Descriptive analysis on students assessing the most difficult subjects in school

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Abstract: This study investigates the challenges students face in learning certain subjects and the underlying causes of these difficulties. A survey of 50 high school students identified three major factors: the nature of the subject, teaching methods, and curriculum design. Topics lacking practical examples and an overemphasis on theory were primary sources of misunderstanding. Students also reported challenges with problem-solving and asking questions in class. These findings highlight the need for interventions and teaching strategies to address these issues, fostering better understanding and improving learning outcomes.

Keywords: Descriptive statistics, Measure of central tendency, Measure of variability, Skewness, Kurtosis.

1. Introduction

Descriptive statistics are a set of techniques used to summarize and describe a given data of an entire sample or population using numbers and graphs. we can describe our data using many concepts of statistics. These summaries are vital to describe the state and understanding the prioritize of measured data to making it more manageable and interpretable. Statistics are focused on mathematical discipline, which involve the collection, description, analysis and inference the conclusion from quantitative data. The mathematical theory behind the statistic is depend on differential and integrals calculus, liner algebra and probability theory. It is using in many fields of scientific such as quantum mechanics which using the probability of finding the electrons at a given point, weather forecasting, proteomics or microarray analysis in genomics, etc. There are two subdivided of statistics method.

Descriptive statistics: It mostly focuses on central tendency, variability and distribution to summaize and describe the main features of data in either tables or graph form which outcome from population.

Inferential statistics: It include techniques to draw the conclusion of sampled data to make prediction about the large sample or population.

Some basic definitions

Population: All the member of group from which you want to collect the data and draw the conclusion, for example all students who registered in private school last year.

Sample: The part of population selected to analysis, for example the students selected to fill out a learning-satisfaction questionnaire.

Parameter: A numerical measure that describe the characteristic of population, for example the percentage of all student who are very satisfied with the learning techniques in school.

Quantitative variable (numerical variable): The value of these variables includes a measured value. there are two types of quantitative variable:

Discrete variable-it counts the individual items, for example the number of students in class.

Continuous variable-it measurement non-finite value, for example distance.

Qualitative variable (categorical variable): A variable is not numerical. It describes the character- is
tics or variable such as color, weight, state, etc.
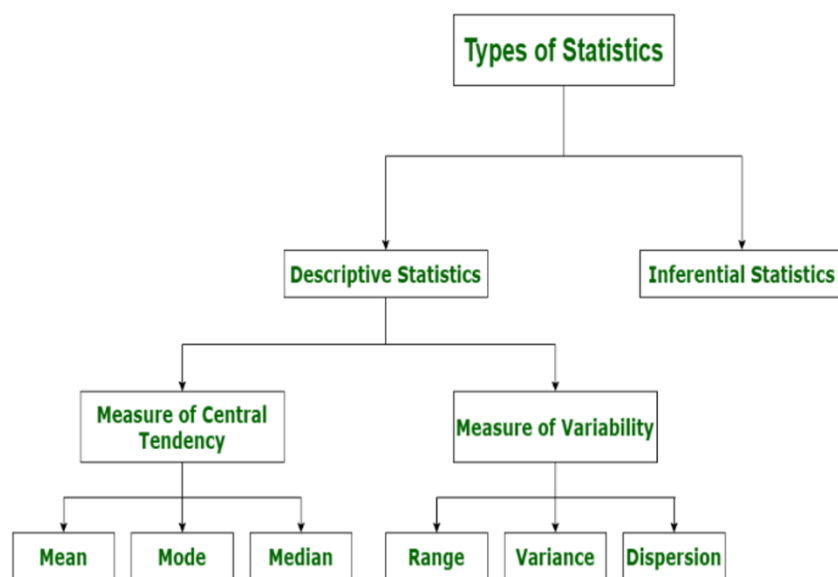The following figure illustrate the types of statistics:

Figure 1.
This figure shows major types of statistics.

2. Literature Review

Poldrack, et al. [1] statically thinking philosophy is underlying to understand our complex world
and provide the main ideas of statistics in a way that focuses on deep comprehension rather than rote
application. It provides the tools to describe the complicated pattern, which generated from data, make
accurate predicates, and decisions based on data.

