



## **Analisis Kemampuan Numerik Calon Guru Sekolah Dasar Berdasarkan Pilihan Jurusan di Sekolah Menengah Atas**

### ***Analysis Ability Numerical Prospective Elementary School Teachers Based on Choice Majors in High School***

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#### **Abstrak**

Kemampuan numerik merupakan keterampilan esensial bagi calon guru sekolah dasar, terutama dalam pengajaran Matematika. Penelitian ini bertujuan untuk menganalisis perbedaan kemampuan numerik mahasiswa Program Studi Pendidikan Guru Sekolah Dasar (PGSD) berdasarkan latar belakang jurusan di sekolah menengah atas (SMA), khususnya antara mahasiswa dari jurusan ilmu pengetahuan alam (IPA) dan ilmu pengetahuan sosial (IPS). Pendekatan kuantitatif digunakan dalam penelitian ini dengan melibatkan sampel sebanyak 120 mahasiswa, terdiri dari 60 mahasiswa dengan latar belakang jurusan IPA dan 60 mahasiswa dengan latar belakang jurusan IPS. Data dikumpulkan melalui tes kemampuan numerik dan dianalisis menggunakan statistik deskriptif serta statistik inferensial yaitu uji *Mann-Whitney U*. Hasil analisis statistik deskriptif menunjukkan bahwa mahasiswa dengan latar belakang jurusan IPA memiliki rata-rata skor kemampuan numerik yang lebih tinggi dibandingkan dengan mahasiswa dari jurusan IPS. Namun, hasil uji *Mann-Whitney U* menunjukkan bahwa perbedaan tersebut tidak signifikan secara statistik dengan ( $p > 0,05$ ). Temuan ini menunjukkan bahwa latar belakang jurusan IPA atau IPS tidak memiliki perbedaan yang signifikan terhadap kemampuan numerik mahasiswa PGSD. Implikasi dari penelitian ini menekankan pentingnya pengembangan kurikulum yang dapat memperkuat kemampuan numerik mahasiswa secara komprehensif guna mendukung pengajaran Matematika yang efektif di sekolah dasar.

#### **Abstract**

*Numerical ability is an essential skill for prospective elementary school teachers, especially in teaching Mathematics. This study aims to analyze the difference in the numerical abilities of students in the Elementary School Teacher Education Study Program (PGSD) based on their high school major background, specifically between students from the Natural Science and Social Science fields. A quantitative approach was used with a sample of 120 students, consisting of 60 students with a background in natural science and 60 students with a background in social science. Data were collected through a numerical ability test and analyzed using descriptive and inferential statistics, including the Mann-Whitney U test. Descriptive results show that students from the natural science major have higher average numerical ability scores compared to students from the social science major, but the Mann-Whitney U test indicates that this difference is not statistically significant ( $p > 0.05$ ). These results suggest that the background in natural science and social science majors does not significantly influence the numerical ability of PGSD students. The implications of this study highlight the importance of developing a curriculum that strengthens students'*

## INTRODUCTION

Numerical skills are essential for success in various professional fields. This is because numerical ability is closely related to problem-solving, logical reasoning, and the capacity to interpret and analyze data skills that are essential in many professional domains (Ludewig et al., 2020). Numerical ability enables students to analyze information and apply mathematical reasoning in real-life situations, which is vital for both education and the workforce (Reinhold et al., 2020; Fawziawati, 2022).

In Indonesia, numerical ability is one of the key indicators in the selection tests for various fields of employment. This is evident from tests conducted during various selection processes, such as college entrance exams and job recruitment (R. Wanma & Attamimi, 2022). In the civil servant recruitment process (CPNS), numerical ability is also one of the criteria that must be met, as proficiency in numeracy and logical reasoning forms the basis for assessment in many professional sectors (Adiningsih et al., 2023). Therefore, it is crucial for Prospective elementary school teachers (PGSD) students to develop this intelligence in order to be competitive in both education and the workforce.

School teachers are expected to teach mathematics effectively to elementary school students. However, many elementary school teachers demonstrate a weak understanding of essential mathematical concepts (Kajander, 2010). Research by Maasepp & Bobis, (2014) shows that many elementary school teachers face difficulties in grasping basic mathematical concepts, which can negatively impact their teaching practices and attitudes toward mathematics. Furthermore, the content knowledge of elementary school teachers in foundational mathematics is often inadequate. The lack of mathematical ability in elementary school teachers can be addressed during their studies at college.

Several factors affect an individual's numerical ability, one of which is the choice of major in high school. This is because each major offers a different curriculum, especially in terms of the approach to and intensity of mathematics learning (Aughinbaugh, 2012; Trusty, 2002). For instance, students who choose the natural science track are exposed to more challenging mathematics lessons compared to those who choose social science or language majors.

