Berkala Ilmiah Pendidikan
Volume 6 Nomor 2, Juni 2026

scidac plus

Analysis of Understanding of Quantitative Research Methods among History Education Students

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Abstract

Qualitative research methodology is one of the important methodologies in educational research. The objectives of this study are (1) to understand the basic concepts of qualitative research; (2) to understand the population and sample; (3) to understand the data collection techniques; and (4) to understand data analysis and statistics. This study uses a quantitative research method with a closed questionnaire. The population of this study consist of history education students who have taken the Educational Research Methodology or Quantitative Research Methodology course and are in semesters 3-6. The sampling technique in this study is simple random sampling. The sample used in this study consist of 121 students. The results of this study are as follow: (1) understanding the basic concepts of quantitative research shows that 65 students stated that they understand very well, 45 students stated that they understand, and 11 students stated that they do not understand; (2) understanding of the population and sample shows that 87 students understand the population and sample very well, 31 students stated that they understand, and 3 students stated that they do not understand; (3) understanding of the data collection techniques shows that 24 students understand very well, 91 students stated that they understand, and 6 students do not understand; (4) understanding of data analysis and statistics shows that 1 student understands very well, 96 students understand, and 24 students do not understand well.

Keywords: Quantitative Research Methods, Students, Research Methods

INTRODUCTION

Research methods are one of the important subjects in higher education. This course equips students to think scientifically, systematically, and data-based. In various higher education institutions, various research methods are provided to students, adjusted to the curriculum applicable to each study program (Sugiono, 2019). In the field of education, especially history education, various research methods are provided, including qualitative research methods, historical research methods, classroom action research methods, and quantitative research methods (Agung et al., 2025).

Quantitative research methods are crucial in educational research. They play a strategic role in history teaching, such as evaluating learning outcomes and developing educational innovations based on empirical data. However, despite their strategic role, few students from educational backgrounds utilize them. Students often experience difficulties in applying and processing research data. Students perceive qualitative research methods courses as difficult because they deal with numbers (Creswell & Guetterman, 2019). This is in line with the findings of VanSledright (2014), which state that students with a poor understanding of methodological concepts will impact their research outcomes.

Students' difficulties in studying quantitative research do not only originate from statistical aspects, but also stem from a weak understanding of the logic of scientific research. Students' statistical understanding must be built by combining concepts, procedures, interpretation, and not just the ability to use data analysis software (Pallant, 2020). Based on initial observations carried out by researchers at the History Education Study Program at IKIP PGRI Wates as an example of a campus in Yogyakarta, and the History Education Study Program at Muhammadiyah University Purwokerto, it was observed that during Educational Research Methods courses covering quantitative material, as well as in Quantitative Research Methods courses, students were often busy with their devices, some students fell asleep, and some did not understand the material and asked the lecturer for clarification.

Apart from that, the observations also found that when students entered the calculation material using software or manual calculations, students were less enthusiastic. This is in line with previous research by Zientek et al. (2008), which showed that students who have low methodological literacy are less able to connect research objectives with appropriate data analysis techniques. In the context of history education, this challenge becomes more complex because the characteristics of history emphasize qualitative and narrative approaches. In addition, history education students often view quantitative methods as an approach that is less relevant to their scientific field. Consequently, this condition affects students' low motivation and understanding of the basic concepts of quantitative research.

Based on previous research, although many studies have addressed students' difficulties in learning quantitative research methods and statistics in general, research specifically analyzing the level of understanding of quantitative research methods among history education students is still very limited (Mulyana & Kurniawati, 2020). Furthermore, there is limited research that maps students' understanding based on comprehensive methodological indicators, from conceptual to practical aspects, within the context of educational disciplines, particularly history.

The urgency of this research is further strengthened within the context of higher education curricula, particularly in the field of education (Seixas & Morton, 2013). Research methods courses are mandatory courses for students and serve as the foundation for their final assignments (Wineburg, 2001). Furthermore, the higher education curriculum requires students not only to understand scientific theory but also to develop the research competencies required for conducting research (Garfield & Ben-Zvi, 2008). Therefore, mapping students' understanding of quantitative research methods serves as the basis for curriculum evaluation and the development of conceptual and practical research learning strategies that align with the characteristics of history education students.

Based on this description, this study aims to descriptively analyze history education students' understanding of quantitative research methods (Wineburg, 1991). The results are expected to provide theoretical contributions to the study of research methods learning and practical contributions to curriculum development.

