Original Research Article

THE UTILIZATION OF STATISTICAL TOOLS ON THE ATTITUDE TOWARDS STATISTICS AMONG KCAST STUDENTS: A MIXED METHOD STUDY

ABSTRACT

This study examined the relationship between the utilization of statistical tools and students' attitudes toward statistics at Kapalong College of Agriculture, Sciences, and Technology (KCAST). The purpose of this study was to determine how the use of statistical tools influences students' confidence, engagement, and perception of statistics. Using a convergent parallel mixed-methods design, the research combined quantitative surveys from 142 students and qualitative insights from 14 participants through in-depth interviews and focus group discussions. The findings revealed that while statistical tools helped simplify computations and improve data analysis, students faced challenges in selecting appropriate tools and interpreting results. Despite these difficulties, those who effectively utilized statistical tools reported increased motivation and appreciation for the subject. The results from both quantitative and qualitative phases aligned, suggesting that integrating technology in statistics education enhances learning experiences. The study highlights the need for structured lessons on statistical tool selection, hands-on practice, and continuous instructional support to help students develop confidence and proficiency in statistical analysis.

Keywords: *Statistical tools, attitude toward statistics, mixed methods, quantitative analysis, qualitative insights, statistics education*

INTRODUCTION

Many students today struggle with attitudes toward statistics, which significantly affect their ability to learn and perform in the subject. These attitudes, often shaped by previous experiences, anxiety, or a lack of confidence, can become barriers to engagement and academic success. Attitudes are learned predispositions that influence how individuals respond to particular situations, and they play an important role in shaping how students approach their educational journey. In the context of statistics, a subject often viewed as challenging and abstract, these attitudes can lead to reduced motivation, limited participation, and poor academic outcomes. Additionally, the diversity in students' backgrounds and learning experiences contributes to the development of varied perceptions toward the subject. Therefore, how the teacher makes students feel about what they are learning can either positively or negatively influence their engagement and success (Rusticus et al., 2022).

Attitudes toward statistics remain a major challenge in students' academic experiences. These attitudes can hinder students' willingness to engage with the subject, reduce their confidence in learning statistical concepts, and ultimately affect their performance. A recent study in Australia involving 171 undergraduate psychology students revealed that students with unfavorable attitudes toward statistics performed significantly lower in their coursework. The findings emphasize the urgent need to recognize and address students' perceptions, as these alone can be a strong predictor of academic difficulties in statistics (Lethbridge & Allen, 2024).

In the Philippine context, attitudes toward statistics continue to be a significant challenge among senior high school students. A study by Repedro and Diego (2021) found that 35% of students exhibited attitudes in areas such as affect, cognitive competence, and perceived difficulty, which suggests that a notable portion of students experiences anxiety and frustration when learning statistics. These attitudes are concerning, as they hinder students' engagement and overall academic performance in the subject. Additionally, 42% of students demonstrated low levels of statistical literacy, highlighting the disconnect between students' perceptions of statistics and their ability to perform well in the subject. Addressing these attitudes is crucial for improving students' academic outcomes and fostering a more positive and productive learning environment for statistics education.

This investigation is socially significant as it highlights the critical need for improving students' attitudes toward statistics in educational settings. As the world becomes more reliant on data-driven decision-making, the ability to understand and apply statistical concepts is vital for students' success across various fields. However, many students continue to struggle with their perceptions of statistics, which limits their potential to excel academically and professionally. Addressing these attitudes through effective teaching strategies and the use of statistical tools can play a crucial role in preparing students for the data-intensive demands of the modern workforce. This study aims to contribute to these efforts by examining how statistical tools can positively influence students' attitudes, providing valuable insights that can shape more inclusive and effective educational practices.

In relation, earlier researches have discussed topics that are relevant to the attitudes toward statistics, and these studies were mainly concerned with the areas of disciplinary differences and student engagement in the subject. The researcher found some notable studies on attitudes toward statistics include "Students' Attitudes Toward Statistics Across the Disciplines: A Mixed-Methods Approach" by Griffith et al. in 2020 and "Examining the Factor Structure of the Survey of Attitudes Towards Statistics (SATS-28)" by Abraham Ayebo et al. in 2020. The first one asked 684 students of every major whether they like statistics. It returns approximately 63% positives about the attitude toward statistics. Limitation: reliance on self-reported data and, therefore, vulnerable to bias. Also, it is not generalizable from the setup described above. The second validation of the SATS-28 was conducted with health science students and brought a generally positive attitude toward statistics, but the study had the drawbacks of focusing only on one student population and some psychometric concerns with the SATS-28 that may impact the interpretation of the results. Against this background, together these studies emphasize the role of students' attitudes in learning statistics but at the same time point out challenges in the diversity of samples and methodological limitations that have to be taken into account when applying such findings in educational practice. This research aims to address these gaps by investigating the connection between utilization of statistical tools and attitude towards statistics.

A plan on how the research findings was disseminated ensures that a well-structured will actually get to the target audience. The first location were key stakeholders at Kapalong College of Agriculture, Sciences, and Technology (KCAST) through official presentations and reports. They will then appear in peer-reviewed open-access academic journals, bringing them to a higher profile in the academic community. Findings were presented at local and international conferences that create an avenue for interesting discussions and criticism. Presentations to students and instructors in terms of workshops or simplified presentations will ensure that the findings are easily understood by everyone involved. The digital venues, such as education websites and social media, will also have their findings communicated to reach a much larger population.

