on students' performance in Statistics with the implementation of the program for all grade courses, both individually and globally

Problem No. 3: In what extent that the students are satisfied in the implementation of Project HELPS-KITA in improving students' performance in Statistics in terms of; knowledge acquisition?

Table 3
Students' Perceived Level of Satisfaction on the Implementation of Project HELPS-KITA in Relation with Knowledge-Acquisition

Criteria	**N**	**Mean**	**StDev**	**Verbal Interpretation**
* The objective/s of the lesson was clearly presented and met by the teacher.	20	3.45	0.59	Very Satisfied
* The teacher used appropriate learning strategy and activity/ies were delivered in non-threatening manner.	20	3.20	0.68	Very Satisfied
* The teacher provides worksheets for guided-activity instruction which is helpful in learning the subject easily.	20	3.35	0.65	Very Satisfied
*The venue of the remedial class is free from noise and well-ventilated.	20	3.10	0.70	Satisfied
		3.26	**0.66**	**Very Satisfied**

Scale: 3.25-4.00 (Very Satisfied) 2.50-3.24 (Satisfied) 1.75-2.49 (Moderately Satisfied) 1.00-1.74 (Satisfied)

Table 3 shows the students perceived level of satisfaction on the implementation of Project HELPS-KITA in relation with knowledge-acquisition. The statistical mean (3.20) and standard deviation (0.68) indicate that students are very satisfied with the methods and exercises used by the researcher to teach statistics. The students are also very satisfied in the worksheets provided by the researcher which is used in guided activities in Statistics with a mean of (3.35) and Standard deviation od (0.65). Lastly, the students are satisfied to the venue of the program with a mean 0f (3.10) and standard deviation of (0.70). Over-all, the students are very satisfied on how the program address students need in terms of knowledge acquisition in Statistics with a composite mean of (3.26) and composite standard deviation of (0.66)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

Integration Of Technology

Table 4
Respondent's Perceived Level of Satisfaction on the Implementation of Project HELPS-KITA in Relation with Integration of Technology

Criteria	N	Mean	StDev	Verbal Interpretation
* The teacher and tutors help the learners in using the scientific calculator and Microsoft Excel.	20	3.15	0.57	Satisfied
*I can easily learn Statistics with the use of technology.	20	3.20	0.68	Satisfied
		3.18	**0.63**	**Satisfied**

Scale: 3.25-4.00 (Very Satisfied) 2.50-3.24 (Satisfied) 1.75-2.49 (Moderately Satisfied) 1.00-1.74 (Satisfied)

Table 4 shows the level of satisfaction of the students on the project in terms of integration of technology. Based on the study results, the students are satisfied on how teachers and volunteers utilized scientific calculator and Microsoft Excel in learning Statistics with a mean of (3.15) and standard deviation of (0.57). Over all the students are satisfied on how integration of technology is helpful in learning Statistics with a composite mean of (3.18) and composite standard deviation of (0.63).

Attitude Development?

Table 5
Respondent's Perceived Level of Satisfaction on the Implementation of Project HELPS-KITA in Relation with Attitude Development

Criteria	N	Mean	StDev	Verbal Interpretation
*I increased my motivation, eagerness and interest in studying statistics after attending the remedial class.	20	3.44	0.66	Very Satisfied
		3.44	**0.66**	**Very Satisfied**

Scale: 3.25-4.00 (Very Satisfied) 2.50-3.24 (Satisfied) 1.75-2.49 (Moderately Satisfied) 1.00-1.74 (Satisfied)

Table 4 shows the level of satisfaction of the students on the project in terms of attitude development. Students' enthusiasm, willingness, and interest in learning statistics rise after attending the remedial class, as indicated by their mean score of (3.44) and standard deviation of (0.66).

Problem No. 4: Which aspect of the program might be enhanced going forward for the school's ongoing improvement plan?

