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Relationship between Cognitive Learning Outcomes and Student Entrepreneurial Motivation in Biology Subjects

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Abstract: This study aims to analyze the relationship between cognitive learning outcomes and student entrepreneurial motivation in biology subjects in class XI MA NW Narmada. The population in this study were all female class XI students totaling 198 students with a sample of female class XI MIPA students totaling 88 students. This research is a survey research. The data collection method uses a questionnaire on entrepreneurial motivation and report card documents. The data analysis technique used in this study is the *Pearson product-moment* correlation test. The results showed a relationship between cognitive learning outcomes and student entrepreneurial motivation ($p < 0.05$) with a correlation coefficient value of -0.225. The correlation index is in a low category so the relationship between the two negatively correlated variables is classified as low.

Keywords: *Entrepreneurial Motivation, Cognitive Learning Outcomes, Biology.*

INTRODUCTION

The demand for high-quality Human Resources (HR) is increasingly needed because the industrial world requires the readiness of prospective workers and the creation of more jobs. In 2015, countries that are members of ASEAN were free to enter between ASEAN countries without a visa. This can be used as a motivation to improve the quality of human resources through education, to be able to compete with prospective professional labor in the free market [1].

In 2018, the proportion of entrepreneurs in Indonesia remained at around 3.1% of the overall population, indicating a need for at least 4 million additional entrepreneurs. Although the ratio of entrepreneurs in Indonesia in 2018 has exceeded the international standard of 2 percent, Indonesia needs to catch up with the achievements of neighboring countries such as Singapore which reached 7 percent, and Malaysia at the level of 5 percent [2]. This is done to face the current industrial era of 5.0. In 2023, according to the International Monetary Fund (IMF), Indonesia ranks second in unemployment among Southeast Asian countries with a projected unemployment rate of 5.3 percent [3].

According to Diana (2016), the cause of the problem of the large number of unemployment created by educated groups is the education system that only produces *technical skills*. So that those who have completed their education, generally only look for jobs to become civil servants or employees. Only a small percentage are willing and able to create jobs, both for themselves and others, and become an entrepreneur. This reality indicates that the education system is only able to prepare students to fill jobs and has not been able to prepare students to become entrepreneurs [4].

Developing an entrepreneurial spirit is one way to get over the aforementioned obstacles. A project-based biopreneurship program is one illustration. The project-based biopreneurship module in Rosyidi et al.'s research from 2023 is a learning module that integrates entrepreneurial and biological ideas to highlight project-based learning. The biopreneurship module's design takes into account the creative and entrepreneurial literacies of the students. The project-based biopreneurship science module was assessed in this study as feasible to use with the acquisition of scores from three science education expert validators which amounted to 77.3% [5]. Entrepreneurship here is not just the ability to open a business, but how to instill entrepreneurial motivation in high school students who have reached a productive age. So that the younger generation can change their mindset from looking for work to creating jobs by way of entrepreneurship.

Entrepreneurship by paying attention to knowledge is in line with the concept of *Knowledge-Based Entrepreneurship*. The concept of *Knowledge-Based Entrepreneurship* is a new idea that links knowledge with entrepreneurship. According to Kanellos, *Knowledge Based*

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Entrepreneurship, or KBE for short regroups entrepreneurial initiatives based on scientific or technological knowledge consisting of a combination of new resources. KBE is a specialized form of entrepreneurship often referred to as the knowledge economy that conducts activities that provide the creation of new knowledge to create value. The knowledge economy was first introduced by the OECD (1996), which refers to an economy consisting of the production, distribution, and use of knowledge [6].

Knowledge does not lead to performance and innovation but requires the ability to launch ideas to be useful. KBE maintains mechanisms to transform knowledge into economic activities, this refers to the nature of activities based on the exploitation of new knowledge to create economic value [6].

Knowledge may be effectively transformed into innovation through knowledge-based entrepreneurship. New information derived from many sources is crucial for generating new ideas, since it is characterized by extensive knowledge utilization and inventive endeavors [6]. So it can be concluded that *Knowledge-Based Entrepreneurship* is an idea about the relationship between knowledge and entrepreneurship, which between the two are interrelated to bring up business ideas to be developed or new businesses.

Cognitive learning outcomes are learning outcomes that have to do with memory, thinking, or intellectual abilities. Cognitive learning outcomes can determine the level of success in achieving learning. Cognitive learning outcomes in Biology subjects are the achievement of learning objectives that are in the knowledge domain which includes the ability to understand, know, memorize, interpret, translate, and distinguish which are expressed in the form of scores [7]. The cognitive aspect's goals are focused on thinking skills that include more basic intellectual aptitudes, such as recalling how to solve issues that call on pupils to link and integrate various concepts, ideas, techniques, or processes they have studied to solve difficulties [8].