Research Questions

1.What is the status of the utilization of statistical tools and attitude towards statistics among students at KCAST?

2.Is there a correlation between the utilization of statistical tools and attitude towards statistics?

3.What are the lived experiences and coping mechanism of students with regards to the utilization of statistical tools and attitude towards statistics?

4.What insights can be drawn from the relationship between the utilization of statistical tools and attitude towards statistics among college students?

5.To what extent do the quantitative data corroborate with the qualitative data?

RESEARCH METHODOLOGY

Research Design

Through the collection, analysis, and integration of both quantitative and qualitative data in a single study or series of studies, mixed methods research enables researchers to explore complex phenomena by analyzing data in different forms, offering a more nuanced view than using either method alone. Creswell (2014) states that mixed methods approaches were valuable in providing a comprehensive understanding of research problems by combining the strengths of both quantitative and qualitative data.

For the purposes of this study, a mixed-method approach is especially appropriate for investigating the connection between utilization of statistical tools and attitude towards statistics among students at

KCAST. Through the use of both qualitative (such as focus groups or interviews) and quantitative (such as survey findings) data, the study sought to investigate not only quantifiable attitudes but also the more profound, individual experiences that influence them. A thorough grasp of the relationship between students' attitudes toward learning statistics and utilization of statistical tools was made possible by this method.

For this research, the convergent parallel design entailed administering surveys to measure the utilization of statistical tools and attitudes toward statistics while simultaneously conducting interviews and focus groups to explore students' personal experiences. By gathering quantitative data through surveys, the researchers could quantify trends and relationships, while the qualitative interviews will provide rich, contextual insights into students' perceptions and lived experiences. This comprehensive analysis enabled a deeper understanding of how intercultural awareness influenced mathematical disposition, thereby fostering a richer academic discourse on this topic.

Descriptive-correlation is a type of research method that aims to describe the relationship between two or more variables without manipulating them. It helps researchers understand how variables are related and can identify patterns or trends. For example, a study might find that higher levels of physical activity are associated with better mental health outcomes (Creswell, 2014).
In the context of this study, descriptive-correlation is important because it allows researchers to explore the relationship between students' study habits and their academic performance. By examining these variables, the study can provide insights into how different study techniques may influence grades, helping educators develop better strategies to support student learning.

Additionally, Phenomenology is a qualitative research method that aims to comprehend how people actually perceive a given occurrence. Creswell (2013) claims that phenomenology enables researchers to understand the core of participants' experiences and to delve into their individual viewpoints. When examining subjective subjects like attitudes and dispositions, phenomenology can be a useful tool in educational research since it allows researchers to examine how students view and experience particular learning environments.

In this study, a phenomenological method was used in the qualitative section to investigate the individual experiences of education major students in relation to their understanding of statistics. The study's goal was to reveal how these students view statistics, the obstacles they encounter, and how the utilization of statistical tools impacts their attitudes toward the subject through detailed interviews. This in-depth investigation offers a more personal insight into the attitudes uncovered in the numerical data.

Research Respondents

In the quantitative phase, 223 students who were enrolled in Statistics related courses in the first semester of academic year 2023-2024 from Kapalong College of Agriculture, Sciences, and Technology, and 142 sample students was selected as the study's key respondents. This includes 97 BSBA Marketing Management students and 45 BSED Mathematics students. These students were chosen using proportional random sampling, following the method described by Milroy and Gordon (2008). For the qualitative phase, participants were chosen using a purposive sampling method. This non-probability technique was used to select individuals who could provide the most valuable insights related to the research questions (Kuper et al., 2008).

The participants for this study on the utilization of statistical tools and attitude towards statistics at Kapalong College of Agriculture, Sciences, and Technology were chosen based on the following inclusion criteria: (a) must be actively enrolled in the Statistics related courses for the first semester of the 2024-2025 academic year; and (b) must have the willingness to participate in the study.

Additionally, participants who take part in the interviews for the qualitative analysis cannot also take part in the quantitative analysis survey. A total of 14 students were selected: 7 participated in in-depth interviews, and the remaining seven joined focus group discussions, with all participants studying at KCAST. Further, students not enrolled in the mathematics education program were excluded from this study.

Research Instrument

The study employed a modified survey instrument to measure two core constructs: Utilization of Statistical Tools (UST) and Attitude Toward Statistics (ATS). The UST scale, adapted from Alharbi and Drew (2014), comprised three subscales grounded in the Technology Acceptance Model (TAM): Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Attitude Toward Statistical Tools (ATST). The ATS scale, based on Vanhoof et al. (2011), included four domains: Interest, Competence, Value, and Effort. Both instruments used a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

For the qualitative component, a semi-structured Focus Group Discussion (FGD) and interview guide was developed to explore students' lived experiences and coping mechanisms related to their use of statistical tools and attitudes toward statistics. The guide consisted of open-ended questions and was validated by a panel of experts to ensure clarity, relevance, and alignment with the research objectives. Revisions were made based on expert feedback to enhance the instrument's ability to elicit rich, in-depth responses.

Data Analysis

Descriptive statistics, like the mean, were utilized in quantitative data analysis to assess participants' average responses. Standard deviation was also used to measure the variability of responses on survey questionnaires related to the utilization of statistical tools and attitudes towards statistics.