METHOD

This study employed a descriptive quantitative research method. The purpose of this study was to objectively and measurably examine the level of understanding of History Education students regarding the research variables. A quantitative approach was used to identify factors influencing the results through the collection of numerical data and statistical analysis (Creswell, 2018). The stages of this study were: (1) Identifying the research problem; (2) Literature review; (3) Establishing objectives and hypotheses; (4) Data collection; (5) Analyzing and interpreting the data; (6) Reporting and evaluating the research (Creswell & Creswell, 2018).

This study was conducted from October 2025 to February 2026. The research locations included the Special Region of Yogyakarta (DIY) and Central Java. In this study, the researchers stipulated that the respondents included active History Education students in the DIY and Central Java regions, provided that they had taken a Quantitative Research Methods or Educational Research Methods course in semesters 3-6. The study population consisted of 174 students. The sampling technique used was simple random sampling. To determine the number of samples used, the researchers used the Slovin formula with the following margin of error.

$$N = n / (1 - n \times e^2)$$
$$N = 174 / (1 + 174 \times 0{,}0025)$$
$$N = 121$$

In this study, the instrument used by the researcher was a closed-ended questionnaire with a Likert scale. This study used four questionnaires, consisting of a questionnaire on understanding the basic concepts**.** Before collecting data, the researcher conducted a limited test to determine the validity and reliability of the instruments. The results of this test showed that all instruments were valid and reliable, so they could be used for further testing.

RESULTS AND DISCUSSION

Results

In this study, the population used by the researcher consisted of students in the History Education Study Programs at private and state universities in Central Java and the Special Region of Yogyakarta. The researcher used a simple random sampling technique. The specific criteria used by the researcher were as follows: active students in the History Education Study Program at universities in the Special Region of Yogyakarta and Central Java who were in semesters 3–6 and had completed a Quantitative Research Methods or Educational Research Methods course.

The study aimed to determine students' understanding of quantitative research methods, including basic concepts, population and sample selection, data collection instruments, data and statistical analysis, relevance, and constraints. The researcher presented the data. Descriptive data presentation included the highest and lowest scores, the mean, median, mode, standard deviation, frequency distribution, and classification. The descriptive data presentation also included understanding of basic concepts, population and sample selection, data collection instruments, data, and statistical analysis.

Understanding Basic Concepts

Researchers obtained data on the variable of basic conceptual understanding from a closed-ended questionnaire consisting of 11 valid statements with 121 students as respondents, using a score of 1-5. Furthermore, the researchers conducted an analysis and obtained the highest score of 590, the lowest score of 42, a mean value of 50.2, a median value of 51, a mode value of 54, and a standard deviation of 3.98. The following is the frequency distribution of the basic conceptual understanding variable.

Table 1. Frequency Distribution of Basic Concept Understanding Variables

No	Intervals	Frequence	F(%)
1	41-45	16	13,2
2	46-50	43	35,5
3	51-55	62	51,2
4	56-60	0	0,0
Total	121	100,0	

Based on the frequency distribution calculations, the researchers identified the following categories:

Table 2. Identification of Basic Concept Understanding Variable Categories

No.	Interval Class	Score Range	Category
1	$50 \leq X$	≥ 50	Very understanding
2	$45 \leq X < 50$	$45 - 49$	Understand
3	$40 \leq X < 45$	$40 - 44$	Not really understand
4	$X < 40$	< 40	Do not understand

From Table 2, the researcher created the following categories of trends in the basic concept understanding variables:

Table 3. Table of Trend Categories for Basic Concept Understanding Variables

No.	Interval Class	Score Range	Frequence	Category
1	$50 \leq X$	≥ 50	65	Very understanding
2	$45 \leq X < 50$	$45 - 49$	45	Understand
3	$40 \leq X < 45$	$40 - 44$	11	Not really understand
4	$X < 40$	< 40	0	Do not understand

From these results, the researcher presents them in the form of a pie chart diagram.

