Exploring Motivational Factors in Data Collection Process: A Comparative Study of Two University Programmes

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Abstract. In bachelor's program, students develop communication and practical skills through group project assessment. The introduction to the statistical course reveals a preference among students for descriptive analysis over regression analysis, indicating less popularity for the latter as a statistical exploration choice. Descriptive analysis utilizes survey data, while regression analysis requires at least two quantitative variables, which are challenging to obtain via survey. Consequently, a compelling approach for gathering quantitative data has been introduced which has gained popularity among students and is now used in other courses. After its adoption, nine out of ten groups chose to explore regression analysis. Thus, this study aims to analyse motivation levels for data collection using this approach and compare them across programme and gender. Two bachelor's programmes that took a statistical course and conducted a group project assessment were studied. The findings indicate no significant difference in acceptance between the two programmes, and the motivation for collecting the data was high. Our analysis leads us to the conclusion that it is crucial to scrutinize and contemplate students' behaviour during the data collection process, as we believe that an increase in students' motivation to learn with authentic data will expose students to the complexities of real data and encourage them to utilize regression analysis for more in-depth insights. Other lecturers at various universities can use the results of this research to enhance the attractiveness of the data collection process in their statistical courses and design effective team-based learning interventions for undergraduate statistics learners.

Keywords: Numeracy Skills, Learning Motivations, Online Data Hunting, Statistical Course, Digital Skills.

1 Introduction

The importance of student motivation cannot be disputed as it has a significant impact on their attitudes towards the learning process. As a means of cultivating communication and practical skills in students, the statistical courses offered in bachelor's programmes often include a group project as part of their assessment. These projects entail a collaborative effort among three to four students who work together on an assignment

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related to a specific university statistical course. Interestingly, most students tend to lean towards choosing descriptive analysis as their preferred method for the group project, as highlighted during the statistical course's introduction. On the other hand, regression analysis appears to be less favoured among students as an option for exploring statistical analysis. The preference for descriptive analysis can be attributed to its compatibility with survey data, making it a more accessible choice for the group project. In contrast, regression analysis requires at least two quantitative variables, which can prove challenging to obtain through survey or questionnaire-based methods. The students involved in this study require data so they may practice learning statistical analysis and data interpretation. A lot of educators acknowledge that involving students in the data collection process will surely help them understand the type of analysis and allow for many queries later. This inquiry helps students grasp statistical theory more fully.

In higher education, student learning motivation is a crucial matter due to the significant role that academic performance plays in their future professional endeavours. Academic performance relies significantly on students' ability to stay motivated, which is essential for mastering any subject. In a Ghanaian university, [5] explores how constructivist teaching techniques, undergraduate students' self-concepts in statistics, and psychological conceptions affect their motivation to learn statistics. According to the study, the way that students were taught had a beneficial impact on their psychological needs and sense of self, which in turn had an encouraging effect on their motivation to study statistics. Student motivation also plays a critical role in shaping their attitudes towards the learning process. It serves as a driving force, guiding and sustaining positive student behaviour, ensuring their active engagement in the learning experience, and ultimately influencing their overall academic development [26]. If motivation is low on a learning subject, students will tend to ignore it and will lead to learning outcomes that are not optimal [26].

An innovative teaching approach that blends collaborative learning, action research, and the application of learning processes to real-world knowledge management can boost learning motivation and increase the effectiveness of learning throughout statistics [11]. Numerous studies have investigated the relationship between student motivation and academic performance, and various definitions of motivation have been used by researchers. In the current study of student motivation specifically for statistical courses, many researchers measured the relationship of student motivation with technology application. For example, [26] found that student motivation in learning educational statistics course increases after participating in technology application-based online tutorials. This is supported by [8] in which their study found high motivation of the students with the use of podcasts as an instructional medium in the statistic course. It shows the positive relationships between attention, relevance, trust, and satisfaction [8]. For data interpretation, [14] employed collaborative work and problem solving as a strategy for teaching statistics. The motivation of conducting this study is to assess the usefulness of an online data approach for educating quantitative data collection and analysis, boosting student motivation, teaching statistical concepts and theories, and helping students build practical skills in data understanding and interpretation.