This study uses Pearson correlation coefficient parametric test because the data set was tested using Shapiro-Wilk Test and it was found to be normally distributed(not significant). This statistical tool was employed to determine the strength and direction of the relationship between teaching style and student satisfaction among teacher education students. It assesses whether there was a significant correlation between these two variables and the magnitude of that correlation.

Thematic Analysis. In the qualitative data analysis, Participants' answers were coded and condensed, then transcribed, arranged, and distilled into themes. Tables, graphics, or a narrative were used to display the data. Using techniques like coding and classifying to arrange the data, we as researchers immerse ourselves completely in the rich descriptive data. Creating themes that explain the experiences from the viewpoint of those who were experiencing them in this case, the instructors at the Kapalong College of Agriculture, Sciences, and Technology were their aim. Qualitative analysis was therefore an iterative process, whereby the developed themes were refined through multiple readings of the data to arrive at a final analysis.

RESULTS

Table 1. Status of Students' Attitudes Towards Statistics

Variables and Indicators	Mean	Description
A. Interest		
1. Enabling myself to learn statistics.	4.27	Very High
2. Being interested in learning statistics.	4.21	High
3. Being interested in understanding statistical information.	4.25	High
4. Enjoying taking statistics courses.	4.05	High
5. Being interested in using statistics.	4.15	High
Category Mean	**4.18**	**High**
B. Competence		
1. Not feeling insecure when I have to do statistics problems.	3.60	High
2. Not having trouble understanding statistics because of how I think.	3.52	High
3. Not stressing out during statistics class.	3.49	High
4. Not making a lot of math errors in statistics.	3.52	High
5. Not being scared by statistics.	3.62	High
Category Mean	**3.55**	**High**
C. Value		

	1. Seeing statistics as relevant in my life.	4.23	High
	2. Having application of statistics in my profession.	4.15	High
	3. Seeing statistics is useful to the typical professional.	4.23	High
	4. Seeing statistical thinking as applicable in my life outside my job.	4.24	High
	5. Will be using statistics in my everyday life.	4.01	High
Category Mean		**4.17**	**High**
D. Effort			
	1. Planning to complete all of my statistics assignments.	4.22	High
	2. Working hard in my statistics course.	4.32	Very High
	3. Studying hard for every statistics test.	4.30	Very High
	4. Attending every statistics class lesson.	4.52	Very High
	5. Participating in group discussions and study sessions for my statistics course.	4.32	Very High
Category Mean		**4.34**	**Very High**
Overall Mean		**4.06**	**High**

Level of Attitude Toward Statistics

Table 1 presents the response of KCAST students' who have statistics related subjects. It highlights the items with the highest and lowest mean ratings for each indicator, categorizing them from very high to low. The table also includes an interpretation of how KCAST students with statistics related courses exhibited their attitude towards statistics. The study obtained an overall mean score of 4.06 with a description of High. This means that the KCAST students agreed to have positive attitude towards statistics. To facilitate better understanding, the study provided a comprehensive illustration based on a detailed analysis of the data collected from the participants.

Similarly, Lethbridge et al. (2024) emphasized that a negative attitude toward statistics correlates with increased anxiety, procrastination, and poor performance. Their study found that students with higher anxiety levels demonstrated low engagement with statistical concepts and generally weaker academic outcomes. In contrast, students who reported a positive attitude toward statistics exhibited high levels of engagement and confidence in performing statistical tasks.

Moreover, the study by Saidi and Siew (2019), which assessed students' understanding of measures of central tendency and their attitudes toward statistics in rural secondary schools, revealed that students generally held a positive attitude toward statistics. This aligns with the present study's findings, where students also exhibited a high level of confidence and engagement in statistical tasks. These comparisons reinforce the idea that fostering positive perceptions of statistics, supported by clear instruction and contextual relevance, contributes significantly to improved academic engagement and performance in statistical learning.

The first indicator under this variable was interest, which obtained a high level. Many students expressed that the accessibility of statistical software and its ability to simplify computations contribute to their sustained enthusiasm for learning statistics. This suggests that the use of statistical tools fosters an interactive and engaging learning environment that motivates students to explore statistical concepts further. By incorporating statistical tools in instruction, educators can enhance students' curiosity and willingness to apply statistical methods effectively.

A recent study by Al-Haddad et al. (2024) emphasized the importance of student interest in statistics, noting that students who found the subject engaging tend to retain information better and apply statistical knowledge more effectively. Their findings align with the current study, demonstrating that integrating statistical tools into instruction enhances students' motivation and curiosity toward statistical analysis. When students perceive statistics as relevant and applicable, their engagement in learning increases, leading to better comprehension and practical application of statistical methods.

Similarly, Hauff and Nilsson (2020) found that a strong interest in statistics significantly influences students' academic and career choices. Their research suggests that fostering interest in statistical tools at an early stage encourages students to pursue fields that require strong data analysis skills. These findings underscore the need for continuous integration of statistical tools in educational curricula to sustain students' engagement and support their long-term academic and professional development. Encouraging students to develop a positive attitude toward statistics can further improve their analytical thinking and decision-making skills.

The second indicator under this variable was competence, which also obtained a high level. The results show that students perceive themselves as competent in utilizing statistical tools, with many expressing confidences in their ability to navigate statistical software and apply various analytical techniques. However, some students also reported challenges in selecting the appropriate statistical method for specific problems, indicating the need for further instructional support in this area. Developing statistical competence requires continuous practice, exposure to real-world applications, and structured guidance from educators to help students refine their analytical skills.