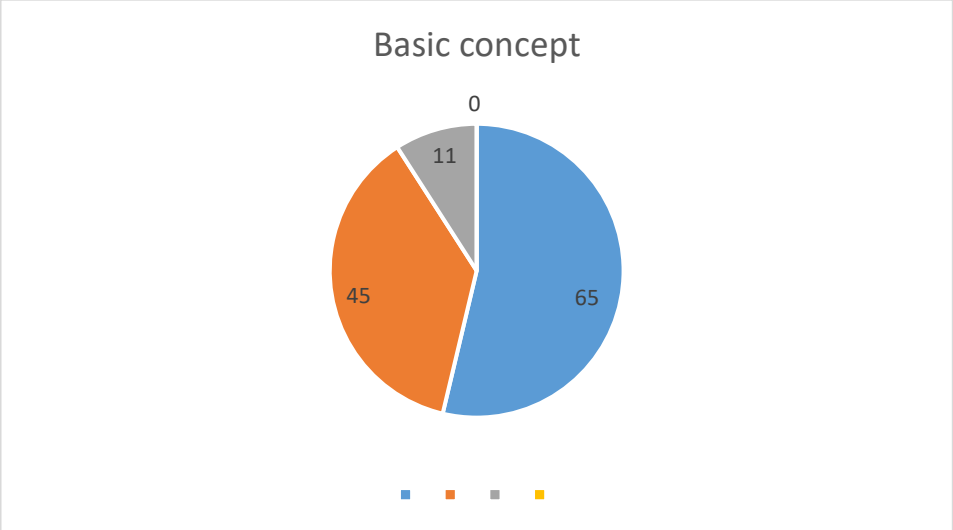

Figure 1. Pie Chart of Basic Concept Trends

Population and Sample Understanding

The researcher obtained data on the variable of population and sample understanding from a closed-ended questionnaire containing 14 valid statements and 121 student respondents, using a scoring scale of 1-5. After analyzing the data, the highest score was 70 and the lowest score was 70, with a mean of 63, a median of 64, a mode of 68, and a standard deviation of 5.3. The following is the frequency distribution of the population and sample understanding variables.

Table 4. Frequency Distribution of Population and Sample Understanding

No	Intervals	Frequence	F(%)
1	46-50	13	10,74
2	51-55	13	10,74
3	56-60	8	6,61
4	61-65	43	35,54
5	66-70	44	36,36
Total	121	100,0	

From the frequency distribution calculations, the researcher identified the following categories.

Table 5. Identification of Variable Categories Understanding Population and Sample

No.	Kelas Intervals	Score Range	Category
1	$60 \leq X$	≥ 60	Very understanding
2	$51 \leq X < 60$	$51 - 60$	Understand
3	$41 \leq X < 50$	$41 - 50$	Not really understand
4	$X < 41$	< 41	Do not understand

From Table 5, the researcher created the following categories of population and sample understanding variable trends:

Table 6. Table of Population and Sample Understanding Variable Trend Categories

No.	Intervals Class	Score Range	Frequence	Category
1	$60 \leq X$	≥ 60	87	Very understanding
2	$51 \leq X < 60$	$51 - 60$	31	Understand
3	$41 \leq X < 50$	$41 - 50$	3	Not really understand
4	$X < 41$	< 41	0	Do not understand

Researchers analyzed the trend category table of the tendency of the basic concept understanding variable and found that, out of 121 active students, 87 students reported having a very good understanding of population and sample, 31 students reported having a good understanding of population and sample, and 3 students had a poor understanding of the basic concepts of quantitative research. From these results, the researchers presented the findings in the form of a pie chart diagram.

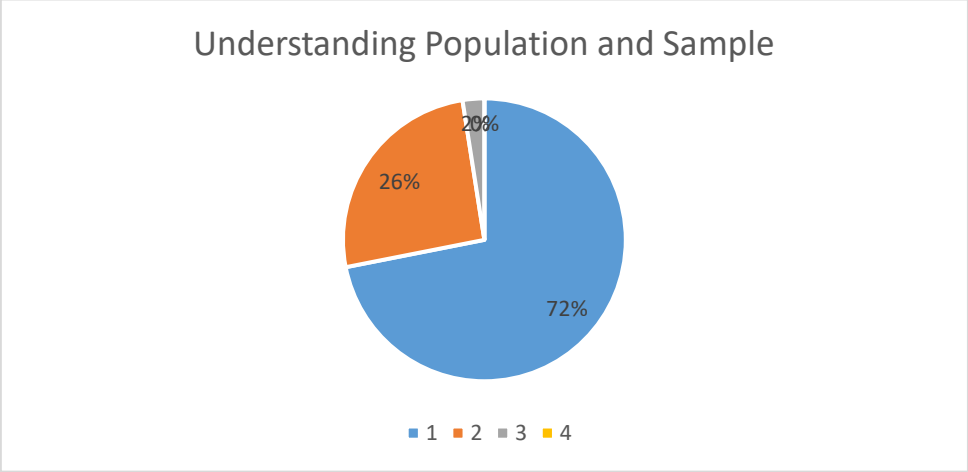

Figure 2. Pie Chart of Population and Sample Understanding Trends

Understanding of Data Collection Instruments

The researcher obtained data on the variable of understanding data collection instruments from a closed-ended questionnaire consisting of 10 valid statements from 121 student respondents, using a score of 1–5. After analyzing the data, the researcher obtained the highest score of 50 and the lowest score of 27, with a mean of 43, a median of 44, a mode of 43, and a standard deviation of 4.6. The following is the frequency distribution of the understanding of data collection instruments variable**:**

