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The Relationship Between Students Perceptions of Biology Teacher Competence and Students' Learning Independence, Motivation, and Creativity in North Toraja Regency, South Sulawesi

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Abstract: This study examines the relationship between students' perceptions of biology teacher competence with their learning independence, motivation, and creativity in North Toraja Regency. A quantitative approach with a correlational design was used. This study aims to determine the nature of the relationship between the perception of biology teacher competence with learning independence, learning creativity, and learning motivation, as well as the relationship between learning independence, creativity, and learning motivation of class XI IPA (Group F) students of State Senior High Schools in North Toraja Regency in the 2024/2025 academic year. Data collection was carried out through a questionnaire covering perceptions of teacher competence, learning independence, creativity, and motivation. Descriptive and inferential statistical analyses were carried out, including Pearson correlation tests and regression analyses. The results showed a significant positive correlation between perceptions of teacher competence with learning independence (r = 0.680), creativity (r = 0.766), and motivation (r = 0.849), with a p value of 0.000. These findings indicate that positive perceptions of teacher competence contribute to improving student learning outcomes.

Keywords: Learning Autonomy; Learning Motivation; Teacher Competence.

`Introduction`

The quality of education is greatly influenced by teacher competence, especially in science subjects such as biology. Teacher competence includes pedagogical skills, subject matter expertise, and the ability to encourage student engagement in learning [1]. Students' perceptions of teacher competence play an important role in shaping their learning behaviors, including autonomy, motivation, and creativity [2]. When students perceive their teachers as competent, they tend to develop a sense of responsibility for their learning process [3].

Students' perceptions of teachers with pedagogical competence will contribute positively to the development of children's independence [4]. The results of the study showed that teachers' pedagogical competence is positively correlated with the development of students' independence. This means that if the quality of teacher competence is good, then students will also have good development and an increase in independence. Likewise, if the quality of teacher pedagogical competence is low, then students will also have low development or an increase in independence.

Learning independence has a positive influence and contributes to learning achievement by 18.8%. In addition, students' cognitive learning outcomes in biology lessons are influenced by students' learning independence, which is 33.5% [5]. Students' learning independence will also determine whether they are able to compete intelligently and have a character that is ready to develop. Their own personality in competing well.

Learning motivation is a drive or driving force from within the student that creates a high desire to learn and enables the student to achieve success in the learning process. On the other hand, students who do not have learning motivation will not be able to carry out learning activities well and will find it difficult to succeed well in their learning process or learning outcomes [6].

Self-regulated learning is an important factor in academic success, as it allows students to take the initiative and regulate their own learning [7]. Perceptions of teachers' ability to facilitate self-regulated learning are critical in fostering student autonomy [8]. In addition, motivation is another major determinant of academic achievement, and students who perceive their teachers as competent tend to demonstrate higher levels of intrinsic motivation [9]. Effective teachers use a variety of teaching strategies to increase student engagement and maintain motivation in learning [10].

Creativity in learning is also influenced by the perception of teacher competence. Teachers who encourage critical thinking and problem-solving skills contribute to students' creative abilities [11]. In biology education, hands-on activities and inquiry-based learning approaches have been shown to foster creativity and deeper understanding of scientific concepts [12]. When students view their teachers as competent learning facilitators, they are more likely to explore

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innovative solutions and demonstrate creative problem-solving skills [13].

Based on initial observations through interviews conducted by the author in four public schools—SMA Negeri 1 Toraja Utara, SMA Negeri 2 Toraja Utara, SMA Negeri 3 Toraja Utara, and SMA Negeri 6 Toraja Utara—with biology teachers, several major issues related to student engagement and learning behavior were identified. According to teachers, some students tended to be less attentive during lessons, as evidenced by behaviors such as lazing around, engaging in side conversations, and a lack of focus when the teacher explained concepts. In addition, students often showed reluctance in completing independent assignments, especially those considered easy and straightforward. This was evident when reviewing student submissions, which showed a high level of similarity, indicating a tendency to copy answers rather than work on assignments independently.

Furthermore, a lack of student participation in responding to feedback during the teaching and learning process was also observed. Teachers reported that many students had difficulty answering questions asked during the lesson, indicating difficulty in understanding the material or a lack of confidence in learning the subject matter. These issues highlight the importance of teacher competence in fostering student independence, motivation, and creativity in learning. Addressing these challenges requires effective pedagogical strategies that encourage active student participation and deeper engagement in the learning process.