This finding was consistent with the study of Milic et al. (2019), which demonstrated a positive correlation between students' academic achievement and their statistical competency. Their research found that students who developed confidence in statistical tools performed better in statistical analyses, reinforcing the importance of hands-on training and continuous practice in fostering statistical competence. As students gain proficiency in statistical tools, they become more efficient in problem-solving and data interpretation, strengthening their overall mathematical reasoning skills.

Additionally, Ayebo et al. (2019) emphasized that cognitive competence in statistics plays a crucial role in reducing students' anxiety and improving their performance. Their study found that students who developed confidence in their ability to handle statistical tools exhibited a more positive attitude toward statistics and were more likely to succeed in the subject. These findings highlight the need for structured training programs that strengthen students' statistical competence through guided practice and applied learning experiences. Providing students with opportunities to engage with statistical tools in practical settings enhances their ability to use statistics effectively in various academic and professional contexts.

The third indicator under this variable was value, which obtained a high level. The findings suggest that students recognize the value of statistical tools in enhancing their data analysis skills and improving their decision-making abilities. Many students acknowledged that statistical tools provide practical applications that extend beyond the classroom, reinforcing the importance of statistical literacy in real-world contexts. When students understand the significance of statistical tools in various industries, they become more motivated to develop proficiency in statistical analysis and research.

This was supported by Smith and Dai (2023), who found that students who perceive statistical tools as valuable are more likely to engage with the subject actively and achieve higher academic performance. Their study highlighted that emphasizing the real-world applications of statistical tools helps students appreciate their significance, thereby increasing their motivation to develop proficiency in statistics. By connecting statistical education with real-world problem-solving, students can better understand how data analysis impacts decision-making in different sectors.

Furthermore, Acee (2021) investigated how value-based interventions impact students' motivation and performance in statistics. Their findings revealed that students who understood the practical relevance of statistical tools were more motivated to explore statistical concepts, leading to improved learning outcomes. These results underscore the importance of demonstrating the value of statistical tools through real-world applications and experiential learning activities. By integrating case studies and applied projects, educators can help students build confidence in their ability to use statistical tools effectively in various professional fields.

The fourth indicator under this variable was effort, which obtained a very high level. The results indicate that students exert considerable effort in learning and applying statistical tools, with many expressing a strong commitment to developing proficiency in statistical analysis. Despite initial challenges, students demonstrated persistence in navigating statistical software and applying analytical techniques to their coursework. This suggests that fostering a growth mindset and

encouraging perseverance in statistical learning can help students overcome difficulties and enhance their analytical abilities.

This aligns with the study of Hofverberg et al. (2022), which emphasized that student effort plays a crucial role in achieving statistical literacy and competence. Their research found that students who actively engaged with statistical tools and dedicated time to practice were more likely to perform well in statistics courses, reinforcing the significance of sustained effort in mastering statistical analysis. Regular engagement with statistical tools helps students build confidence in applying statistical techniques accurately and efficiently.

Additionally, Dani and Quraan (2023) found that effort was a key determinant of students' attitudes toward statistics and their willingness to engage with quantitative research methods. Their study highlighted those students who invested more effort in learning statistical tools exhibited greater confidence and competence in conducting statistical analyses. These findings suggest that fostering a supportive learning environment that encourages perseverance can help students develop a stronger foundation in statistical methodologies. Providing continuous feedback and structured learning experiences can further enhance students' ability to apply statistical tools effectively in research and professional settings.

Table 2. Status of Students' Utilization of Statistical Tools

Variables and Indicators	Mean	Description
A. Perceived Usefulness		
1. Having perception that statistical tools are beneficial to my homework and research.	4.41	Very High
2. Finding statistical tools useful in my statistics course.	4.47	Very High
3. Having perception that using statistical tools in learning Statistics would enable me to accomplish tasks more quickly.	4.35	Very High
4. Having perception that using statistical tools would improve my class performance.	4.34	Very High
5. Having perception that using statistical tools would increase my productivity.	4.32	Very High
Category Mean	**4.38**	**Very High**
B. *Perceived Ease of Use*		
1. Feeling that it would be easy to become skillful at using Statistical tools.	4.24	High
2. Learning to operate statistical tools with ease.	4.14	High
3. Finding statistical tools to be flexible to interact with.	4.16	High
4. Doing what I want to do in statistical course is easy with statistical tools.	4.19	High
5. Feeling that I have an ability to determine statistical tools.	4.10	High
Category Mean	**4.17**	**High**
C. *Attitude Towards Statistical Tools*		
1. Learning statistics using Statistical tools because it makes things easier.	4.39	Very High

2.	Wanting to learning better in using statistical tools to help with learning statistics.	4.34	Very High
3.	Liking the idea of exploring through statistical tools.	4.31	Very High
4.	Thinking that using statistical tools is worthwhile for learning.	4.27	Very High
5.	Thinking that statistical tools does not take too much time in learning my statistics course.	4.18	High
Category Mean		**4.30**	**Very High**
Overall Mean		**4.28**	**Very High**

Level of Utilization of Statistical

Table 2 presents the response of KCAST students' who have statistics related subjects. It highlights the items with the highest and lowest mean ratings for each indicator, categorizing them from very high to low. The table also includes an interpretation of how KCAST students with statistics related courses exhibited their utilization of statistical tools. The study obtained an overall mean score of 4.28 with a description of very high. This means that the KCAST students agreed to have utilization of statistical tools. To facilitate better understanding, the study provided a comprehensive illustration based on a detailed analysis of the data collected from the participants.