However, in a study conducted by [1], they argued that student motivation is one of the factors that influence learning difficulties in statistics courses. Factors such as gender, regional origin, learning motivation, and learning resources influence student learning difficulties in statistics courses. Educators in statistics courses also face some fundamental challenges of creating assessments that motivate students to learn. A study from [18] mentioned that many students struggle to understand the underlying concepts and theories of statistics, such as probability, sampling, and hypothesis testing (conceptual understanding). [18] further explained that students find it difficult to perform statistical computations and analyse data, especially if they have limited experience with mathematical notation and software tools (computation and analysis). Even if students can compute statistical results, they may struggle with interpreting those results and communicating them effectively to others (interpretation and communication). Some students may have negative attitudes or beliefs about statistics, such as the perception that it is boring or irrelevant to their interests or career goals (attitudes and beliefs). Finally, educators may face pedagogical challenges in designing and delivering effective statistics courses, such as balancing theoretical concepts with practical applications and accommodating diverse learning styles and backgrounds (pedagogical challenges). [22] suggested that educators should provide learning assignments based on conditions so that students obtain support and benefits in their capacity to solve problems independently to overcome the challenges of learning.

Thus, this study proposed a compelling approach for gathering quantitative data meant at enhancing the quality of the learning experience when completing student's assessment. This way of data collection method has gained attraction among students as it is combined with technology. This study also extends the discussion in the context of gender and learning motivation from the study of [1].

We implemented the five factors adapted based on the study from [16] which are based on motivation theories and self-regulation. They break mathematical motivation up into its components by creating the Mathematical Motivation Questionnaire (MMQ), which lists intrinsic value, self-regulation, self-efficacy, utility value, and test anxiety as the primary components [16].

Intrinsic value refers to the enjoyment experienced by performing a particular academic task. Students who raise intrinsic motivation will be doing the task of learning because completing the task is considered enjoyable. For example, in a study of [19], they used interactive multimedia as a media innovation to see the significance impact to the student intrinsic motivation in the process of learning. Self-regulation theory by [40] refers to a metacognitive system that regulates students' learning strategies actively. It consists of two main components which are the ability to use, and the effective and efficient learning strategies to motivate ourselves to always participate in the learning process [34]. Students are said to have the ability to self-regulate if they can use a variety of learning strategies, and be able to decide when, why, and how to use this strategy in the right context [34].

Self-efficacy refers to the perception and belief that individuals have of their skills and that they mobilize effectively to succeed in a particular action in the sense of achieving a goal. For example, the students' belief in their ability to learn and succeed in their studies during emergency remote learning such as during COVID-19 pandemic

[21]. Statistics anxiety, specifically, refers to the feeling of anxiety experienced when taking a statistics course or doing statistical analysis [36]. This anxiety can negatively affect students' performance and is particularly prevalent among graduate students who may not have a strong math and statistical background. Understanding the sources of anxiety-related behaviours, such as the importance of the course, math and computer skills, exam stress, and foreign language skills, can help in designing more effective statistics courses. Students may lack confidence in their ability to learn and apply statistical concepts, which can lead to anxiety and avoidance of the subject [18]. We further explain all factors linked to this study in the next section.

By using these factors, we evaluate students' motivation by comparing two bachelor programmes that took statistical courses and conducted group project as their assessment. The educator has introduced a new approach for data collection process using an online platform for gathering quantitative data and creating an enjoyable experience throughout the process of data collection. The aim of this study is to identify the elements that influence students' learning motivation towards the data collection process. The objective of this study is to know the level of motivation in data collection process, to compare the level of motivation among different gender in data collection process and to compare the level of motivation between two bachelor programmes in data collection process.

2 Method

2.1 Research Design and Sampling

This study uses a cross-sectional survey research design to gather information on data collection motivation in introductory statistics course. With the aim to investigate the motivational factors that influence data collection processes in two distinct university programmes, this study adopts a comparative research design to examine and contrast the motivational aspects of data collection in two different programmes settings. By employing quantitative data, this research provides a comprehensive understanding of the distinctions in the data collection processes within the chosen university programmes.

2.2 Research Questions

This study addresses three primary research questions.

i. What is the level of motivation in the data collection process in completing their group project assessment?
ii. Are there statistically significant differences in motivational levels towards data collection for statistical courses among various academic programmes?
iii. Are there statistically significant differences in motivational levels towards data collection for statistical courses between genders?