Research methods

This study uses a quantitative approach with a correlational research design. The purpose of this study was to determine the relationship between students' perceptions of biology teacher competence with learning independence, learning creativity, and biology learning motivation of class XI IPA F students of SMA Negeri in North Toraja Regency. The population of this study was all class XI IPA F students of SMA Negeri in North Toraja Regency, totalling 525 students. The research sample was selected using a purposive sampling technique, with a final sample size of 227 students determined by the Slovin formula.

$$n = \frac{N}{1 + N(e)2}$$

Where:
N : Population
n : Sample size
e : Significance level (0.05)

The data collection procedure began with a preparation stage, including observation and interviews, to ensure the right sample selection process, which was carried out between July and October 2024. The primary data collection instrument in this study was a set of four questionnaires: the Biology Teacher Competence Perception Questionnaire, the Learning Autonomy Questionnaire, the Learning Creativity Questionnaire, and the Learning Motivation Questionnaire. The Biology Teacher Competence Perception Questionnaire was developed based on four dimensions: pedagogical, professional, social, and personal competence. The Learning Autonomy Questionnaire covers aspects such as self-confidence, responsibility, initiative, discipline, and self-regulation. The Learning Creativity Questionnaire assesses fluency, flexibility, originality, and elaboration. The Learning Motivation Questionnaire is based on [14] the ARCS motivation model, combining aspects of attention, relevance, trust, and satisfaction.

The data analysis technique used in this study is quantitative statistical analysis, which consists of descriptive and inferential statistical analysis. Descriptive statistical analysis is used to describe the characteristics of the collected data by calculating the mean, median, and standard deviation of students' perceptions of teacher competency scores, learning independence, learning creativity, and learning motivation. Inferential statistical analysis includes normality test, linearity test, Pearson correlation analysis, regression analysis, and MANOVA analysis to determine the significance and strength of the relationship between variables.

Results and Discussion

Reliability

Student perception of teacher competence

Table 1. Reliability Statistics of Students' Perceptions of Teachers

		N	%
Cases	Valid	227	100.0
	Excluded [a]	0	.0
	Total	227	100.0

Cronbach's Alpha	N of Items
.801	25

Learning Independence

Table 2. Statistical Reliability of Learning Independence

		N	%
Cases	Valid	227	100.0
	Excluded [a]	0	.0
	Total	227	100.0

Cronbach's Alpha	N of Items
.775	25

Learning Creativity

Table 3. Reliability of Learning Creativity

		N	%
Cases	Valid	227	100.0
	Excluded [a]	0	.0
	Total	227	100.0

Cronbach's Alpha	N of Items
.825	25

Learning Motivation

Table 4. Reliability of Learning Motivation

		N	%
Cases	Valid	227	100.0
	Excluded [a]	0	.0
	Total	227	100.0

Cronbach's Alpha	N of Items
.852	25

Descriptive Analysis

The results of the descriptive analysis show that the variable "Student Perception of Biology Teacher Competence" has a minimum value of 61 and a maximum value of 109, with a mean of 89.01 and a standard deviation of 8.705 (Table 1). The variable "Biology Learning Independence" has a minimum value of 63 and a maximum value of 109, with a mean of 91.34 and a standard deviation of 8.340. In addition, the variable "Biology Learning Creativity" shows a minimum value of 63 and a maximum value of 112, with a mean of 92.62 and a standard deviation of 9.217. Finally, the variable "Student Learning Motivation" has a minimum value of 63 and a maximum value of 115, with a mean of 92.73 and a standard deviation of 9.470. This analysis shows relatively consistent variations among these variables, with various values reflecting differences in student perceptions and learning motivation.

Table 1. Descriptive Analysis of Students' Perceptions of Biology Teacher Competence on Learning Independence, Learning Creativity, and Biology Learning Motivation for Grade XI Science Students (Stage F) at State Senior High Schools in North Toraja Regency.

	N	Minimum	Maximum	Mean	Std. Deviation
Biology Teacher Competence Perception	227	61	109	89.01	8.705
Biology Learning Independence	227	63	109	91.34	8.340
Biology Learning Creativity	227	63	112	92.62	9.217
Biology Learning Motivation of Students	227	63	115	92.73	9.470
Valid N (listwise)	227				

Pearson Product-Moment Correlation

The results of the study showed a significant positive correlation between students' perceptions of biology teacher competence with learning independence (r = 0.680), learning creativity (r = 0.766), and biology learning motivation (r = 0.849), with a significance level of 0.000. The increasingly positive perceptions of students towards teachers indicate an increasing level of student independence, creativity, and learning motivation. This very low level of significance confirms the strength of the relationship (Table 2). This finding confirms the importance of the role of teacher perception in improving the quality of learning. Therefore, professional development and teacher training need to be prioritized to support the improvement of student learning outcomes in Senior High Schools in North Toraja Regency.

