Correlation Between Gender and Students' Biology Learning Outcomes

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ABSTRACT
Gender is still an issue that is always linked to students' ability, including their learning outcomes. This research aims to examine the correlation between gender and students' biology learning outcomes. The research involved 15 male and 15 female students from classes X, XI, and XII Science at MA Ghozaliyah in the 2022/2023 academic year. Students' biology learning outcomes were obtained from odd semester final exam scores. Data analysis was carried out statistically using the Eta correlation formula. The research results show that there is a weak negative linear relationship between gender and students' biology learning outcomes, because the eta value obtained was 2,94 and Fcount < Ftable at a significance level of 0,01.

Keywords: Gender; Learning outcomes; Biology.

INTRODUCTION

Society's assumptions about gender differences and their relationship to student learning achievement are still being studied in educational research. Previous research examining the relationship between mathematics learning outcomes and student gender at the elementary school level found that there were significant differences between the learning outcomes of male and female students (Charisma et al., 2022). Similar research examining students at junior high school level found that female students' biology learning outcomes were higher than male students (Muspiroh, 2020). At the high school level, previous research revealed that there were no differences in mathematics learning outcomes between male and female students (Hasanusi, 2019). In general, previous research findings regarding the relationship between gender and student learning outcomes were quite diverse.

Biology is a science subject which is an intra-curricular component in the high school curriculum. Biology learning at MA Ghozaliyah was carried out classically with a variety of methods to meet students' learning needs. Teacher used the lecture method to clarify explanations of the material, the discussion method to train students' courage in expressing opinions, and the practicum method to train students' performance skills related to biological material. Student learning outcomes in biology subjects were determined from affective, cognitive, and psychomotor assessments. In this research, the learning outcomes studied were cognitive learning outcomes.

Cognitive learning outcomes are one indicator of students' success in achieving the competencies determined by curriculum (Alianto et al., 2021). Cognitive learning outcomes relate to students' cognitive abilities, namely the ability to reconstruct knowledge and understanding. Students' cognitive abilities can differ from one another and change due to certain conditions (Nurlindayani et al., 2020). Students' physical and psychological conditions can influence learning outcomes (Syafaruddin et al., 2022). Male and female students certainly have different physical and psychological conditions, so gender may influence learning outcomes.

The results of interviews conducted with biology teacher at MA Ghozaliyah in January 2023 show that research has never been conducted on the relationship between gender and student learning outcomes. This research aims to analyze the correlation between gender and students' biology learning outcomes. This research is expected to provide additional information regarding the relationship between gender and student learning outcomes, especially in biology subjects in high school.

METHOD

This research is quantitative research with a bivariate correlation analysis method between nominal scale variable (gender) and interval scale variable (biology learning outcome). The research subjects were students of classes X, XI, and XII Science at MA Ghozaliyah in the 2022/2023 academic year. The population of science class students was 56, with details of 15 male and 41 female students. All male students became the research sample, while the sample of female students was determined by randomly selecting 3 students from each grade level. The sample size was 30 students, 15 male and 15 female students. Students' biology learning outcomes was obtained from odd semester final exam scores. The data was analyzed statistically using the Eta test with the formula:

$$\eta = \sqrt{1 - \frac{\Sigma Y_T^2 - (N_1)(\bar{Y}_1)^2 - (N_2)(\bar{Y}_2)^2}{\Sigma Y_T^2 - (N_1 + N_2)(\bar{Y}_T)^2}}$$

Abbreviation: η = eta correlation coefficient, N_1/N_2 = sample size, Y_1/Y_2 = group average, Y_T = combine average.

The significance of the eta value was calculated using the formula:

$$F = \frac{\eta^2(N-K)}{(1-\eta^2)(K-1)}$$

Abbreviation: F = calculated value, η = eta value, N = sample size, k = number of subclasses in the nominal variable.