2.3 Participants and Sampling Technique

The targeted respondents involved in this study must go through the experience of finding real data by browsing specific websites that relate to their group project. The students need to respond to the questionnaire after completing their assessment. The population of this study involves all students from two bachelor programmes; Bachelor of Information Systems with specialization in Business Computing (CS264) and Bachelor of Science in Mathematical Modelling and Analytics (CS267), where students for both programmes took a statistical course and needed to complete a group project as part of assessment involving the data collection process. Meanwhile, any group that chose to proceed with their group project using descriptive analysis was excluded from this study. The total population for this study comprised 57 registered students for the statistical course in CS264 and 53 students for CS267. Stratified random sampling was used in this study, and the sample of study consisted of 32 students from CS264 programmes and 30 students from CS267 programme.

2.4 Data Collection

The customized online survey was distributed to the participants to gather information on motivational factors. The survey was composed of a Likert scale with five possible responses: strongly agree (5), agree (4), neither strongly agree nor disagree (3), disagree (2), and strongly disagree (1).

2.5 Instrument and Procedures

In this phase, the researchers employed a quantitative method to achieve its objectives. The data were collected through questionnaire surveys targeting the third-year students who enrolled in the Bachelor of Information Systems with specialization in Business Computing (CS264) and the first-year students from the Bachelor of Science in Mathematical Modelling and Analytics (CS267). The questionnaire contains six sections: demographics background, degree of intrinsic value measures, degree of self-regulation value measures, degree of self-efficacy value measures, degree of utility value measures, and degree of anxiety value measures. Respondents were asked to indicate their level of agreement with each statement using a five-point Likert scale.

The survey instrument for this study was adapted from the MMQ survey tool created by [16]. The questionnaire consisted of 19 items selected based on the final version of the MMQ survey [16], and motivation was measured for the data collection process. Hence, the modification of each item for the replacement of mathematical motivation with the data collection process was implemented. As [16] suggested, the MMQ can help educators to determine the best approach in increasing student motivation according to their specific motivational profile. The reliability of the instrument for each factor was calculated using Cronbach's alpha which ranged from 0.898 to 0.918, implying they are reliable, as shown in Table 1. The overall reliability of the 19-item MMQ was Cronbach's alpha value of 0.897.

Table 1. Definition of the five constructs of the finalized MMQ with reliability evidence.

Factors	Cronbach's Alpha	Number of Items	Definition
Intrinsic value	0.898	4	A student's feeling that experiences in data collection process is personally valuable.
Self-regulation	0.795	3	A student's tendency to engage in behavioural data collection strategies.
Self-efficacy	0.909	4	A student's belief that they have the necessary competence and capability to perform well in data collection process.
Utility value	0.918	4	A student's perception that data collection process is personally relevant to their lives or future careers.
Test anxiety	0.910	4	A student's feeling of anxiety toward being assessed in data collection process or compared with others.
Overall	0.897	19	

2.6 Data Analysis

The quantitative data for this study was analysed using SPSS software. The analysis helps to compare two bachelor programmes and gender in the data collection motivation.

2.7 Data Hunting Approach for Regression Analysis

There are several stages to complete the assessment project. Initially, the students learn about the related chapters for this assessment. To start, they need to form a group, which is limited to three to four members per group. After that, they need to decide on the topic of their interest to explore. For example, the students are interested in exploring the relationship and the factors that influence the fare of the bus ticket and the destination. Based on this example, the dependent variable is the fare of a bus ticket, and the independent variable is the distance in kilometers. After they have chosen the topic, they need to proceed with data collection by referring to the relevant sources on the relevant websites. By employing this method, the students have the freedom to choose a subject matter that captures their interest.

This approach enables the students to derive pleasure from both data analysis and data interpretation. After accumulating adequate quantitative data, the third stage involves utilizing regression and correlation analysis. The students delve into the data, and the outcome holds more significance for them since they have selected the topic and participated in data collection. To relate the syllabus to real-life application, this approach to online data hunting is expected to create a fun environment in the student learning process. In the last phase, following data analysis, the students incorporate data presentation and interpretation into their written report. As their findings pertain to current issues and use up-to-date data, they will capture the attention of the lecturer and encourage further reading. Figure 1 shows the flowchart for the proposed work of this study.