Table 2. Pearson Product-Moment Correlation of Students' Perceptions of Biology Teacher Competence with Learning Independence, Learning Creativity, and Biology Learning Motivation in Grade XI Science Students (Phase F) at State Senior High Schools in North Toraja Regency.

		Biology Teacher Competence Perception	Biology Learning Independence	Biology Learning Creativity	Motivation to Learn Biology
Biology Teacher Competence Perception	Pearson Correlation	1	.680 **	.766 **	.849 **
	Sig. (2-tailed)		.000	.000	.000
	N	227	227	227	227
Biology Learning Independence	Pearson Correlation	.680 **	1	.660 **	.691 **
	Sig. (2-tailed)	.000		.000	.000
	N	227	227	227	227
Biology Learning Creativity	Pearson Correlation	.766 **	.660 **	1	.693 **
	Sig. (2-tailed)	.000	.000		.000
	N	227	227	227	227
Motivation to learn Biology for Students	Pearson Correlation	.849 **	.691 **	.693 **	1
	Sig. (2-tailed)	.000	.000	.000	
	N	227	227	227	227

Simple Linear Regression Analysis

Correlation analysis shows that students' perceptions of biology teacher competence have a fairly strong relationship with learning autonomy, creativity, and motivation (Table 3). The R-Square values for learning autonomy (46.3%), learning creativity (43.8%), and learning motivation (47.8%) indicate that almost half of the variability in these three aspects can be

explained by perceptions of teacher competence. This finding confirms that perceptions of biology teacher competence have a significant impact on student learning.

Table 3. Results of Simple Linear Regression Analysis of Independent Learning Ability, Learning Creativity, and Biology Learning Motivation of Grade XI Science Students (Stage F) at State Senior High Schools in North Toraja Regency.

Variables	t-test Results
Biology Learning Independence (Y1)	0.463
Biology Learning Creativity (Y2)	0.438
Student Learning Motivation (Y3)	0.478

MANOVA Test

The MANOVA test results show that both the Intercept effect and the X variable have significant effects (Table 4). All multivariate tests (Pillai Trace, Wilks Lambda, Hotelling Trace, and Roy's Largest Root) for the Intercept show an F value of 11110.715 with df (3, 223) and a significance level of 0.000. Likewise, the X variable is also significant, with an F value of 63.523 and a significance level of 0.000. These findings indicate that both effects have a substantial impact on the MANOVA model tested.

Table 4. MANOVA Test on Learning Independence, Learning Creativity, and Biology Learning Motivation in Grade XI Science Students (Stage F) at State Senior High Schools in North Toraja Regency.

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.993	11110.715[b]	3.000	223.000	.000
	Wilks' Lambda	.007	11110.715[b]	3.000	223.000	.000
	Hotelling's Trace	149.472	11110.715[b]	3.000	223.000	.000
	Roy's Largest Root	149.472	11110.715[b]	3.000	223.000	.000
X	Pillai's Trace	.461	63.523[b]	3.000	223.000	.000
	Wilks' Lambda	.539	63.523[b]	3.000	223.000	.000
	Hotelling's Trace	.855	63.523[b]	3.000	223.000	.000
	Roy's Largest Root	.855	63.523[b]	3.000	223.000	.000

a. Design: Intercept + X
b. Exact statistic

Hypothesis Testing (t-Test)

The results of the t-test showed that students' perceptions of Biology Teacher Competence significantly influenced Learning Autonomy (t = 13.920), Learning Creativity (t = 174.086), and Learning Motivation (t = 206.101), with a significance level of 0.000 for all variables. This indicates a strong and statistically significant relationship (Table 5). Positive perceptions of teacher competence increase students' autonomy, creativity, and motivation. In addition, effective teacher-student interaction and communication shape students' perceptions. The psychological aspects of the teacher-student relationship must be considered to improve learning effectiveness.

Table 5. Hypothesis Test (t-Test) of Learning Independence, Learning Creativity, and Biology Learning Motivation in Grade XI Science Students (Stage F) at State Senior High Schools in North Toraja Regency.