The research hypothesis formulated in this study was: H_0 there is no linear relationship between gender and students' biology learning outcomes, H_1 there is a linier relationship between gender and students' biology learning outcomes. The significance level used was 0,01; if $F_{count} > F_{table}$, then there is no linear relationship between the two variables (Silalahi, 2018).

RESULT AND DISCUSSION

This research analyzed the bivariate correlation between gender and students' cognitive domain biology learning outcomes using the Eta Test and a significance level of 0,01. The following are the research results obtained and their discussion.

Result

Table 1 is a help table for the Eta Test which contains data on biology learning outcomes for male and female students. The calculation results show that the eta value obtained is 2,94. Because the eta value obtained is in the range 0,25-0,50, the strength of the relationship between gender and students' biology learning outcomes is in the sufficient category. The calculated F value obtained is -31,67 which is smaller than the Ftable at the 0,01 significance level which is 7,64.

Table 1 Relationship Degree of Gender and Biology Learning Outcomes

Gender				
Male			Female	
Y_1	Y_1^2		Y_2	Y_2^2
77	5929		78	6084
70	4900		64	4096
81	6561		79	6241
80	6400		76	5776
85	7225		69	4761
69	4761		69	4761
73	5329		82	6724
75	5625		77	5929
70	4900		77	5929
72	5184		85	7225
73	5329		84	7056
80	6400		74	5476
69	4761		74	5476
70	4900		74	5476
76	5776		79	6241
$\sum Y_1 = 1120$	$\sum Y_1^2 = 83980$		$\sum Y_2 = 1141$	$\sum Y_2^2 = 87251$
$\overline{Y_1} = 74,67$		$\overline{Y_T} = 75,37$	$\overline{Y_2} = 79,07$	
$\sum Y_1^2 + \sum Y_2^2 = 171231$				

Discussion

The eta correlation coefficient (η) of 2,94 indicates a sufficient correlation between gender and student biology learning outcomes. The sufficient category is obtained by converting the coefficient value into the range 0-1 by calculating 2,94/10 which produces a value of 0,294; the conversion value is between 0,25 – 0,50 so it meets the sufficient category (E. Pratama, 2023). However, when compared with the correlation coefficient category in previous research regarding the strength of the relationship (Jabnabillah & Margina, 2022), the value of 2,94 is included in the weak category. Researchers concluded that the relationship between gender and students' biology learning outcomes was weak. This weak relationship can mean that gender is not closely related to students' biology learning outcomes.

The eta value was also tested for significance at the 0,01 level and showed that the F_{count} was negative (-31,67) which was known to be smaller than the F_{table} (7,64). A negative sign indicates that the relationship between the two variables being analyzed goes in the opposite direction or is in a negative relationship (R. Pratama et al., 2023). Then, because the calculated value is smaller than the table value, it can be concluded that there is a linear relationship between gender and students' biology learning outcomes. However, as with the previous eta value, the relationship between these two variables is weak.

The results of this study show that gender is not very related to biology learning outcomes, in fact the relationship is negative. This results is in accordance with previous researches which found that the relationship between gender and student learning outcomes was low (Fitri et al., 2017) or not significant (Amintarti et al., 2018). However, there is also previous research which reveals that gender is closely related to student learning outcomes (Utami & Yonanda, 2020). The relationship between gender and learning outcomes may be related to the brain structure and psychology of male and female.

Differences in brain anatomy and development between male and female affect their cognitive abilities and learning styles (Amin, 2018). The brain size of male is larger than that of female, but in male the right brain develops earlier than the left brain. This causes female's cognitive development to be faster than male of the same age. So that at school age, it is often found that the learning outcomes of female students are higher than those of male students. In this study, it was also found that the average biology learning outcomes for female students were higher (79,07) than male students (74,67), although the difference was small (4,4).

Learning styles are included in the psychological factors of student learning. Learning outcomes can be influenced by learning style (Sartika et al., 2023; Syarifah & Lestari, 2021). The learning style of male students tends to be visual, while female students tend to be auditory (Yanti & Alimni, 2023).