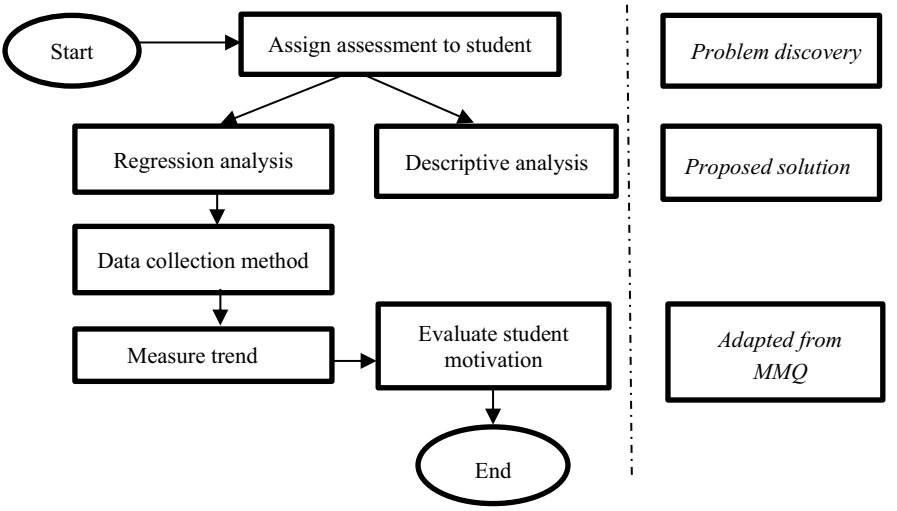

Fig. 1. Proposed work flowchart.

3 Result and Discussion

Table 2 shows the tabulated data collected from sixty-two samples in two programmes, CS264 and CS267. A cross-tabulation table for the profile of the participants by duration of data collection is recorded in Table 3. The fastest duration to collect data using this approach was recorded at less than 6 hours, and one group took about five (5) days to collect the data.

Table 2. Cross-tabulation table for demographic profiles of participants.

	Gender		Total
Programme	Female	Male	62
CS264	22	10	32
CS267	14	16	30

Table 3. Cross-tabulation table for programme of participants by duration of data collection.

	How long do you manage to collect the data for your assessment?								
	< 6 hours	6 - 12 hours	1 day	2 days	3 days	4 days	5 days	1 week	
CS264	3	2	5	5	5	3	1	8	32
CS267	10	4	2	7	2	1	0	4	30
Total	13	6	7	12	7	4	1	12	62

3.1 Overall level of motivation in data collection process for statistical course

The mean value and standard deviation of each item of the five factors in the motivation level of the data collection process are presented in Table 4. The highest mean score was recorded for the item "*Understanding the data collection process gives me a sense of accomplishment'* (mean = 4.40, SD = 0.639), and the lowest mean score was recorded for the item "*I become anxious when it is time to take a data collection process"* (mean = 2.89, SD = 1.103).

Table 4. Descriptive Statistics.

Factors	Items	N	Mean	Std. Deviation
Intrinsic Value	1. I enjoy collecting data.	62	4.21	0.750
	3. I find learning the data collection process is interesting.	62	4.31	0.801
	4. I like the data collection process as it is challenges to me.	62	4.08	0.874
	5. Understanding the data collection process gives me a sense of accomplishment.	62	4.40	0.639
Self-regulation	1. If I am having trouble during data collection process, I try to figure out why.	62	4.37	0.773
	3. I use strategies that ensure I learn the data collection process well.	62	4.15	0.721
	5. I prepare well for my data collection process.	62	4.15	0.674
Self-efficacy	2. I am confident I will do well on my data collection process and my assessment.	62	4.15	0.698
	3. I believe I can master the knowledge and skills in the data collection process.	62	4.13	0.689
	4. I am confident I will do well on the data collection process.	62	4.11	0.655
	5. I believe I can earn a good result from the data collection process.	62	4.23	0.663
Utility value	2. I think about how learning the data collection process can help me get a job.	62	4.11	0.791
	3. I think about how the data collection process I learn will be helpful to me.	62	4.21	0.631
	4. I think about how learning data collection process can help my career.	62	4.10	0.718
	5. I think about how I will use the data collection process I learn.	62	4.15	0.743
Test anxiety	1. I am nervous about how I will do on the data collection process.	62	3.24	1.169
	2. I become anxious when it is time to take a data collection process.	62	2.89	1.103
	3. I worry about failing in data collection process.	62	3.37	1.271
	4. I am concerned that the other students are better in data collection process.	62	3.29	1.077

Firstly, this approach was assessed and evaluated to measure how well it can help the students enhance motivation and creativity while completing the assessment in a stress-free setting. Except for the anxiety test, the overall findings for the level of motivation in the data collection process of the statistical course are found to be higher for the factors of intrinsic worth, self-regulation, self-efficacy, and utility value.