Entrepreneurial motivation is a strong drive from within humans to start, run, and develop a business by utilizing all knowledge and abilities to improve the welfare of themselves, society, and the environment. Entrepreneurial motivation can be instilled in students with clear delivery and examples that are acceptable to the students themselves. If students have a strong knowledge or knowledge, entrepreneurial motivation related to that knowledge will arise by itself. But there is a fear in students that often becomes an obstacle, namely failure. Therefore, the role of educators is to convince students how entrepreneurship can run and develop [9].

The results of observations obtained at MA NW Narmada from interviews with biology teachers/ustadzah explained that the cognitive learning outcomes of students in biology subjects were good and above average. Good student cognitive learning outcomes indicate that students have mastered certain material in biology. But it is not yet known whether with the understanding of the concept students have thoughts to make it a business in the future.

In this study, entrepreneurial motivation will be associated with cognitive learning outcomes in biology subjects. In biology subjects, several subjects can be used as entrepreneurial ideas, such as biotechnology material, kingdom Animalia, Plantae, fungi, and bacteria. According to Majid (2022), when studying plants and doing a practicum on leaf bones, Sugiwati got the idea to make keychain crafts and bookmarks [10]. So it can be seen that biology subjects can be used as a motivation to start a business because some materials can be connected to entrepreneurship. Based on the above problems, this study was conducted to know whether there is a relationship between cognitive learning outcomes and student entrepreneurial motivation in biology subjects in class XI MA NW Narmada.

RESEARCH METHODS

This study uses the correlational approach to conduct a quantitative descriptive research study. The goal of quantitative descriptive research is to use statistics to observe, analyze, and explain a subject while it is being investigated in order to make inferences about events that may be observed [11]. The correlational method is a research method used to determine the effect of two or more variables [12].

MA NW Narmada was the research location and the data collecting site. The study's participants were all XI MIPA students at MA NW Narmada. Purposive sampling was the method of sampling that was employed in the investigation. The study utilized samples from

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four classes, namely grade XI MIPA 1 to grade XI MIPA 5, consisting of students from grade XI MA NW Narmada who had just progressed to grade XI.

A questionnaire designed to gauge students' motivation for entrepreneurship served as the study tool. There are nineteen statements on the Likert scale in the questionnaire. Respondents are presented with a reality and given the option to select one of four responses on a Likert scale: strongly agree, agree, disagree, and strongly disagree [1]. While the data on students' cognitive learning outcomes were obtained from the report card scores of grade XI in biology subjects in the 2022/2023 school year.

The study's premise is that students' cognitive learning outcomes in biology class XI are significantly correlated with their entrepreneurial desire. NW Narmada, Putri MA. Product-moment correlation analysis methods with recommendations are used in hypothesis testing. Ho is rejected and Ha is accepted if the significance value is less than 0.05. Conversely, if the significance value is higher than 0.05, Ho is accepted and Ha is rejected. In the interim, use the correlation coefficient to determine the strength of the association between the two variables in accordance with Table 1's instructions [13].

Table 1. Correlation Coefficient Interpretation Guidelines

Coefficient Interval	Relationship Level
0,00-0,199	Very Low
0,20-0,399	Low
0,40-0,599	Medium
0,60-0,799	Strong
0,80-1,000	Very Strong

Categories of entrepreneurial motivation and student learning outcomes can be determined based on category guidelines as shown in Table 2 below [14].

Table 2. Categorization Guidelines

Category	Criteria
Low	$X < M - 1SD$
Medium	$M - 1SD \leq X < M + 1SD$
High	$M + 1SD \leq X$

RESULTS AND DISCUSSION

Cognitive learning outcomes of students in biology subjects are taken from the report card scores of grade XI MA NW Narmada. Cognitive learning outcomes data were collected from 88 students of class XI. Frequency data of students' cognitive learning outcomes in biology subjects are shown in Figure 1.