Students with a visual learning style are more effective in understanding and remembering information when they see the object, while students with auditory learning style are more effective in understanding and remembering information when listening to the object (Mulyawati & Us, 2023). Learning style is only one factor that influences learning outcomes (Sari & Sartika, 2021), there are many other factors that need to be considered in their influence on students' learning outcomes.

Other psychological factors such as motivation to learn. Learning motivation is known to have a significant positive relationship with students' biology learning outcomes (Putri et al., 2021). Previous research that took the subject of Z generation revealed that the learning motivation of male and female students was not significantly different (Marisa, 2020). These findings strengthen the hypothesis about the weak relationship between gender and student learning outcomes.

CONCLUSIONS

This research has analyzed the relationship between gender and students' biology learning outcomes at MA Ghozaliyah in the odd semester of the 2022/2023 academic year using the Eta Test. The results show that there is a weak negative linear relationship between these two variables. Negative correlation indicates a relationship between two variables that move in opposite directions. It can be concluded that gender has a weak relationship with students' biology learning outcomes. Therefore, educational equality between male and female students needs to be given more attention. Teachers need to recognize the characteristics of students in terms other than gender, for example learning styles and learning motivation, so that they can develop learning plans that accommodate students' learning needs.

REFERENCES

Alianto, A., Hasan, R., & Irwandi, I. (2021). Perbedaan hasil belajar kognitif siswa pada pembelajaran daring melalui google classroom dan whatsapp mesenger di SMP Negeri 4 Bengkulu Tengah. *Biodik*, *7*(4), 10–17. https://doi.org/10.22437/bio.v7i4.13565

Amin, M. S. (2018). Perbedaan struktur otak dan perilaku belajar antara pria dan wanita: eksplanasi dalam sudut pandang neuro sains dan filsafat. *Jurnal Filsafat Indonesia*, *1*(1), 38–43. https://doi.org/10.23887/jfi.v1i1.13973

Amintarti, S., Ajizah, A., & Utami, N. H. (2018). Hubungan antara jenis kelamin dengan hasil belajar dan sikap ilmiah mahasiswa pada mata kuliah botani tumbuhan rendah di prodi pendidikan biologi FKIP Universitas Lambung Mangkurat. *Wahana-Bio: Jurnal Biologi Dan Pembelajarannya*, *10*(1), 1–13. https://doi.org/10.20527/wb.v10i1.5460

Charisma, N., Heldayani, E., & Tanzimah, T. (2022). Pengaruh karakteristik gender terhadap hasil belajar siswa pada mata pelajaran matematika di kelas V SD Negeri 32 Palembang. *BADA'A: Jurnal Ilmiah Pendidikan Dasar*, *4*(2), 257–268. https://doi.org/10.37216/badaa.v4i2.661

Fitri, J., Jalmo, T., & Marpaung, R. R. T. (2017). Identifikasi gaya belajar berdasarkan gender dan hubungan dengan hasil belajar siswa SMP kelas VII IPA sekecamatan labuhan. *Jurnal Bioterdidik*, *5*(5), 1–11.

Hasanusi, F. S. (2019). Kemampuan tingkat gender siswa terhadap hasil belajar matematika kelas xii sma negera 1 ketapang kalimantan barat. *Qalam: Jurnal Ilmu Kependidikan*, *8*(1), 130–142. https://doi.org/10.33506/jq.v8i1.364

Jabnabillah, F., & Margina, N. (2022). Analisis korelasi pearson dalam menentukan hubungan antara motivasi belajar dengan kemandirian belajar pada pembelajaran daring. *Jurnal Sintak*, *1*(1), 14–18.