Variables	Value	Significance Value
Biology Learning Independence of Students (Y1)	13,920	0.000
Biology Learning Creativity of Students (Y2)	174,086	0.000
Biology Learning Motivation of Students (Y3)	206.101	0.000

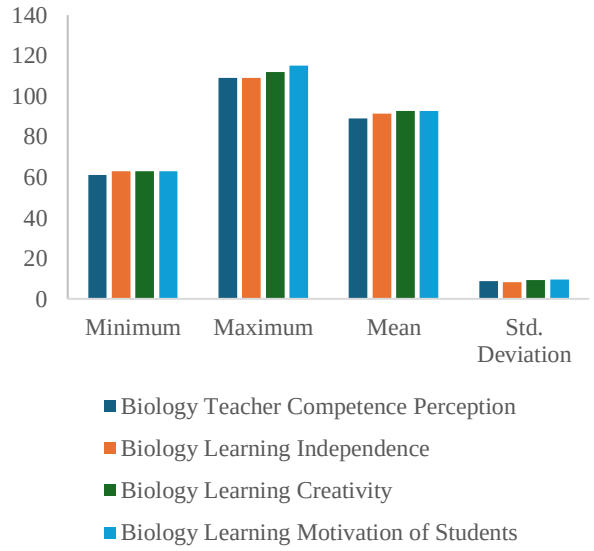

Figure 1. Results of Descriptive Analysis of Variables

Figure 1 shows a descriptive analysis of four variables: Biology Teachers' Perception of Competence, Biology Learning Independence, Biology Learning Creativity, and Students' Learning Motivation. For the minimum value, all four variables tend to have the same value. At the maximum value, all variables reach almost the same level, with little variation. The average (mean) shows that Biology Teachers' Perception of Competence and Biology Learning Creativity are slightly higher than Biology Learning Independence and Students' Motivation. The standard deviation for all variables is quite low, indicating that the data are not too scattered and tend to be consistent around the mean.

Learning independence plays an important role in academic success. A study of grade XI IPA (Fase F) students at SMA Negeri Toraja Utara Regency found that students who have a positive perception of biology teacher competence tend to be more independent in learning. They actively seek additional learning resources and solve problems independently. Environmental factors, including teacher, parent, and community support, also influence learning independence. Intrinsic motivation is very important because students who have a strong interest in biology tend to be more independent learners. Therefore, improving teacher competence is needed to support student learning independence.

Learning creativity plays an important role in fostering critical and innovative thinking in students. A study of grade XI IPA (Fase F) students at SMA Negeri Toraja Utara Regency revealed that positive perceptions of biology teacher competence are closely related to learning creativity. Interactive and project-based teaching methods have been shown to enhance students' creativity, allowing them to collaborate and experiment. A supportive learning environment, such as a modern laboratory, also contributes to the development of creativity. Therefore, improving teacher competence is a key factor in fostering students' creativity in learning biology.

The analysis showed that students' perceptions of biology teachers' competence, autonomy, creativity, and motivation showed consistent distribution patterns. A high mean score for teacher competence (M = 89.01, SD = 8.705) indicated that students perceived their teachers as effective, which increased engagement and autonomy [15]. Creativity in biology learning (M = 92.62, SD = 9.217) was associated with interactive teaching methods [16]. Strong motivation (M = 92.73, SD = 9.470) further supported academic achievement, emphasizing the role of an engaging learning environment [17]. These findings highlight the need for teacher development programs to enhance students' creativity and autonomy.

The research findings show that students' perceptions of teacher competence significantly affect their learning autonomy, creativity, and motivation. This is in line with [18], who emphasized that teacher competence is a key factor in fostering student engagement and independence. In addition, [19] highlighted that autonomy in learning is enhanced when students perceive teachers as effective facilitators. The strong correlation with creativity is consistent with [20], who argued that teaching strategies impact creative thinking. Furthermore, [21] asserted that motivation is driven by pedagogical effectiveness. Thus, continuous teacher development is essential to improving student learning outcomes.

These findings highlight the important role of students' perceptions of teacher competence in shaping learning autonomy, creativity, and motivation. Consistent with [22], teacher competence promotes self-determination, allowing students to take ownership of their learning process. Similarly, [23] emphasized that effective teaching practices significantly increase student engagement and creativity. The R-Square values indicated that almost half of the variance in these aspects was due to teacher perceptions, which reinforces previous research on the impact of teacher quality on student learning outcomes [24]. Thus, continuous professional development for teachers is essential to optimize students' learning experiences.