Table 7. Frequency Distribution of Understanding of Data Collection Instruments

No	Intervals	Frequency	F(%)
1	26-30	1	1
2	31-35	5	4
3	36-40	25	21
4	41-45	48	40
5	46-50	42	35
Total	121	100,0	

Based on the frequency distribution calculations, the researcher identified the following categories:

Table 8. Identification of Variable Categories: Understanding, Understanding of Data Collection Instruments

No.	Intervals Class	Score Range	Category
1	$44 \leq X$	≥ 44	Very understanding
2	$36 \leq X < 44$	$47 - 44$	Understand
3	$27 \leq X < 35$	$27 - 35$	Not really understand
4	$X < 27$	< 27	Do not understand

From Table 8, the researcher created the following categories for the variable "Understanding of Data Collection Instruments."

Table 9. Table of Variable Tendency Categories for Understanding of Data Collection Instruments

No.	Intervals Class	Score Range	Frequency	Category
1	$44 \leq X$	≥ 44	24	Very understanding
2	$36 \leq X < 44$	$47 - 44$	91	Understand
3	$27 \leq X < 35$	$27 - 35$	6	Not really understand
4	$X < 27$	< 27	0	Do not understand

Researchers analyzed the trend category table of the Understanding of Data Collection Instruments variable and found that, out of 121 active students, 24 students reported having a very good understanding of data collection instruments, 91 students reported understanding the data collection instruments, and 6 students did not understand the data collection instruments. From these results, the researchers presented the findings in the form of a pie chart diagram.

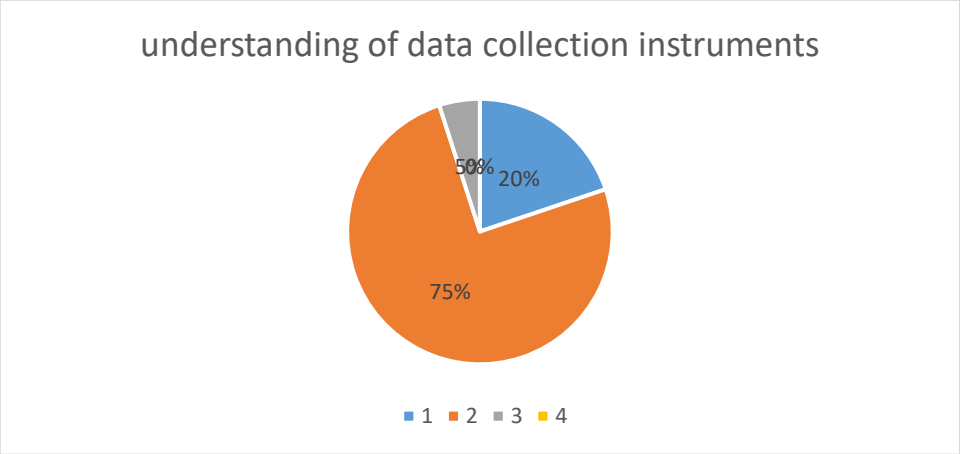

Figure 3. Pie Chart of Trends in Understanding Data Collection Instruments

Understanding of Data Analysis and Statistics

The researcher obtained data on the variable of understanding data analysis and statistics from a closed-ended questionnaire consisting of 10 valid statements from 121 student respondents, using a score of 1–5. After conducting the analysis, the researcher obtained the highest score of 85 and the lowest score of 38, with a mean of 61, a median of 61, a mode of 61, and a standard deviation of 7.6. The following is the frequency distribution of the Understanding of Data Analysis and Statistics variable:

Table 10. Frequency Distribution of Understanding of Data Analysis and Statistics

No	Intervals	Frequency	F(%)
1	31-40	2	2
2	41-50	5	4
3	51-60	51	42
4	61-70	50	41
5	71-80	13	11
Total	121	100,0	

Based on the frequency distribution calculations, the researcher identified the following categories:

Table 11. Identification of Variable Categories: Understanding Data Analysis and Statistics

No.	Intervals Class	Score Range	Category
1	80≤ X	≥ 80	Very understanding
2	56≤ X<80	56 – 80	Understand
3	30 ≤ X< 55	30 – 55	Not really understand
4	X < 30	< 30	Do not understand

From table 8, the researcher created the following categories of tendencies of the Data Analysis and Statistics Understanding variables.