Cobb and Moore [2] note that "The naturally of variability gives statistics a specific content which
set it apart from mathematics itself and from other mathematical science, however there are more than
content that distinguish statistical thinking from mathematics. Statistics needs a different kind of
thinking, because data in not just number, there are number with a context". One result is that students
are learning that perfectly symmetrical graphical displays are hard to find. Even with the ability to
verbally describe a distribution from a visual display, researchers have found [3] that students cannot
translate their understanding of shape when asked to compare numerical statistics such as the mean and
median. Hence, measures of skewness are becoming more important (although many instructors may
reasonably conclude that kurtosis does not deserve extended discussion in a basic statistics class.

Horswell and Looney [4] note that "The performance of skewness tests is shown to be very
sensitive to the kurtosis of the underlying distribution." Because the Kurtosis id difficult to explanation
and also it is difficult to judge from histogram, we see a few of instructor say much about it. The main
property of Kurtosis is a symmetric distribution [5]. Data set contains a lot of values will be not only
skewness but also will be leptokurtic, therefor We cannot speak of non- normal skewness as if it were
separable from non-normal kurtosis. The best we can do is to focus on the skewness statistics for
departure from the symmetric normal distribution.

3. Methodology

We use univariate analysis, which is concerned on describing the distribution of single variable,
including central tendency which measure mean, median and mode, and variability which include range,

variance and depression (include data set and measure the spread like variance and standard deviation). The shape of distribution may describe through skewness and kurtosis. The property of variable's distribution may also draw in in graphical or tabular format, and histograms.

Some of the advantage of descriptive statistics:

Summarize a set of observations that will present a largest amount of information as a simply as possible.

It used to represent the feature of data in study such as the mean and standard deviation.

Data is present in a meaningful and understandable away.

It can identify further ideas of research.

It gives the characteristics of population or sample.

A good primer to learn about statistics process.

4. Analysis

The sample comprised 50 (73% females and 26% males) high school students. we choice those students because we saw vary in grades basically in scientific subjects also some subjects are depend in each other, so Students' views were gathered using a short questionnaire that contained acceptance about some techniques in education and ways who teacher used to explanation also Students were asked to indicate the difficult subject to study which take more time and contains more thing that cannot understanding, finally we ask them to write some suggestions to improve the education in their school.
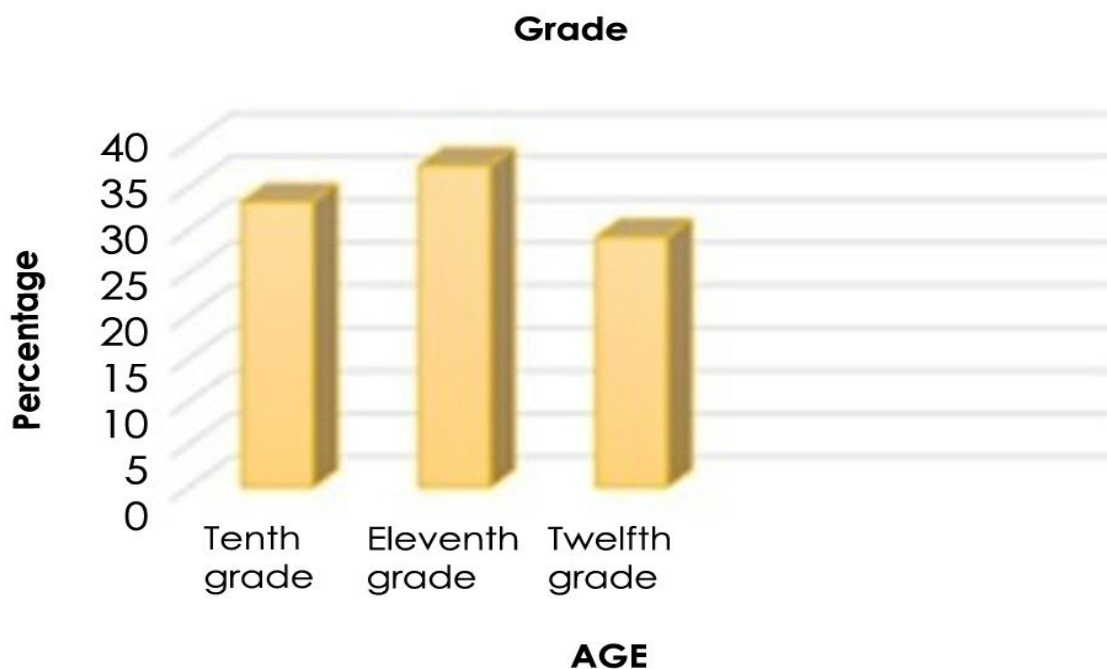