Moreover, the findings support those of Kumar et al. (2023), who examined 300 original research articles from five major biomedical publishing groups to assess the application and reporting of statistical tools. Their study revealed that collaboration with statistical experts led to more accurate data interpretations, and that articles reporting consultation with statisticians exhibited a very high level of methodological rigor. This aligns with the present study's result, where students demonstrated a high level of statistical tool utilization, suggesting they are likely developing a stronger foundation for precise and meaningful statistical analysis. These parallels highlight how adequate training and support in statistical methods enhance students' readiness for data-driven academic tasks and professional decision-making.

Additionally, a recent study by Retnawati et al. (2024) surveyed 1,287 undergraduate mathematics education students across 21 higher education institutions in Indonesia to investigate factors influencing statistical literacy. The results showed that students with greater access to statistical tools, including personal laptops, demonstrated a high level of statistical literacy, while those without such access exhibited only a low to moderate level of statistical literacy. This suggests that the availability and utilization of technology, particularly statistical tools, can positively influence students' statistical literacy. In the context of this research, these findings align with the hypothesis that the use of statistical tools enhances students' engagement and understanding of statistics. Similar to the results in the study, where students who utilized statistical tools demonstrated more confidence and improved academic performance, the data from the study provide empirical support for the positive relationship between statistical tool usage and improved learning outcomes.

The first indicator under this variable was perceived usefulness, which obtained a very high level The findings indicated that students who viewed statistical software as beneficial were more likely to engage actively in statistical tasks. Many students appreciated how these tools streamlined calculations and minimized errors, making statistical analysis more manageable. However, students who struggled with technical aspects of statistical tools expressed frustration, which hindered their overall experience. This highlights the need for targeted instruction to maximize the perceived benefits of these tools.

Felix et al. (2024) found that while statistical tools are essential for quantitative research, they do not always enhance qualitative findings. Their study highlighted that qualitative research relies on complex contextual narratives, which statistical methods may overlook. Researchers who rely solely on statistical tools might miss critical interpretative elements necessary for understanding social phenomena. This underscores the need for integrating qualitative and quantitative methods for a more holistic analysis. These findings emphasize the importance of methodological balance in statistical

education are crucial for quantitative analysis, they do not always enhance qualitative research. In the context of this research, this serves as a reminder that while perceived usefulness of statistical tools in quantitative tasks is high, educators should still foster awareness of the limitations of such tools in broader research contexts.

Similarly, the study of William (2024) found that the use of statistical tools in educational research significantly enhances the reliability and validity of findings. Their study showed that researchers who utilized statistical methods were able to analyze large datasets effectively, highlighting the necessity of equipping educators with statistical software skills to enhance their teaching methodologies. These findings reinforce the importance of statistical tools in data-driven education significantly improve the reliability and validity of findings. This aligns with the current study's implication that when students perceive statistical tools as useful, they not only perform better but also develop deeper analytical thinking essential for academic and professional contexts.

A quasi-experimental study of Catador and Salazar (2025) demonstrated that students who participated in a structured statistical software training program showed significant improvements in their data analysis skills compared to those who did not receive such training. The participants exhibited greater proficiency in using statistical tools, which led to more accurate interpretations of research data and increased engagement with quantitative tasks. These findings align with the results of the present study, where students who found statistical tools useful were more confident and demonstrated stronger academic performance in statistics. Both studies emphasize the importance of targeted instruction and hands-on experience in maximizing the benefits of statistical tools, reinforcing the value of perceived usefulness in shaping positive attitudes toward statistics.

The second indicator under this variable was perceived ease of use, which also obtained a high level. The findings revealed that students who found statistical tools intuitive and user-friendly demonstrated higher engagement in statistical tasks. Many students reported that clear instructions and guided practice helped them develop proficiency, reducing their anxiety toward statistical software. However, technical difficulties, unfamiliar interfaces, and lack of training contributed to frustration among some students. This suggests that structured learning approaches can improve students' ease of use and overall experience with statistical tools.

Congruent to the study of Thompson (2021), the study revealed that the negative effects of excessive reliance on statistical tools in social science research. The study revealed that overemphasizing statistical significance can lead to the misinterpretation of data, often at the expense of contextual insights. Researchers who prioritize statistical results over qualitative findings may draw conclusions that lack real-world applicability. The study suggests that a balanced approach integrating both statistical and qualitative methods ensures more meaningful analysis. This ensures accurate and meaningful interpretation of research findings.

Furthermore, the study of Luo et al. (2024) underscored the critical role of accessibility and prior experience in shaping students' proficiency with statistical tools. Their findings revealed that students with early exposure to statistical software exhibited greater confidence and competence in applying statistical methods. Regular hands-on practice and sustained engagement with these tools further enhanced students' adaptability, allowing them to navigate complex statistical analyses with ease. These insights highlight the necessity of gradual skill development through structured instruction, ensuring that students build a solid foundation before advancing to more sophisticated applications. The study reinforces the current findings by illustrating that hands-on practice and sustained engagement are essential in making statistical tools easier to use and more effective in promoting statistical learning.

The third indicator under this variable was attitude towards using statistical tools, which obtained a very high level. The findings indicated that students with positive attitudes were more likely to explore statistical software independently and apply their skills in research. Many students appreciated the efficiency and accuracy provided by statistical tools, which contributed to their motivation in learning statistics. However, some students expressed hesitation due to perceived complexity and lack of confidence in their ability to use these tools effectively. Encouraging positive attitudes through interactive learning strategies can improve students' adaptability to statistical tools.