Table 12. Table of Variable Trend Categories for Understanding Data Analysis and Statistics

No.	Intervals Class	Score Range	Frequence	Category
1	80≤ X	≥ 80	1	Very understanding
2	56≤ X<80	56 – 80	96	Understand
3	30 ≤ X< 55	30 – 55	24	Not really understand
4	X < 30	< 30	0	Do not understand

Researchers analyzed the trend category table for the Understanding of Data Analysis and Statistics variable. Of the 121 active students, 1 student stated that they had a very good understanding of Data Analysis and Statistics, 96 students stated that they had a good understanding of Data Analysis and Statistics, and 24 students had a poor understanding of Data Analysis and Statistics. The researchers presented these results in the form of a pie chart.

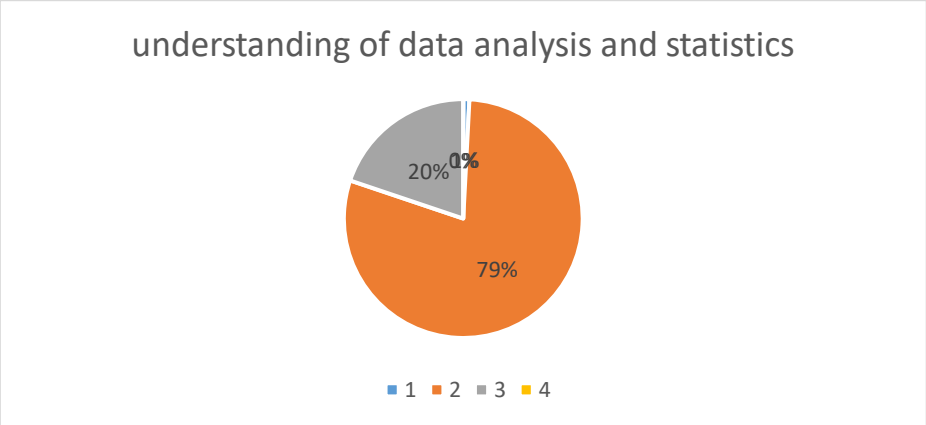

Figure 4. Pie Chart of Trends in Understanding Data Analysis and Statistics

Discussion

Understanding Basic Quantitative Concepts

The research results indicate that the understanding of basic quantitative research concepts among history education students in the Special Region of Yogyakarta and Central Java, with 121 respondents, resulted in the highest score of 59 and the lowest score of 42. The mean score was 50.2, the median was 51, and the mode was 54. The standard deviation was 3.9, indicating a relatively homogeneous distribution of the data. This data is very interesting to explore further. Quantitative research is often cited as a challenging approach for students with a humanities background, including history education (Johnson & Christensen, 2020). This is in line with previous research conducted by Cohen et al. (2018) The results of this study indicate that students' understanding of quantitative research methods is very limited. This is due to several factors, including a lack of understanding of quantitative methods because quantitative research involves complex data analysis and statistics, limited mastery of complex data analysis tools, limited mastery of statistical analysis tools, and the dominance of qualitative research in the social sciences and humanities, which is more flexible and less dependent on numbers.

The quantitative aspect in education is often interpreted only as the extent to which students learn, reflected in the number of courses, learning outcomes, and assessment scores (Saukah, 2026), In its implementation, an in-depth conceptualization of quantitative research methodology is not only measured by quantitative aspects but also requires qualitative aspects to deepen thinking, enhance relevance to real life, and strengthen students' ability to connect knowledge and skills (Ary et al., 2018). In this study, the mean reached 50.2, indicating that on average students have an adequate understanding, although there were 11 students who were in the category of having less understanding.