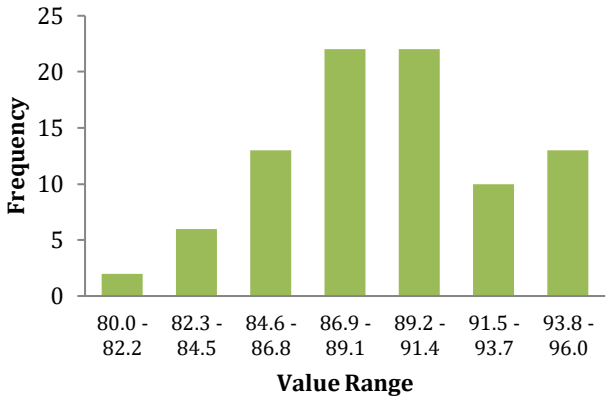

Figure 1. Frequency Distribution of Cognitive Learning Outcomes of Biology Subject Students

Figure 1 shows the frequency of cognitive learning outcomes of biology students the majority are in the interval 86.9 - 89.1 and the interval 89.2 - 91.4 with 22 students (25%). The frequency of the least cognitive learning outcomes variable is in the interval 80.0 - 82.2 with 2 students (2.3%).

Table 3. Categorization of Students' Cognitive Biology Learning Outcome Score

Category	Criteria	Frequency	%
Low	$X < 85$	8	9.1%
Medium	$85 \leq X < 91$	44	50.0%
High	$91 \leq X$	36	40.9%
Total		88	100%

Data on the category of student learning outcomes show that the low score category is 9.1% of students, the medium category is 50% of students and the high category is 40.9% of students. Based on this data, students generally have scores in the medium value category and very few are in the low category.

Student motivation is taken from the results of filling out a questionnaire by students. The questionnaire was filled out by 88 students of class XI MIPA MA NW Narmada. The frequency data of students' entrepreneurial motivation is shown in Figure 2.

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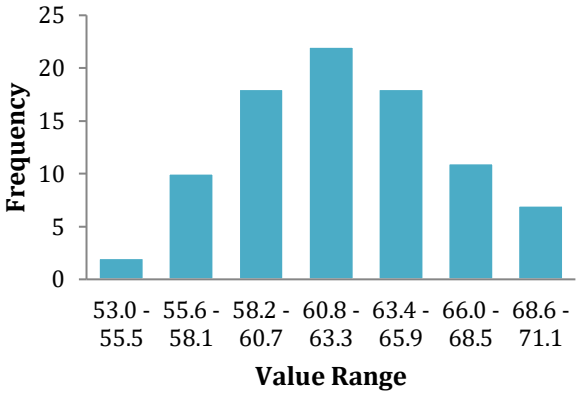

Figure 2: Frequency Distribution of Student Entrepreneurial Motivation

Figure 2 shows that the frequency of student entrepreneurial motivation is mostly in the interval 60.8 - 63.3 with 22 students (25%). The least frequency of entrepreneurial motivation variables is in the interval 53.0 - 55.5 with 2 students (2.3%)

Table 4. Categorization of Student Entrepreneurial Motivation

Category	Criteria	Frequency	%
Low	$X < 58$	10	11.4%
Medium	$58 \leq X < 66$	60	68.2%
High	$66 \leq X$	18	20.4%
Total		88	100%

Based on the data in Table 3, students in the medium score category have the highest number of students while students in the low category have the least number.

Data on learning outcomes and entrepreneurial motivation were tested for normality using the *Kolmogorov-Smirnov* test. A normality test is conducted to determine whether the data is normally distributed or not. The results of the data normality test are shown in Table 4.

Table 5. Normality Test Results

Variables	*Kolmogorov-Smirnov*		Ket.
	Sig. Level	Sig. Value	
Learning Outcomes	0.05	0.288	Normal
Entrepreneurial Motivation	0.05	0.699	Normal

Based on the normality test in the table above, the significance value for the learning outcomes variable is 0.288 and the significance value for the entrepreneurial motivation variable is 0.699. The significance value of the two variables can be seen to be greater than 0.05 so that the data for the two variables is declared normally distributed.

The linearity test using the SPSS tool by paying attention to the F test obtained for the *deviation from linearity* line aims to determine whether two variables have a linear relationship or not. The results of the linearity test are presented in Table 6.

Table 6. Linearity Test Results

Variables	Df	Harga F		Sig.	Ket.
		Count	Table (5%)		
Learning Outcomes ⬇ Entrepreneurial Motivation	13	1.366	1.857	0.197	Linear

Based on the results in the table above, the significance value in the linearity test results is 0.197 and this value is greater than 0.05. So the variable value of learning outcomes (X) on entrepreneurial motivation (Y) of students has a significantly linear relationship. The relationship between learning outcomes and entrepreneurial motivation is shown in Table 7.

Table 7. Correlation Test Results

Variables	*Correlation Coefficient*	*Correlation Product Moment*		Ket.
		Sig. Level	Sig. Value	
Learning outcomes with entrepreneurial motivation	-0.225	0.05	0.035	Has significant and negatively correlated relationship.

Based on the analysis data in the table above, it is known that the significance value is 0.035 where this value is smaller than 0.05.