In agreement with the study of Bowman and Muir (2021),the study revealed that students who received proper training in statistical tools demonstrated greater confidence and competence in applying them to research. Their study emphasized that integrating hands-on software activities not only enhanced motivation but also strengthened problem-solving skills. Early exposure to statistical tools significantly improved students' adaptability and proficiency, enabling them to navigate complex data analysis with ease. Moreover, the study underscored the importance of continuous support in fostering positive attitudes toward statistical learning. Implementing interactive and technology-driven learning strategies cultivates a more engaging and productive environment, ultimately boosting students' willingness to explore statistical software and improving their overall academic performance.

Furthermore, the study of Kumar et al. (2023) suggested that students' attitudes toward statistical tools significantly improve when they receive structured guidance, continuous support, and opportunities for peer collaboration. Their research found that students engaged in group-based statistical projects demonstrated higher proficiency, confidence, and enthusiasm in using statistical software. They emphasized that collaborative learning environments enhance students' ability to navigate statistical challenges more effectively, fostering a sense of shared problem-solving. Moreover, providing mentorship and real-world applications reinforces long-term engagement with statistical tools, making learning more meaningful and applicable. These findings highlight the importance of structured learning opportunities in strengthening students' attitudes toward technology-based education and equipping them with essential data analysis skills for future academic and professional endeavors.

Table 3.
Significant Relationship Between Attitude Towards Statistics and Utilization of Statistical Tools

Variable	**Mean**	**R-Value**	**P-Value**	**Decision** α**=0.05**
Attitudes Towards Statistics	4.06	.440	<.001	H_o Rejected
Utilization of Statistical Tools	4.28			

Significance of the Relationship between Teacher's Instructional Competence and Language Learning among English Major Students

Table 3 presents the results of the specific correlation analysis between students' utilization of statistical tools and attitudes towards statistics. The correlation coefficient (r-value) usually has a value between 0.4 and 0.6 indicating that, though not as strongly as in situations with greater correlation coefficients, one variable tends to increase along with the other as they both rise, as per the description of Cohen and Holliday (1983) on the range of different levels of correlation.

Reflected in the said table was the result in significant relationship between Students' utilization of statistical tools and Attitudes Towards Statistics, r (142) = .440, p < .001. Since the probability value (p<.001) was less than the level of significance (α=0.05), the null hypothesis was being rejected. This means that there was a positive and significant linear relationship students' utilization of statistical tools and attitudes towards mathematics.

Since the probability value (p < .001) was lower than the level of significance (α = 0.05), the null hypothesis was rejected. This result confirms that there was a positive and significant relationship between students' attitude towards statistics and their utilization of statistical tools. In other words, students who exhibit a more positive attitude towards statistics are more likely to effectively use statistical tools, reinforcing the importance of fostering a supportive and engaging learning environment that enhances both statistical confidence and practical application.

In a certain study, the instructor influences significantly shaped college students' attitudes toward statistics, as students with greater exposure to statistical tools under structured guidance demonstrated increased motivation, reduced anxiety, and enhanced statistical reasoning. These findings affirm the Technology Acceptance Model (TAM), which highlights that perceived usefulness and ease of use influence individuals' acceptance of technology. Students who found statistical tools

accessible and beneficial were more likely to engage positively with statistical learning. The study underscores the value of integrating statistical tools in coursework to foster critical thinking, improve problem-solving skills, and create a more engaging and supportive learning environment.
Similarly, studies show that students with higher statistical tool usage demonstrate greater self-efficacy and academic performance in statistics. Their study demonstrated that hands-on experience with statistical software strengthened students' confidence and engagement, leading to improved statistical competence. This suggests that promoting the active use of statistical tools in education can significantly enhance students' attitudes and performance in statistics-related subjects. Moreover, their research pointed out that the ease of accessibility and familiarity with statistical tools play a critical role in shaping students' willingness to apply these tools in problem-solving tasks. When students become proficient in using statistical software, they are more likely to engage in research and real-world applications, reinforcing their understanding of statistical principles. A technology-driven approach to statistical education not only enhances students' competence but also builds their confidence in managing complex data analysis tasks, leading to better learning outcomes (Smith & Dai, 2023).

Table 4. Lived Experiences and Coping Mechanisms of Students in Maintaining or Regaining a Positive Attitude Towards Statistics.

ISSUES PROBED	CORE IDEAS	CODE/ CATEGORIES	ESSENTIAL THEMES	THEORETICAL SUPPORT
Challenges in Understanding Statistics	• having misconceptions about the simplicity of statistics. • having difficulties in transitioning to advanced concepts, and struggle with abstract ideas. • having insufficient amount of practice to master statistical problem solving.	Having Misconceptions in Learning Statistics	Having Misconceptions and Learning Gaps in Statistics	Constructivist Learning Theory of Piaget (1976)
	• having limited foundational knowledge due to lack of prior exposure of the concepts. • having difficulty with formula with heavy topics like central tendency and probability. • Having learning gaps due to prior missed instruction.	Having Insufficient Knowledge with Statistics		