Based on the table of trends in the basic conceptual understanding variable, 65 students (53.72%) stated that they understood very well, 45 students (37.19%) stated that they understood, and 11 students (9.09%) stated that they did not understand the basic concepts of quantitative research. Thus, 110 students (90.91%) were in the understand to understand very well category. This figure is considered high and indicates the success of the methodology learning process in the conceptual understanding section at the tertiary level. This is in line with the results of research by Mulyana & Kurniawati (2020), who used the Marton phenomenography model. The results of this study revealed that students with a deep learning pattern (deep learning) had a significant advantage of 12.11% in terms of historical thinking abilities compared to students with a surface learning pattern. The group with deep learning excelled in aspects of understanding change, comparing historical narratives, interpreting history, understanding historical interpretations, and constructing history. In light of this research's findings, the high level of understanding of basic quantitative concepts among history education students can be interpreted as an indication that the learning process has encouraged students to adopt a deep learning approach, specifically within the context of conceptual understanding. This is important because, as stated in the research methodology, a strong understanding of basic concepts is the foundation for conducting quality quantitative research.

Although the comprehension achievement rate is relatively high, the existence of 11 students (9.09%) who still lack understanding cannot be ignored. This lack of understanding is influenced by difficulties in distinguishing independent and dependent variables, inaccuracy in determining research design, and errors in selecting research instruments (Fraenkel et al., 2019). Factors that influence students' conceptual understanding include learning motivation, learning strategies, research experience, and the availability of learning resources. In the context of history education, mastery of quantitative methodology has become increasingly relevant. History is no longer only understood as a narrative of the past but also involves

quantitative data, historical demographics, economic history, and various approaches that require statistical skills.

Understanding research methodology, including quantitative approaches, is an essential tool for social science researchers, including those in historical research. The fundamental differences between quantitative and qualitative research lie in their assumptions about reality, research objectives, research methods and processes, and their role in the research process (Creswell & Guetterman, 2019). Quantitative research is based on the concept of positivism, which assumes that reality is singular, fixed, stable, and measurable using instruments. Qualitative research, on the other hand, is based on the concept of constructivism, which views reality as multiple and socially constructed.

However, it is important to recognize that conceptual understanding does not fully guarantee application skills. As Fah & Hoon (2019) remind us, a quantitative approach to educational research encompasses not only conceptual understanding but also skills in study design, understanding of population, sample, and sampling techniques, study instruments, quantitative data analysis and hypothesis testing, and the use of parametric and non-parametric statistical tests. In other words, understanding basic concepts is the first step, but it is not sufficient to produce competent historical researchers in quantitative approaches.

Understanding Population and Sample

The results of the data analysis show that the understanding of History Education students regarding the concept of population and sample is at a very satisfactory level (Lohr, 2021). Of the 121 students who became respondents, the highest score was 70 and the lowest score was 42. The mean (average) value of 63 is slightly below the median value (64) and close to the mode value (68), which indicates a symmetrical distribution of the data with a tendency towards centralization at high scores. The standard deviation of 5.3 indicates that the spread of the data is relatively small, meaning that the level of student understanding is relatively homogeneous and there is no extreme variation among students.

The data analysis results indicate that History Education students' understanding of the concepts of population and sampling is at a very satisfactory level (Cochran, 1977). Of the 121 students who responded, the highest score was 70 and the lowest score was 42. The mean (average) of 63 is slightly below the median (64) and close to the mode (68), indicating a symmetrical data distribution with a tendency toward a central tendency at high scores. The standard deviation of 5.3 indicates a relatively small spread in the data, indicating that students' understanding is relatively homogeneous and there is no extreme variation among students.

This situation is interesting because research methodology courses, particularly those that discuss populations and samples, often present challenges for students with a background in the social sciences and humanities, including history education. These challenges include understanding technical terms such as sampling frames, sampling techniques, and sample size calculations (Fowler, 2014).

In the context of conceptual understanding, a population is defined as the entire group of units or individuals within the scope of the research. Meanwhile, a sample is a part of the population selected through a certain procedure so that it can represent the characteristics of the population. Dr. Nur Kafid, in his presentation on Sampling Design, likened the population to a "large area", the sample to a "small plot of land being studied", and the sampling frame to a "map" that serves as a reference in the selection process (Kafid, 2025). Understanding this simple yet sharp analogy is an important foundation for students before they move further into the technical implementation of quantitative research.

Based on the table of population and sample understanding variable trends, of the 121 active students, 87 students (71.90%) stated that they understood very well, 31 students (25.62%) stated that they understood, and only 3 students (2.48%) stated that they did not understand. Thus, 118 students or 97.52%

were in the understand to understand very well category. This figure is very high and indicates extraordinary success in the process of learning quantitative research methodology, especially on the topic of population and sampling.