Figure 2.
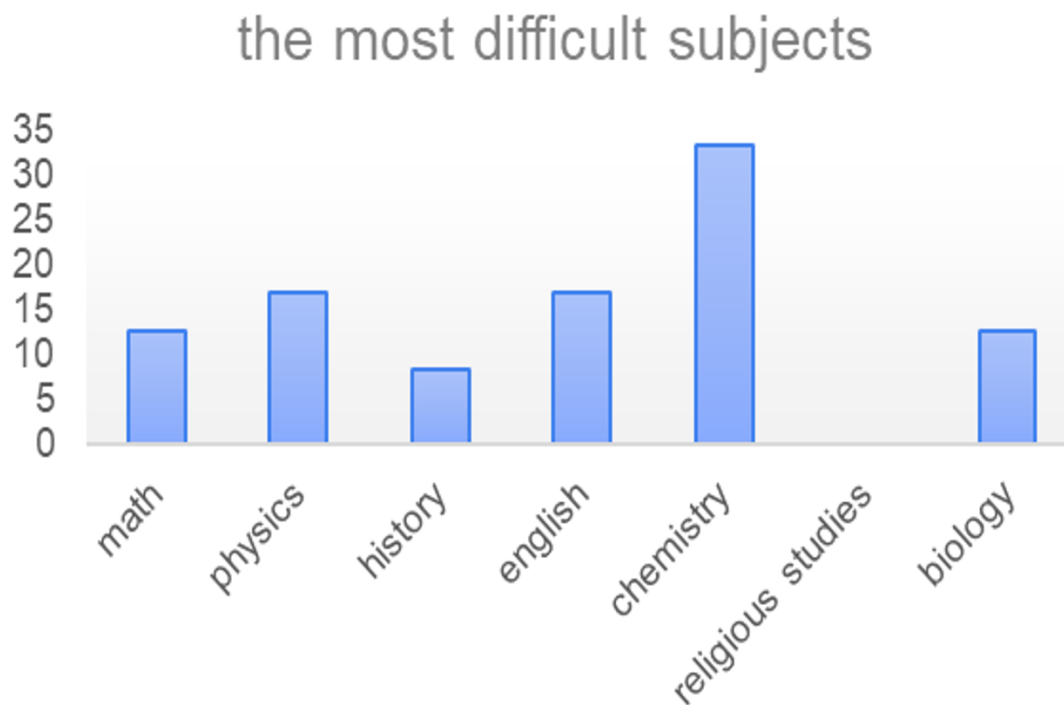the percentage of grade of students who choose to complete the survey.

Figure 3.
the percentage of the most difficult subject in high school.

Table 1.
Participant responses on the statements related to the course offering.

Statements	Strongly agree		Agree		3.00		Disagree		Strongly disagree	
	n	%	n	%	n	%	n	%	n	%
We learn a lot al-most every day	3	6.0	31	62.0	11	22.0	1	2.0	4	8.0
We get choices in how to completeclass activities.	2	4.0	29	58.0	11	22.0	5	10.0	3	6.0
The comments that I get on my work help me understand how todo my work better.	3	6.0	34	68.0	5	10.0	0	0	8	16.0
My teacher encour-ages me to performbetter.	3	6.0	15	30.0	16	32.0	8	16.0	8	16.0
My teacher appreciates the times when I work hard towards scoring well in a test or performing well in extracurricular activities.	5	10.0	25	50.0	11	22.0	5	10.0	4	8.0
My teacher gives adequate answers when I ask questions.	6	12.0	20	40.0	16	32.0	5	10.0	3	6.0
My teacher checks to make sure we understand what he/she is teaching us.	5	10.0	25	50.0	11	22.0	4	8.0	5	10.0
The school provides many tech-niques that help us understand thesubjects well.	6	12.0	13	26.0	10	20.0	15	30.0	6	12.0
The book is present the ex-planation of topicsin clear a way.	6	12.0	12	24.0	7	14.0	11	22.0	14	28.0
I use many resources to help me understand the subject well.	4	8.0	33	66.0	6	12.0	1	2.0	6	12.0

Table 2.
Descriptive statistics of the Likert responses.