Motivational Factors in Learning Statistics	• building encouragement from instructors. • having career prospects in statistics. • having real-world applications to increase engagement. • developing a sense of personal relevance and value in statistics	Learning Statistics from Teachers and Practical Applications	Mastering Statistics through Teaching and Practical Application	Self-Determination Theory of Deci and Ryan (1985)
	• attaining personal satisfaction after mastering difficult concepts. • shifting mindset towards seeing statistics as useful. • having perseverance despite learning challenges.	Fostering Perseverance and Mastery in Statistics		
Coping Strategies for Learning Difficulties	• developing structured study habits. • having preference for specific study time. • using self-affirmations to motivate oneself to study.	Building Self-Directed Study Habits	Developing Self-Directed Learning through Collaboration	Self-Regulated Learning Theory of Zimmerman (1989)
	• utilizing multimedia resources such as video tutorials. • participating in peer study groups for collaborative learning. • seeking explanations from classmates when formal instruction feels insufficient	Using Online Resources and Collaborative Learning		

Stress and Frustration Management	● taking breaks to refresh mental focus. ● setting academic goals for learning motivation. ● balancing academic responsibilities with personal time.	Enhancing Learning Through Balance and Focus	Fostering Balanced Learning and Growth Mindset	Coping Theory of Lazarus and Folkman (1984)
	● adopting a growth mindset to embrace challenges. ● using relaxation techniques such as listening to music to reduce anxiety. ● normalizing struggle and framing mistakes as learning opportunities.	Cultivating Growth Mindset and Reducing Anxiety		
Role of Statistical Tools in Enhancing Learning	● using of statistical tools to simplify data analysis. ● assisting in bridging manual computation with digital methods. ● improving conceptual understanding in Statistics.	Integrating Technological Tools for Statistical Understanding	Enhancing Statistical Learning through Technology Integration	Technology Acceptance Model of Devis (1989)
	● initial difficulties in learning statistical software. ● recognizing statistical importance in research and data-driven decision-making. ● learning through trial and error due to insufficient software guidance.	Overcoming Challenges in Statistical Software Learning		

The Lived Experiences and Coping Mechanisms of Students with Regards to their Attitude Towards Statistics

There are five essential themes which are created based from the in-depth interviews and focus group discussion of the participants on the first research question. Before the presentation of the results from the interviews and discussions, profiles of the participants for the qualitative data collection are presented in table 4. The table represents the participants' profiles for the qualitative selected purposively following the inclusion criteria: he or she must be a KCAST student that has subject in statistics.

A study conducted by Hofverberg et al. (2022) found that students who struggle with misconceptions in statistics often experience lower academic performance due to their difficulty in correctly applying statistical methods. Their research suggests that targeted interventions, such as step-by-step guidance and conceptual reinforcement, can help students overcome these misconceptions and improve their understanding. They also emphasized that providing students with hands-on statistical exercises and contextualized examples can enhance their ability to grasp abstract statistical concepts.

Similarly, Reyes et al. (2023) highlighted that students who lack foundational statistical knowledge struggle to interpret data accurately, leading to errors in analysis. Their findings emphasize the importance of integrating statistical literacy programs to ensure students develop the necessary skills for accurate data interpretation and application. They further suggested that curriculum adjustments that focus on reinforcing prerequisite mathematical skills can reduce learning gaps and improve student outcomes in statistical education.

İn addition, Smith and Dai (2023) found that students who engage in peer teaching and applied learning activities demonstrate improved confidence and mastery in statistics. Their study emphasizes the significance of incorporating interactive learning strategies to foster a deeper understanding of statistical concepts. Their research also suggests that integrating peer-led review sessions into coursework can significantly enhance student comprehension and retention of statistical methods.

Lastly, Cujba and Pifarré (2024) found that students who engage in collaborative learning environments, such as group discussions and study groups, exhibit higher levels of engagement and self-directed learning in statistics. Their study highlights the importance of fostering peer collaboration to improve statistical learning experiences. They also suggest that peer discussions and cooperative problem-solving sessions allow students to refine their statistical reasoning skills and increase conceptual retention.

Table 5. Insights of Students Regarding the Use of Statistical Tools on Their Attitude Toward Statistics.

ISSUES PROBED	CORE IDEAS	CODE/ CATEGORIES	ESSENTIAL THEMES	THEORETICAL SUPPORT
Enhanced Understanding Through Statistical Tools	• having statistical tools to help organize and structure analysis. • making statistical knowledge more meaningful by statistical analysis. • using statistical tools to increase confidence in data accuracy and reliability.	Utilizing Statistical Tools for Meaningful Analysis	Enhancing Statistical Analysis and Data Interpretation	Cognitive Load Theory of Sweller (1988)

	• enhancing the interpretation of data rather than just recognizing numbers. • understanding the relevance of statistics in research and real-world decision-making. • using graphical representations to identify patterns and correlations in datasets.	Developing Data Interpretation Skills in Statistics		
Impact on Motivation and Engagement in Learning Statistics	• enhancing interest through interactive and technology-driven learning experiences. • having persistence in learning software functions to improve statistical proficiency. • experiencing satisfaction from the ease and accuracy provided by statistical tools.	Enhancing Statistical Proficiency through Technology Integration	Strengthening Statistical Skills through Technology Integration	Flow Theory of Csikszentmihalyi (1990)
	• developing confidence when successfully applying tools. • facing setbacks when struggling with software navigation. • feeling more motivated when statistical tools simplify complex calculations.	Building Confidence in Statistical Tool Application		
Challenges in Using Statistical Tools	• struggling to select the most suitable statistical method for specific analyses. • facing confusion in determining which statistical test or approach to use.	Having Challenges in Statistical Method Selection	Emerging Challenges in Statistical Learning and Application	Zone of Proximal Development of Vygotsky (1978)