Compared with the previous findings on the understanding of the basic quantitative concepts variable (where 90.91% were in the understand to understand very well category), the achievement for the population and sample variables was higher (97.52%). This indicates that the population and sample topics may be easier for students to understand than basic quantitative concepts in general, which cover various aspects such as measurement scales, instrument validity, and types of statistics.

Compared with the previous findings on the understanding of basic quantitative concepts variable (where 90.91% were in the understand to understand very well category), the achievement for the population and sample variables was higher (97.52%). This indicates that the topic of population and sampling may be easier for students to grasp than basic quantitative concepts in general, which encompass various aspects such as measurement scales, instrument validity, and types of statistics.

Although the students' understanding was considered very high, it is important to remain aware of the risk of error in the sampling process (sampling error). Kish (1965) defined sampling error as the difference between the actual population parameter and the sample statistics used to estimate that parameter (Lohr, 2021). This error occurs because the sample taken represents only a portion of the population, and therefore does not always perfectly reflect the population's characteristics (Groves et al., 2009).

There are three main types of sampling errors that students need to understand (Cochran, 1977; Lohr, 2021): (1) Random Sampling Error: This occurs due to natural variation in sample selection. Even if the sample is selected randomly, there is still a possibility that the sample is not fully representative of the population; (2) Systematic Sampling Error: This occurs when there is bias in the sample selection method that causes the results to be unrepresentative of the population; (3) Error Due to Insufficient Sample Size: A sample that is too small can lead to inaccurate estimates. The larger the sample size, the less likely sampling error is to occur.

Furthermore, Cochran (1977) identified seven sources of sampling error: random variation, specification errors, respondent selection errors, errors due to incomplete coverage of the population element list (sampling frame), errors due to incomplete responses, sampling errors, and measurement errors. Understanding these potential errors is crucial for students not only to understand the theoretical concepts of population and sampling but also to identify and minimize these errors when they engage directly in research practice.

Understanding Data Collection

The results of the data analysis indicate that the understanding of History Education students regarding data collection instruments is at a good level. Of the 121 students who became respondents, the highest score was 50 and the lowest score was 27. The mean (average) value of 43 is below the median value (44) and close to the mode value (43), which indicates a data distribution that tends to be normal with a tendency towards centralization at medium to high scores. The standard deviation of 4.6 indicates that the data distribution is relatively small, meaning that the level of student understanding is relatively homogeneous and there is no extreme variation between students.

Data collection instruments in quantitative research, particularly questionnaires, are tools used to gather information from respondents. According to the Great Dictionary of the Indonesian Language, a questionnaire is a research or survey tool consisting of a series of written questions, aimed at obtaining

responses from a selected group of people through personal interviews or a list of questions. Questionnaires are one method of collecting data using a quantitative approach.

In the context of higher education, various studies have used questionnaires to measure student perceptions and understanding. Noviani's (2015) research at the History Department of Semarang State University used a descriptive quantitative method with a questionnaire to measure student perceptions of social conservation. The results showed that student perceptions were high, demonstrating that history students had a good capacity to respond to the research instrument.

Meanwhile, Topan's (2013) research at the Faculty of Social Sciences of Yogyakarta State University used a questionnaire to collect data on interest in becoming a history teacher, attitudes toward history lessons, and students' understanding of academic competencies in history education. The study, involving 108 students, successfully demonstrated a positive relationship between the three variables studied. Based on the trend category table for the understanding variable of the data collection instrument, of 121 active students, 24 (19.83%) reported having a very good understanding, 91 (75.21%) reported having an understanding, and 6 (4.96%) reported having limited understanding. Thus, 115 students, or 95.04%, fell into the understand to understand very well category. This figure is considered very high and indicates the success of learning research methodology on the topic of data collection instruments.

Compared to the two previous variables, understanding basic quantitative concepts (90.91%) and understanding population and sample (97.52%), the achievement for the data collection instruments variable (95.04%) is in the middle. This indicates that the topic of data collection instruments is relatively easy for students to grasp, likely due to their direct experience completing various questionnaires in lectures or previous research.

Dr. Heri Retnowati explained that a good instrument must meet the requirements of validity and reliability. This ensures that the data being measured is truly valid and reliable, thus ensuring that the research results are valid and accountable. Validity can be grouped into three types: criterion-related validity, content validity, and construct validity. Meanwhile, the reliability coefficient can be defined as the coefficient of consistency or stability of the measurement results. A reliable measuring instrument is one that produces stable measurement results and closely aligns with the actual conditions of the test participants.