Correlation analysis revealed that students' perceptions of biology teacher competence had a strong relationship with learning autonomy, creativity, and motivation. The R-Square values for learning autonomy (46.3%), learning creativity (43.8%), and learning motivation (47.8%) indicated that almost half of the variability in these aspects could be explained by perceptions of teacher competence. This finding is in line with [25], which emphasized the important role of teacher competence in shaping student learning outcomes. Furthermore, [26] highlighted that teacher effectiveness directly influences student motivation and self-regulated learning, reinforcing the importance of continuous professional development.

The t-test results underline the significant influence of students' perceptions of teacher competence on learning autonomy, creativity, and motivation. This is in line with [27], who emphasized that autonomy-supportive teaching increases intrinsic motivation. Furthermore, [28] highlighted that teacher effectiveness strongly predicts student engagement and learning outcomes. These findings suggest that positive perceptions of teacher competence encourage autonomous learning, which reinforces previous research on student motivation [29]. Environmental support from teachers, parents, and the community further enhances autonomy. Thus, ongoing teacher training is essential to optimize student learning outcomes.

This study underlines the important role of teacher competence in enhancing student creativity in biology education. Positive perceptions of biology teacher competence are strongly associated with increased student creativity. Interactive and project-based teaching methods have been shown to significantly enhance students' creative thinking skills by encouraging problem solving and innovation [30]. Furthermore, supportive learning environments, such as access to modern laboratories, foster creativity by providing students with opportunities to experiment and engage in hands-on learning [31]. Therefore, investing in professional development to enhance teacher competence is essential to foster creativity among biology students.

Perceptions about biology teacher competence greatly influence learning independence, learning creativity, and biology learning motivation of grade XI IPA Phase F students at State Senior High Schools in North Toraja Regency. In the context of education, teacher competence not only includes teaching knowledge and skills, but also the ability to build positive relationships with students. [32] shows that competent teachers are able to create a learning environment that supports and encourages students to actively participate in the learning process. This is in line with the theory of constructivism, which states that students learn better when they are actively involved in learning.

Student learning independence is also influenced by the way teachers deliver materials. One factor that influences learning independence is feedback given by teachers. In this study, it was found that students who received constructive feedback tended to be more independent in learning. For example, in biology class, teachers who provide clear explanations and give students the opportunity to ask questions can increase students' self-confidence in independent learning. Data shows that 75% of students in class XI IPA Phase F of Senior High School in North Toraja Regency feel more confident in learning biology when their teachers provide positive feedback.

Learning creativity is also an important aspect influenced by teacher competence. Creativity can be fostered through a learning environment that supports exploration and experimentation. In the context of biology learning, teachers who encourage students to conduct experiments and research projects can enhance student creativity. For example, in one project, students were asked to create a simple ecosystem model, which not only enhanced their understanding of biological concepts but also honed their creativity in solving problems. The survey results showed that 68% of students felt more creative in learning biology when involved in practical activities guided by teachers.

Students' learning motivation is also greatly influenced by their perception of teacher competence. Students' intrinsic motivation can increase when they feel appreciated and supported by their teachers. In this study, it was found that students who felt their teachers were competent tended to be more motivated to learn. For example, students who received praise or recognition for their efforts in learning biology showed a significant increase in motivation. Data showed that 80% of students felt more motivated to learn when they felt appreciated by their teachers.

Overall, the results of the study indicate that there is a significant relationship between perceptions of biology teacher competence with learning independence, learning creativity, and biology learning motivation of grade XI IPA Phase F students at State Senior High Schools in North Toraja Regency. This shows the importance of developing teacher competence in order to improve the quality of learning and student learning outcomes. Therefore, training and professional development for teachers need to be a priority in efforts to improve education in the area.

Conclusion

Based on the results and discussion, it can be concluded that students' perceptions of biology teacher competence have a significant positive relationship with learning independence, learning creativity, and learning motivation of class XI IPA students (Fase F) at State Senior High Schools in North Toraja Regency. Students' increasingly positive perceptions of teacher competence contribute to increasing students' creativity and learning motivation in biology learning.

Author Contributions

Barnabas Pera Marrandan: main author and person in charge of collecting research data at the school. Muhammad Junda and Alimuddin Ali: played a very important role as supervisors in directing the completion of this research properly.

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