According to Hayati & Kamid (2019), students in the natural science track often excel in calculations and applying formulas. On the other hand, students in the social science track demonstrate stronger verbal expression and reasoning skills but face challenges in translating problems into mathematical language and using formulas effectively. Other studies also suggest that students from non-natural science majors often experience greater anxiety toward mathematics, which ultimately affects their ability to solve numerical problems.

Increasing the numerical competence of prospective teachers is crucial, not only for their own benefit but also to ensure that future generations receive adequate mathematics education. This aligns with the goals of mathematics education reform, which emphasizes the need to develop both conceptual understanding and procedural fluency in students from an early age (Keazer & Phaiah, 2023; Inayah et al., 2020). Developing these skills will help prospective teachers provide more in-depth and structured learning experiences for their future students.

Therefore, it is important to analyze how the choice of major in high school affects the numerical ability of PGSD students as part of efforts to improve the quality of education. This study aims to analyze the differences in numerical abilities of PGSD students based on the major they chose in high school, with the hope of providing

deeper insights into curriculum development strategies and training programs to enhance the competence of prospective mathematics teachers.

## METHOD

This study uses a quantitative approach. The objective of the research is to analyze the numerical ability of PGSD students based on their selected majors during high school or its equivalent. This design helps compare the numerical abilities of PGSD students from natural science and social science majors. The population in this study consists of all Elementary School Teacher Education Study Program students at a university in Mataram City during the 2024/2025 academic year. The research uses a purposive sampling technique to select the sample. The sample comprises 120 first-semester students, including 60 students from the natural science major and 60 students from the social science major. First-semester students are chosen because they have recently entered higher education, making the influence of their high school majors still relevant to their numerical ability. The instrument used to measure students' numerical ability is a numerical ability test comprising 20 questions. The test is designed to evaluate various aspects of numerical ability, including arithmetic test, number series test, number logic test, and story-based numerical problems test.

Additionally, a supplementary survey is distributed to collect data on students' high school majors. The numerical ability test is administered through Google Forms and consists of multiple-choice questions. The numerical ability test is administered directly to students in their respective classes at a scheduled time. Before the test begins, the researchers explain the objectives of the study and the procedures to the participants. Students are given 20 minutes to complete the test. Data obtained from the numerical ability test is analyzed using descriptive and inferential statistics. Descriptive statistics are used to provide a general overview of the numerical ability scores of each group, including measures such as the mean, median, and standard deviation. To identify differences in numerical ability between students from natural science and social science majors, the Mann-Whitney test is employed, as the data in this study are not normally distributed. All statistical analyses are conducted using the software Jamovi.

## RESULTS AND DISCUSSION

### Result

#### *Descriptive Statistics of Numerical Ability Based on High School Majors*

The analysis of numerical ability among Elementary School Teacher Education Study Program students demonstrates a difference in test results between students with a background in Natural Science and Social Science from their Senior High School education. Table 1 below presents the descriptive statistics for each group in the numerical ability test.

**Table 1.** Statistics Descriptive Ability Numeric Based on High School Majors

Group	Amount student	Mean	Median	Standard Deviation
Natural Science	60	77.6	85	18.8
Social Science	60	71.3	75	21.4

The analysis results show that the average score for students with a background in natural science majors reached 77.6, with a median of 85. This indicates that a significant number of students from the natural science department tend to have higher numerical abilities (Indrayanti et al., 2022). On the other hand, students from the social science department recorded an average score of 71.3, with a median of 75. The variability of the scores also shows notable differences, with natural science

students having a standard deviation (SD) of 18.8, while social science students' standard deviation is 21.4. The higher variation in the social science group can be attributed to a more heterogeneous background in numerical ability, as research has shown (Hayati & Kamid, 2019), which states that natural science students tend to possess more structured numerical skills due to frequent exposure to mathematics lessons during high school.

The difference in average scores is in line with findings from several previous studies, which highlighted that the intensity and complexity of the mathematics curriculum in natural science majors is indeed higher compared to social science majors (Başaran et al., 2015). Mathematics teaching in the natural science department generally focuses on understanding complex concepts, such as pattern analysis and solving numerical problems that require strong and logical thinking. On the other hand, students in the social science department generally focus on developing verbal and interpretive skills that prioritize social context analysis (Burghardt et al., 2015).

### ***Analysis Inferential Difference in Numerical Ability between Natural Science and Social Sciences Departments***

To test the significance of the difference in numerical ability between the two groups, the Mann-Whitney U test was conducted due to the non-normal distribution of the data. Table 2 below presents the results of the analysis.