In the context of history education research, understanding the characteristics of these instruments is highly relevant. History is not limited to qualitative sources such as documents and archives; it can also utilize quantitative approaches with structured instruments. History education students need to understand that a good instrument is one that accurately and consistently measures what it is intended to measure.

Understanding Data Analysis and Statistics

The data analysis results indicate that History Education students' understanding of data analysis and statistics is at a fairly good level, but presents its own challenges. Of the 121 students who responded, the highest score was 85 and the lowest score was 38. The mean (average) value of 61 falls exactly between the median (61) and mode (61), indicating a perfectly symmetrical (normal) data distribution with a very clear central tendency at 61. The standard deviation of 7.6 indicates that the data distribution is relatively more varied compared to the previous variables (basic concepts: 3.98; population and sample: 5.3; data collection instruments: 4.6), indicating a wider gap in understanding among students.

This condition is interesting to observe because data analysis and statistics are often a particular challenge for students with a background in the social sciences and humanities, including history education (Pallant, 2020). A study published by Field (2018) revealed that the lack of quantitative research among students and lecturers is caused by several factors, including a lack of understanding of quantitative methods

because they involve complex statistics and data analysis, limited mastery of statistical analysis tools such as SPSS, AMOS, or SmartPLS, and the dominance of qualitative research in academic environments based on the social sciences and humanities, which are considered more flexible and less dependent on numbers.

Furthermore, research at the social science doctoral level conducted by Hair et al. (2019) found that 78 percent of sociology students, 77 percent of political science students, and 70 percent of social work students used qualitative methods in their research. One student even commented: "Many students enter the social sciences with little mathematical background and struggle with even basic statistics." These findings suggest that challenges in mastering statistics occur not only at the undergraduate level, but also extend to the doctoral level.

Based on the trend category table for the variable of understanding data analysis and statistics, of the 121 active students, 1 student (0.83%) reported a very good understanding, 96 students (79.34%) reported a good understanding, and 24 students (19.83%) reported a poor understanding. Thus, 97 students, or 80.17%, fell into the understanding to very good understanding category, while nearly 1 in 5 students (19.83%) still lacked understanding.

Research conducted by Nainggolani et al. (2025) at Labuhan Batu University identified the types of student errors in solving statistics problems. The analysis showed that the largest error occurred in the use of formulas (50%), followed by calculation errors (25%), and errors in determining frequency counts (25%). Factors contributing to these errors included a lack of accuracy and difficulty understanding and selecting the correct formula.

The study concluded that students still frequently make errors in solving problems related to descriptive statistics (mean, median, mode), particularly in terms of conceptual understanding, formula application, and determining the final answer. Another study by Rahma (2024) at Makassar State University on students' statistical literacy in interpreting statistical graphs found that overall, students' statistical literacy tends to focus on visual or explicit reading of data that can be seen and communicated directly in the graph. Students are not yet capable of deeper interpretations such as reading between the data and reading beyond the data (making predictions based on accumulated data).

These findings are relevant to the research results showing that only 1 in 121 students (0.83%) reported a very good understanding of data analysis and statistics. This means that almost no students feel they have a deep understanding of this material, while the majority are only at the "understanding" level, which is likely still limited to procedural understanding and has not yet reached the level of in-depth application and interpretation.

CONCLUSION

This study shows that History Education students in the Special Region of Yogyakarta and Central Java (with 121 respondents) have a high to very high understanding of the basic concepts of quantitative research, population and sampling, and data collection instruments, with percentages of 90.91%, 97.52%, and 95.04%, respectively. This achievement indicates that the research methodology learning process at universities has successfully built a strong conceptual foundation, which is likely related to students' implementation of the deep learning approach.

However, significant challenges arise in understanding data analysis and statistics. Although the average score (mean = 61) is considered quite good, only 0.83% of students (1 out of 121) felt they had a very good understanding, while another 19.83% still fell into the poor understanding category. The higher standard deviation (7.6) compared to other variables also indicates a significant gap in understanding among students.

This aligns with other research findings that statistics is often a major obstacle for students with social science and humanities backgrounds, including History Education.

Thus, it can be concluded that although students' conceptual understanding of the fundamentals of quantitative research is quite good, their understanding of data analysis and statistics still requires serious attention. A good conceptual understanding does not necessarily guarantee application skills, particularly in terms of mastery of analytical tools, use of formulas, and in-depth data interpretation.

ACKNOWLEDGMENTS

The researcher would like to thank all parties involved during the implementation of this research.

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