Marisa, C. (2020). Gambaran motivasi belajar pada siswa generasi z dan implikasinya dalam pelayanan bimbingan dan konseling di sekolah. *Guidance*, *17*(02), 21–32. https://doi.org/10.34005/guidance.v17i02.1117

Mulyawati, M. S., & Us, S. (2023). Pengaruh gaya belajar terhadap kemampuan berpikir kritis siswa. *STRATEGY : Jurnal Inovasi Strategi Dan Model Pembelajaran*, *3*(3), 243–249. https://doi.org/10.51878/strategi.v3i3.2425

Muspiroh, N. (2020). Perbedaan hasil belajar peserta didik berdasarkan gender pada mata pelajaran biologi. *Jurnal Equalita*, *2*(1), 48–57. https://doi.org/10.24235/equalita.v2i1.7055

Nurlindayani, E., Setiono, S., & Suhendar, S. (2020). Profil hasil belajar kognitif siswa dengan metode blended learning pada materi sistem pernapasan manusia. *Biodik*, *7*(2), 55–62. https://doi.org/10.22437/bio.v7i2.12813

Pratama, E. (2023). Analisis korelasi eta dalam menentukan hubungan. *Mabha Jurnal*, *4*(1), 52–56. https://ejournal.mandalabhakti.ac.id/mabha/article/view/59

Pratama, R., Aisyah, S. A., Putra, A. M., Sirodj, R. A., & Afgan, M. W. (2023). Correlational research. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(3), 1754–1759. https://doi.org/10.54371/jiip.v6i3.1420

Putri, P. E., Lufri, L., Helendra, H., & Fuadiyah, S. (2021). Motivasi belajar dan hasil belajar biologi selama pembelajaran daring pada siswa xi sekolah menengah atas. *Journal for Lesson and Learning Studies*, *4*(3), 338–342. https://doi.org/10.23887/jlls.v4i3.37617

Sari, N., & Sartika, S. B. (2021). Korelasi gaya belajar dengan hasil belajar kognitif pada mata pelajaran IPA SMP. *LENSA (Lentera Sains): Jurnal Pendidikan IPA*, *11*(1), 1–7. https://doi.org/10.24929/lensa.v11i1.114

Sartika, M., Hatim, M., & Rosmiyati, E. (2023). The correlation of learning style and english achievment of the students of nurul huda senior high School. *Esteem Journal of English Education Study Programme*, *6*(2), 311–318. https://doi.org/10.31851/esteem.v6i2.12310

Silalahi, U. (2018). *Metodologi analisis data dan interpretasi hasil untuk penelitian sosial kuantitatif*. PT Refika Aditama.

Syafaruddin, S., Dewi, I. N., & Utami, S. D. (2022). Perbedaan hasil belajar kognitif siswa berdasarkan gender melalui penerapan model pembelajaran kooperatif berbasis kolaboratif sainstifik. *Panthera: Jurnal Ilmiah Pendidikan Sains Dan Terapan*, *2*(3), 135–141. https://doi.org/10.36312/pjipst.v2i3.39

Syarifah, S., & Lestari, P. S. (2021). Pengaruh gaya belajar terhadap hasil belajar bahasa arab dasar mahasiswa alumni smk prodi PAI Tahun Akademik 2018/2019 di IAIN Syaikh Abdurrahman Siddik Bangka Belitung. *Sustainable Jurnal Kajian Mutu Pendidikan*, *4*(1), 58–74. https://doi.org/10.32923/kjmp.v4i1.2158

Utami, N. E. S., & Yonanda, D. A. (2020). Hubungan gender terhadap prestasi belajar siswa. *Seminar Nasional Pendidikan, FKIP UNMA*, *2*, 144–149. https://prosiding.unma.ac.id/index.php/semnasfkip/article/view/314

Yanti, F., & Alimni. (2023). Perbedaan gaya belajar siswa laki-laki dan perempuan pada mata pelajaran pai di smp negeri 2 kota bengkulu. *Jurnal Hawa: Studi Pengarus Utamaan Gender Dan Anak*, *5*(1), 32–42. https://doi.org/10.29300/hawapsga.v5i1