In the first factor, most of them indicated that they enjoy utilizing this approach to collect data and that they find the data collection process to be engaging when it comes to the intrinsic value factor. In learning statistics, intrinsic value is a crucial indicator of student motivation. The study found that academic self-concept and intrinsic value significantly interact with each other in predicting academic achievement, which supports the situated expectancy-value [23]. According to a study from [39], students' involvement, effort, and persistence in learning activities are all positively correlated with intrinsic motivation, which in turn promotes academic accomplishment. When a learner learns because it makes them happy and satisfied, this is referred to as having intrinsic motivation [6]. Additionally, factors like grade levels, academic grade point averages, and learning environments have been shown to have an impact on intrinsic motivation [37]. Students' involvement and success in learning statistics may therefore benefit from assessing and developing their intrinsic drive.

Self-regulation, as the second factor, measures the tendency of students to use behaviour data collection approaches. The outcomes of this aspect demonstrate that students who possess a thorough comprehension of the data collection process will perform better on evaluation, thereby achieving higher scores due to their ability to precisely interpret the information. The results of a study by [3] also confirmed this conclusion. According to them, motivated students are more likely to have low latency and high perseverance in task engagement. Additionally, the use of original data can increase student engagement in the learning process and improve their understanding of statistical concepts [24]. The educator's role is crucial in both offline and online learning environments, particularly regarding students' motivation to learn and ability to self-regulate their academic efforts [17]. This approach is in line with the research from [35], which concluded that educators must provide students the freedom to explore, learn, and think without the pressure of rapid evaluation or grading. This will allow students to become more engaged in the subject matter. Furthermore, a mixed-method study by [33] discovered a significant relationship and influence between self-regulation and student motivation towards learning.

The third factor is self-efficacy which measures a student’s belief that they have the necessary competence and capability to perform well in the data collection process. Most of the students are confident in their ability to use this approach to collect data effectively and possess the knowledge and skills needed. An explanation for these results could be that students perceive themselves as possessing the necessary knowledge and skills to proficiently execute the data collection process. Consequently, enabling students to choose any topic will heighten their enthusiasm for completing this assessment. As stated by [28], educators can design a fun delivery strategy to inspire students to be more involved in the lesson, which will increase their motivation. In accordance with [12], team-based learning activities help undergraduate statistics students develop self-efficacy and reduce anxiety. In comparison to students who did not participate in the team-based learning activities, the results demonstrated a statistically significant rise in self-efficacy and a statistically significant drop in anxiety levels. According to

the study, team-based learning can be a helpful strategy for enhancing undergraduate biology students' statistics learning.

In the utility value factor, this factor is used to measure a student's perception that the data collection process is personally relevant to their lives or future careers. Based on the results, the students feel that this learning process can help them get a job and will be helpful in their career. To increase students' utility factors in statistical subjects, there are several strategies that can be employed. One strategy is to provide opportunities for students to demonstrate their abilities and achieve learning outcomes through varied assessment strategies [9]. Additionally, introducing students to tools for data management, visualization, and reproducibility can enhance their ability to express statistical computations [20]. Furthermore, studies conducted by [24] and [30] also supported our finding. [24] suggested that repetition, immediate feedback, and the use of original data are found to be effective strategies for teaching statistics to students. Additionally, [30] suggested that employing a guided problem-based learning approach in hybrid learning environment can increase students' motivation and reduce dropout rates in statistics courses.