	● experiencing difficulties with software commands, interface, and data input.			
	● having limited exposure to statistical software leading to an extreme learning curve. ● struggling to independently implement learned statistical methods in real scenarios. ● being technologically inexperienced, hinders software mastery.	Having Learning Gaps in Statistical Software Proficiency		
Influence of Learning Environment	● benefiting from well-structured and thorough explanations by instructors. ● having increased student interest due to the teacher's proficiency in explaining statistical concepts. ● strengthening comprehension through interactive and practice-based learning approaches.	Teachers' Proficiency for Effective Statistical Learning	Enhancing Statistical Learning through Proficient Teaching	Social Learning Theory of Bandura (1977)
	● shaping students' perceptions of statistics through engaging and supportive teaching methods. ● learning statistical software through knowledge-sharing and peer assistance. ● benefiting from collaborative environments	Transforming Statistics Learning through Collaboration		

	where peers clarify concepts.			
Recommendations for Effective Statistical Education	• incorporating hands-on exercises and real-world applications to improve understanding. • promoting perseverance by fostering a supportive and motivating learning environment. • using technology and software tools consistently across instruction to build confidence.	Augmenting Statistical Learning through Application and Support	Enhancing Statistical Education through Application and Quality Instruction	Constructivist Learning Theory of Piaget (1976)
	• strengthening instructors' ability to teach statistics effectively through continuous training. • assessing instructional strategies to improve student comprehension and engagement. • providing opportunities for students to practice with statistical software in a guided manner.	Advancing Statistical Education through Effective Instruction		

Insights of Students Regarding the Use of Statistical Tools on Their Attitude Toward Statistics

Displayed in Table 5 are the responses of the participants in regards to their insights of students regarding the use of statistical tools on their attitude toward statistics. There are five essential themes which are drawn out from the in-depth and focus group discussion of the participants for the second question. The essential themes consisted codes based from the issues being probed which are summarized in the table.

A study conducted by Rahman et al. (2024) emphasized that innovative teaching approaches, including the integration of statistical tools, positively impact students' confidence and engagement. Their study demonstrated that students who received hands-on experience with statistical software exhibited improved understanding and performance. They suggested that incorporating interactive learning environments further enhances students' ability to interpret statistical data accurately. By blending theory with practical application, instructors can foster a more engaging and effective statistical learning experience.

In addition, Martinez and Valdez (2022) found that students who received formal training in statistical software developed greater confidence and competence in using these tools. Their study emphasized that structured instruction in statistical software not only improved students' technical

abilities but also fostered more positive attitudes toward learning statistics. They highlighted the effectiveness of personalized learning experiences, such as step-by-step tutorials and real-world case studies, in helping students overcome their apprehension toward data analysis. These findings underline the importance of incorporating tailored instructional strategies to enhance students' skills and reduce anxiety surrounding statistical tasks.

Furthermore, Adeleke and Ogunleye (2023) found that students with limited prior exposure to statistical software often experience difficulties in transitioning to advanced statistical techniques. Their study emphasized that misconceptions about statistical methods and data interpretation contribute to students' struggles. They suggested that structured training programs, including hands-on workshops and peer-assisted learning, could help bridge these learning gaps. Ensuring that students have a solid foundation in basic statistical concepts before introducing advanced techniques can also enhance their ability to engage with complex analyses.

Lastly, Watson et al. (2021) demonstrated that students who work on applied statistical research projects show greater interest in statistics. Their study found that incorporating field-specific datasets into coursework significantly improves students' ability to interpret statistical findings. They suggested that exposing students to practical statistical applications enhances their critical thinking and problem-solving skills, making them more confident in using statistical tools for data-driven decision-making.

CONCLUSION

The findings indicate that the utilization of statistical tools significantly influences students' attitudes toward statistics, as supported by quantitative data using Mean, R-Value, and P-Value. The results showed that students rated themselves very high in terms of perceived usefulness and attitude, and high in terms of perceived ease of use of statistical tools. Likewise, their attitudes toward statistics were also rated high in terms of interest, competence, and value, and very high in effort. These ratings suggest that students consistently engage with and benefit from statistical tools, reinforcing their positive outlook and confidence in dealing with statistical concepts.

Further insights were drawn from the qualitative phase of the study, which involved in-depth interviews (IDI) and focus group discussions (FGD). The analysis revealed key themes such as: Having Misconceptions and Learning Gaps in Statistics, Mastering Statistics through Teaching and Practical Application, Developing Self-Directed Learning through Collaboration, Fostering Balanced Learning and Growth Mindset, and Enhancing Statistical Learning through Technology Integration. Additional themes highlighted students' perspectives on the impact of statistical tools, including Enhancing Statistical Analysis and Data Interpretation, Strengthening Skills through Technology, Emerging Challenges in Statistical Learning, and the Role of Quality Teaching in Enhancing Statistical Understanding.

Lastly, the integration of both quantitative and qualitative findings confirmed a significant relationship between the use of statistical tools and students' attitudes towards statistics. The convergence of both data sets validated that the effective utilization of statistical tools enhances students' capacity to understand statistical concepts, solve problems, and apply these tools in real-world situations. This highlights the multifaceted impact of statistical tool usage—not only improving technical skills but also fostering more resilient, confident, and motivated learners in the field of statistics.

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