Theme	Narratives
Knowledge Learning	"I improve my understanding about the topic we had, and also how to find all the areas of the normal curve." "I understand the importance of statistics" "The program helps us to more understand the lesson and knows how to solve the problem properly

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

	"It is a great help to improve my performance and understand Statistics"
Continuity of the Program	'Project HELPS-KITA should continue on future school years to help more students in learning Statistics. In order to help more students who struggle with the subjects of probability and statistics, this program should be promoted'.
Schedule of Volunteers	'The students also suggested to considered scheduling of volunteer tutors in order to avoid over capacity in the learning area and avoid noise during the conduct of the program.'
Addressing Students Difficulty	'The program has shown to be quite beneficial, particularly for students who struggle with Statistics and repeatedly miss class." "The program is helpful to the students in learning Statistics and problems involving it.'

CONCLUSIONS

Based on the yielded data, the researchers can conclude that Project HELPS-KITA is beneficial and effective in improving academic performance in Statistics. This program was a success in support by Peer Tutoring and integration of technology. The program was also beneficial in improving students' motivation and interest in learning Statistics subjects.

RECOMMENDATIONS

Based on the results of the study the researchers presented the following recommendations are as follows:

To Statistics Teacher. Teachers may consider the results of the program in enhancing the project by looking at different strategies and methodologies that can be helpful in the next implementation of the project. Teachers can also look on the possible replication of the project in other math-related subjects like General Mathematics and Calculus.
To the School Head. The researchers recommend that school heads shall continue provides support to the project and extend the utilization of the project in the different core, specialization and major subjects especially on subjects which involves Mathematics and Statistics.

To the other District Schools. Different district school may study the results of the study for future development of intervention programs that will focus on skills development of the students in Mathematics, English and. Science.

To the Education Program Specialist in Mathematics. Education Program Specialist of Division of Rizal may consider the results of this study in developing a unified intervention program in Mathematics and Statistics for Senir High School.

To the Department of Education. Department of Education may consider the results of the study in development of future programs and policies that will address students' poor performance of the students in Mathematics and Statistics, and Science ang English as well.

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ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XI Issue VIII August 2024

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REFERENCES

1. Frost, J. (2024). The importance of Statistics. Statistics by Jim: Making Statistics Intuitive. Retrieved from https://statisticsbyjim.com/basics/importance-statistics/ last May 23, 2024.
2. Sirisilla, S. (2023). Effective Use of Statistics in Research – Methods and Tools for Data. Enago Academy. Retrieved from https://www.enago.com/ academy/statistics-in-research-data-analysis/ last June 2, 2024.
3. Sirsilla, S. (2023). Experimental Research Design — 6 mistakes you should never make! Enago Academy. Retrieved form https://www.enago.com/ academy/ experimental-research-design/ last July 7, 2024.
4. Calma J. D., et. al. (2022). Knowledge and Attitude towards Statistics and Probability of Senior High School Students. Department of Mathematics, College of Arts and Sciences, Pampanga State Agricultural University, Magalang, Pampanga. Asia Pacific Journal of Educational Perspective, Vol. 9, No. 1. Retrieved from https://research. lpubatangas.edu.ph/wp-content/uploads/2022/09/3-APJEP-2022-38-Calma-et-al..pdf last July 7, 2024.
5. Alegre F. (2021). Learning statistics and probability through peer tutoring: A middle school experience. South African Journal of Education, Volume 41, Supplement 2. DOI:10.15700/saje. v41ns2a1861. Retrieved from https:// www.researchgate.net/publication/35last9152595_ Learning_ statistics_and_probability_through_peer_tutoring_A_middle_ school_experience last June 3, 2024.
6. Kandeel, R.A.A (2019). Academic Difficulties in Learning a Statistics and Probability Course. Journal of Education and Practice www.iiste.org ISSN 2222-1735 (Paper) ISSN 2222-288X (Online) DOI: 10.7176/JEP Vol.10, No.9, 2019 43. Retrieved from file:///C:/Users/user/Downloads/47180-50719-1-PB%20(3).pdf last July 7. 2024.
7. Puspitasari, N., et al. (2019). What are the difficulties in statistics and probability? IOP Publishing Ltd Journal of Physics: Conference Series, Volume 1402, Issue 7. Series. 1402 077092 DOI 10.1088/1742-6596/1402/7/ 0770 92. Retrieved from https://iopscience.iop.org/article/ 10.1088/1742-6596/1402/7/077092 last July 7. 2024.