In addition, this study also explored students' feelings of anxiety regarding the assessment of their data collection process and being compared with their peers. As widely known, collecting data involves searching for and meticulously analysing the relevant variables to obtain an adequate sample. The findings revealed a moderate level of test anxiety. It shows that there are nervousness and anxiety, worry about performing poorly in the data collection process, and worry that the other students will perform better in the data collection process. However, this is considered a moderate or normal level of anxiety for students to experience because they are not frequently involved in the data collection process. Perhaps we can expect students to participate and make an honest effort to complete their assessment at this level of anxiety. According to the study from [2], anxiety in students is found to contribute to their learning outcomes in statistical subjects. Several studies have shown that anxiety, specifically statistics anxiety, negatively affects students' performance and achievement in statistics courses [27], [32]. By using positive interactions, social-emotional learning strategies, and listening to students' worries, instructors can lower anxiety and improve students' learning results in statistics.

3.2 Level of motivation for the statistical course's data collection process by programme

The level of motivation in the data collection process for all factors is high, as shown in Table 5, except for the test anxiety factor. The highest mean score is recorded for self-regulation in CS264 (mean = 4.31, SD = 0.57) and CS267 (mean = 4.12, SD = 0.65), while the lowest mean score is recorded for the anxiety test factor, CS264 (mean = 3.44, SD = 1.09) and CS267 (mean = 2.94, SD = 0.91).

Table 5: Motivation level of data collection process by two different programmes (N=62).

Factor	Programme	N	Mean	Std. Deviation	Level
Intrinsic Value	CS264	32	4.26	0.66746	High
	CS267	30	4.24	0.69320	High
Self-regulation	CS264	32	4.31	0.56757	High
	CS267	30	4.12	0.64614	High
Self-efficacy	CS264	32	4.08	0.63639	High
	CS267	30	4.23	0.55683	High
Utility value	CS264	32	4.17	0.55879	High
	CS267	30	4.11	0.73895	High
Test anxiety	CS264	32	3.44	1.09250	Moderate
	CS267	30	2.94	0.90183	Low

The results in Table 6 for an independent sample t-test showed that motivation level is not statistically different for all factors between programmes: intrinsic value ($t = 0.093$, $p = 0.926$), self-regulation ($t = 1.234$, $p = 0.222$), self-efficacy ($t = -1.019$, $p = 0.312$), utility value ($t = 0.383$, $p = 0.703$), and test anxiety ($t = 1.942$, $p = 0.057$). Cohen's d effect size was calculated to determine if the difference between the two programmes is practically significant [13]. An effect size is a measure of how important a difference is: large effect sizes mean the difference is important; small effect sizes mean the difference is unimportant. The effect size is found to be very high for the test anxiety factor, which indicated that the difference by programme is important. Concerning all factors, the results indicated that the motivation level for the data collection process using this approach does not differ by student programme in all factors.

Table 6. Comparison between programmes.

Factor	Programme	N	Mean	Std. Deviation	t	Sig. (2-tailed)	Mean Difference
Intrinsic Value	CS264	32	4.26	0.66746	0.093	0.926	0.0162
	CS267	30	4.24	0.69320			
Self-regulation	CS264	32	4.31	0.56757	1.234	0.222	0.1903
	CS267	30	4.12	0.64614			
Self-efficacy	CS264	32	4.08	0.63639	-1.019	0.312	-0.1552
	CS267	30	4.23	0.55683			
Utility value	CS264	32	4.17	0.55879	0.383	0.703	0.0635
	CS267	30	4.11	0.73895			
Test anxiety	CS264	32	3.44	1.09250	1.942	0.057	0.4958
	CS267	30	2.94	0.90183			

The approach started with the statistical course enrolled in the CS264 programme. In their assessment, they can choose two options (descriptive statistics or regression analysis) to complete their assessment. When the lecturer perceives a pattern in which students are less likely to choose the second option for completing their assessments, the new approach aims to motivate them to perform regression analysis. This study was carried out to determine how well this approach was received by the students. Since

most of them believe that choosing the second alternative will allow them to move forward with their assessment of this statistical course, the same approach was also used for another statistical course for the CS267 programme.

It was clear from the results that not all parameters are important when these two programmes are compared on a mean basis. According to these findings, there is no difference between the two programmes, CS264 and CS267, regarding the level of motivation for the data collection process for the statistical course. The study's findings prove that the students in both programmes accept this approach.