Statements	Mean	Std. deviation
We learn a lot almost every day	2.4400	0.95105
We get choices in how to complete class activities.	2.5600	0.95105
The comments that I get on my work help me understand how todo my work better.	2.5200	1.16479
My teacher encourages me to perform better.	3.0600	1.16776
My teacher appreciates the times when I work hard towards scoring well in a test or performing well in extracurricular activities.	2.5600	1.07210
My teacher gives adequate answers when I ask questions.	2.5800	1.03194
My teacher checks to make sure we understand what he/she isteaching us.	2.5800	1.10823
The school provides many techniques that help us understandthe subjects well.	3.0400	1.24474
The book presents the explanation of topics in clear a way.	3.3000	1.41782
I use many resources to help me understand the subject well.	2.4400	1.09096

Summary of participant perception towards the offered course:

Out of total 50 student participants, the majority (46%) of the participants had a neutral perception towards the offered course. 32 % of the participants are satisfied and 10% are highly satisfied with the course offering.
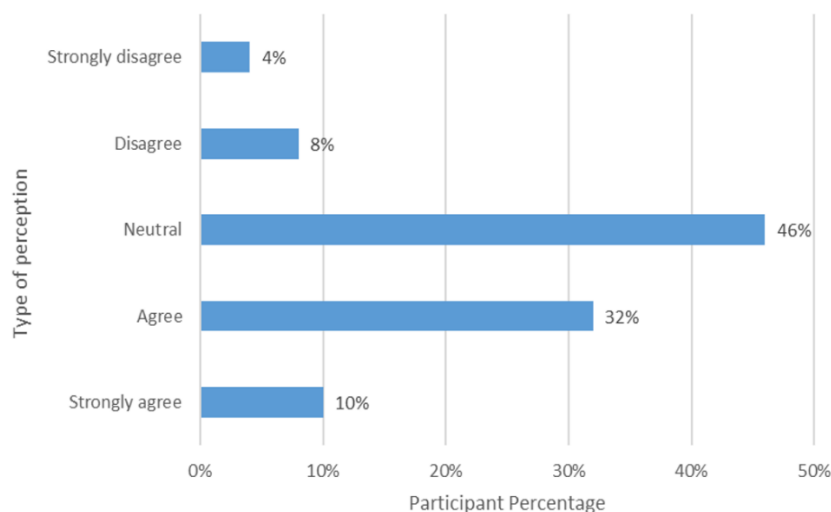

Figure 4.
Participant perception toward the offered course.

Table 3.
Predominant the reason for student finding the subject with their chosen difficult.

Category of reasons	Response%
We learn a lot almost every day.	62.7
We get choices in how to complete activities.	58.8
The comments that I get on my work help me under- stand how to do my work better.	66.7
My teacher encourages me to perform better.	29.4
My teacher appreciates the times when i work hard to-wards scoring well in a testor performing well in extracurricular activities.	49
My teacher gives adequate answer when I ask questions.	39.2
My teacher checks to make sure we understand whathe/she is teaching us.	49
The school provide many technologies that help us to understanding the topicsvery well.	25.5
the book is present the explanation of topic in clear away.	23.5
I use many resources to help me understand thesubject well.	64.7

Table 4.
Frequencies of 50 students results.

Mean	14.29
Median	50.5
Mode	12.5, 16.7
St. deviation	8.319
Variance	69.222
skewness	-13.056
kurtosis	0.646
Range	25
Maximum	33.3
minimum	12.5

5. Result

The data reveals important insights into its distribution and variability. The mean of 14.29 suggests a central value, but the median of 50.5 indicates significant asymmetry, supported by a skewness of -13.056, reflecting a highly left-skewed distribution. The presence of two modes (12.5 and 16.7) indicates bimodality, suggesting varied concentration of values. Measures of variability, including a standard deviation of 8.319 and variance of 69.222, highlight moderate dispersion. The minimum value of 12.5 and a maximum of 33.3 further depict the range. With a kurtosis of 0.646, the distribution is slightly platykurtic, implying a flatter peak compared to a normal distribution.

6. Conclusion

This study employs descriptive statistics to analyze and predict student learning activities. The insights gained through this approach are valuable for teachers, helping them refine teaching methods to better support student learning. By identifying common challenges faced by students, teachers can devise practical strategies to address these difficulties and enhance comprehension. Additionally, the application of descriptive statistics highlights areas where subject-specific practices can be introduced to improve students' understanding and overall academic performance.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

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