**Table 2:** Results of the Mann-Whitney U Test for Numerical Ability Based on High School Majors

Test	Statistics	P
Mann-Whitney U	1517	0.135

Based on the Mann-Whitney U test results obtained U value of 1517 with p-value of 0.135. This result shows that the difference in ability numeric between students from natural science and social science majors is not significant at the level 95% confidence ( $p > 0.05$ ). This indicates that although students from natural science majors have an average score numerically higher than social science students. In general statistics, differences This Not Enough significant interesting conclusion that background behind high school majors direct influence ability numeric PGSD students.

### **Discussion**

The results obtained in this study show a trend that students from natural science majors tend to have better numerical abilities compared to students from the social sciences department. This finding aligns with a study by Hayati & Kamid (2019), which indicates that students in the natural science department tend to have superior capabilities in calculations and applying complex mathematical concepts. Additionally, research by Indrayanti et al. (2022) suggests that the background in natural science majors influences students' psychological responses to tasks, indicating better adaptation to challenges among natural science students compared to social science students. Previous research by Blume et al. (2021) also supports these findings, showing that basic numerical skills are a significant predictor of success in mathematics at the secondary education level.

This result highlights the importance of considering other factors, such as learning motivation, prior educational experience, and individual interest, in developing students' numerical abilities. These factors can either strengthen or weaken the skills possessed by students, regardless of their high school major background. According to Froiland & Davison, (2016), intrinsic motivation and

parental expectations have been shown to play a significant role in the academic achievement of high school students, which in turn affects their ability to perform at the college level. Furthermore, Jiang et al. (2020) demonstrated that motivation in mathematics from early secondary school is significantly correlated with academic achievement and the choice of elective majors in college, particularly in STEM fields. This suggests that motivational and educational environmental factors greatly influence overall skill development.

This study has important implications both scientifically and practically. Scientifically, the results contribute to the ongoing discussion in the literature regarding the numerical abilities of students from diverse educational backgrounds. Although statistically insignificant, the differences in scores between natural science and social science students demonstrate a consistent trend where natural science students tend to have superior numerical abilities. This finding reinforces the idea that while students from the natural science department generally exhibit better numerical abilities, these abilities are not solely dependent on their academic background but are also influenced by external factors. A study by Indrayanti et al. (2022) shows that students from natural science majors are better able to adapt to task pressure, which indicates a stronger response to challenges compared to social science students. Furthermore, research by Pradana et al. (2023) found that characteristics such as discipline and religiosity also contribute significantly to students' numerical abilities, demonstrating that personal traits can strengthen overall numerical skills.

From a practical perspective, this study highlights the need for the development of numerical abilities for prospective elementary school teachers, regardless of their high school background. Strong numerical skills are essential for teachers to effectively teach mathematics to their students. This is in line with research by Kutaka et al. (2017), which states that teachers' mastery of numeracy directly influences students' understanding and application of mathematical concepts. Moreover, the research by Kutaka et al. (2017) shows that professional development programs for math teachers in schools can enhance their knowledge in teaching mathematics and foster greater confidence in student-centered approaches. Therefore, inclusive numeracy education at the university level is crucial for equipping prospective teachers with the necessary skills to improve numeracy literacy at the primary education level (Ottmar et al., 2013).

Improving the numerical abilities of prospective teachers is expected to enhance their understanding of mathematics among school students and foster greater interest in the fields of mathematics and natural science in the future. The importance of numeracy literacy as a foundation for developing competitive human resources and advancing natural science and technology in Indonesia cannot be overstated. Additionally, strong numeracy education programs for prospective teachers can support government efforts to improve literacy as part of national education reforms. Research by Kutaka et al. (2017) indicates that professional development for math teachers positively influences both their knowledge and belief in student-centered teaching. With additional training and support, PGSD students from diverse backgrounds are expected to possess a stronger numerical foundation that they can pass on to their students (Raudenbush et al., 2020).

## CONCLUSION

This study aimed to investigate the differences in the numerical abilities of prospective elementary school teachers based on their high school major background, specifically between natural science and social science students. Descriptive analysis results show that students with a background in the natural science major have a higher average numerical ability compared to students from the social science major. However, the inferential test using the Mann-Whitney U test indicates that the

difference is not statistically significant ( $p > 0.05$ ), meaning that it cannot be concluded that high school major background directly influences the numerical ability of PGSD students. These findings suggest that although there is a trend of different performance based on high school major background, other factors such as learning experience, personal interest, and motivation may influence the numerical abilities of prospective elementary school teachers. The practical implication of this study is the need to develop a curriculum that provides balanced training for PGSD students, irrespective of their high school major background. Strengthening numerical skills for prospective elementary school teachers is crucial for enhancing the effectiveness of mathematics teaching in schools, which in turn will impact students' future numeracy literacy.

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