This new approach revealed the significance of educational innovation. According to [31], educators need to find creative methods to capture their students' interest and attention when it comes to innovation. Innovation in education is usually "student-centered," with a focus on enhancing the learning environment and/or processes. "Innovativeness" is defined as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of the system" [29]. Furthermore, to properly reach every student, educators must employ a variety of teaching techniques. Additionally, it keeps students motivated [10].

3.3 Level of motivation for the statistical course's data collection process by gender

To determine the influence of gender on the motivation level of the data collection process among CS264 and CS267 students, an independent sample t-test was conducted. The results in Table 7 show a significant difference in the test anxiety factor ($t = -3.353$, $p = 0.001$), with the mean score for males in the test anxiety factor (mean = 2.72, SD = 1.003) being lower than the mean score for females (mean = 3.54, SD = 0.91124). Further analysis of the influence of gender on other motivation levels and data collection factors pointed out that intrinsic value, self-regulation, self-efficacy, and utility value factors are not statistically different. These results indicate that the motivation factors in the data collection process do not differ by gender in all factors except test anxiety.

Table 7: Comparison between gender.

Factor	Gender	N	Mean	Std. Deviation	t	Sig. (2-tailed)	Mean Difference
Intrinsic Value	Male	26	4.22	0.69759	-0.284	0.777	-0.0497
	Female	36	4.27	0.66648			
Self-regulation	Male	26	4.08	0.65529	-1.596	0.116	-0.2472
	Female	36	4.32	0.56053			
Self-efficacy	Male	26	4.06	0.53994	-1.068	0.290	-0.1645
	Female	36	4.22	0.63746			
Utility value	Male	26	3.95	0.68564	-2.003	0.050	-0.3258
	Female	36	4.28	0.59094			
Test anxiety	Male	26	2.72	1.00331	-3.353	0.001	-0.8205
	Female	36	3.54	0.91124			

This study also examines the level of motivation in the data collection process for the statistical course between male and female students. The mean comparison between males and females towards the level of motivation in the data collection process revealed that all factors are not significant except for the anxiety factor. In terms of gender, males and females have the same level of intrinsic value, self-regulation, self-efficacy, and utility value. This result is supported by a study of [25] who discovered no statistically significant differences in learning desire among higher vocational students of various grades and genders. A study by [38] discovered that female students are more motivated than male students. As for the anxiety value element, the findings indicated that there is a mean difference in the level of motivation between males and females throughout the data collection process. When getting involved in the data collection process, female students are reported to feel more anxious than male students. This is in line with the results of [15] where females have greater anxiety on the Test and Class Anxiety subscale than males. The study from [7] also found that female students are significantly more anxious than male students when taking mathematics assessments. According to a study by [25], female students are more motivated to learn, and their learning activities are more concerned with how other people will perceive them. In contrast, the result of [4] showed that there is no significant difference in statistics anxiety between male and female college students. As stated in the study, anxiety levels among students taking statistics courses are equivalent for both genders.

4 Conclusion

In conclusion, this study has highlighted the significance of the proposed method for data collection in statistical courses, particularly in the context of group projects. The preference for descriptive analysis over regression analysis among the students was observed initially, but through the implementation of this new approach, there was a remarkable shift in students' attitudes. The result shows there is no difference in the acceptance of two bachelor programmes, and the motivation for collecting the data is considered high. The result also indicates that the motivation factors in the data collection process do not differ by gender in all factors except test anxiety. This approach is supported by the fact that one of the future workspace skills listed in the World Economic Forum (WEF) is active learning and learning strategies. WEF describes active learning as learners exploring well-formed concepts and tasks, which improve problem solving capabilities, attention, and memory. Meanwhile, ‘learning strategies’ are described as capacities for teaching others how to do something which includes selection and using training or instructional methods and procedure appropriate for the situation when learning or teaching new things.

The findings of this research not only emphasize the importance of understanding students' behaviour during the data collection process but also reveal the positive impact of improved motivation on their learning outcomes. As a result, the adoption of this method can be beneficial not only in the two bachelor's programmes studied but also in other statistical courses across different campuses and universities. Furthermore, the implication of this study extends beyond the immediate context of the course assessments. The insights gained from this research can aid in designing more effective

team-based learning interventions for undergraduate statistics learners. It also encourages students to explore both statistical analysis and data interpretation to equip them with a comprehensive understanding of data interpretation and decision-making processes in various scenarios and prepare them for the challenges they may face in their future careers.

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