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Following the results of hypothesis testing in the table, it can be concluded that Ho is rejected and Ha is accepted. So it means that there is a significant relationship between entrepreneurial motivation and students' cognitive learning outcomes in biology class XI MA NW Narmada.

The significant relationship between learning outcomes and entrepreneurial motivation has a negative direction which can be seen through the Pearson correlation value. This indicates that the relationship between the two variables is opposite, which means that if cognitive learning outcomes are low then entrepreneurial motivation is high and vice versaif cognitive learning outcomes are high entrepreneurial motivation is low. In the table of hypothesis test results, it can be seen that the *Pearson correlation value* is negative 0.225. The *Pearson correlation* value is in the coefficient interval 0.20-0.399, this indicates that the level of negative relationship between learning outcomes and entrepreneurial motivation is low.

Table 8. Student Entrepreneurial Motivation Score for Each Category of Cognitive Learning Outcomes

Category	Criteria	F	Avarage	%
Low	$X < 85$	8	66	34.4%
Medium	$85 \leq X < 91$	44	64	33.3%
High	$91 \leq X$	36	62	32.3%
Total		88	192	100%

The data table above shows that the highest entrepreneurial motivation is in the low cognitive learning outcomes category. Although the category of moderate cognitive learning outcomes has the largest number of students, the average entrepreneurial motivation is less than the low category. The average entrepreneurial motivation that has the smallest value is in the high learning outcomes category.

According to Hoy and Cecil, the factors that influence the emergence of entrepreneurial motivation in a person are not only knowledge Knowledge is in the third order of 3 factors, the first of which is hope or a strong desire to succeed, the second is valence which means the level of inner bonding and involvement that likes the entrepreneurial activities undertaken, and the third is equipment/needs in the form of support, tools, abilities and knowledge [15]. Based on the above opinion even though the value of a person's knowledge is high if the inner desire is not in entrepreneurship, the entrepreneurial motivation cannot arise even though business opportunities are wide open.

Students are still not very familiar with entrepreneurship in the field of biology because the learning content is still focused on theory. Schools hold practicums as a form of continuation of the theory taught so that learning can be utilized not only for grades but for many things. Students still think that entrepreneurship is only if studying entrepreneurship, as evidenced by the distribution of questionnaires where students are confused about why studying biology can be entrepreneurial. Students still do not know that biology can create wider business opportunities due to learning that focuses on biology alone.

The results of this study show a relationship between cognitive learning outcomes in biology subjects with student entrepreneurial motivation. However, the relationship between students' cognitive biology learning outcomes has a low and opposite relationship with entrepreneurial motivation. To maximize both students with medium or high scores to have high entrepreneurial motivation, schools can add or slip entrepreneurial concepts related to subjects other than entrepreneurship, not just biology but in subjects that can be connected to entrepreneurship. This is done so that schools can make students who after graduation can utilize their knowledge for quality things. A learning model that has the potential to empower entrepreneurial skills is bioentrepreneurship.

Biopreneurship is an integration of biology and entrepreneurship, which is the utilization of biological materials that can be valuable into marketable products [16]. Biorpreneurship is an empowerment approach that combines biological concepts with entrepreneurship. In biology learning, *bioentrepreneurship is* inserted which is entrepreneurial-based biology learning, so that students who study biology do not only think about fighting for one job, but students can be entrepreneurs by utilizing their knowledge in biology. Empowerment activities in pesantren through *biopreneurship* can increase youth entrepreneurial interest and most students are interested in starting a business after the activities are carried out [17]. Learning implemented with a biopreneurship approach can change the increase in entrepreneurial interest and entrepreneurial life

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skills from before the activity begins to after the application of *bioentrepreneurship* learning. Research shows that *biopreneurship-based* learning has a positive impact on students both in the form of cognitive and skills [18].

Research that corroborates the statement that *biopreneurship* has a positive impact is the results of Fitriah's research (2012) which states that entrepreneurship-based learning can increase student entrepreneurial interest by 7.30% and can improve student learning outcomes by 18.85%. Schools and teachers have an important role in introducing entrepreneurship to students by using biopreneurship learning tools designed for students who want to learn to explore entrepreneurship, make product creativity, and take steps to get new entrepreneurial opportunities. This is done so that students become graduates who can utilize their knowledge to create jobs for themselves and society [19].

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that there is a significant negative relationship between cognitive learning outcomes of biology subjects and with entrepreneurial motivation of students in class XI Putri MA NW Narmada. This shows that students who have high cognitive learning outcomes in biology have low entrepreneurial motivation, and vice versa. Improvement of biology learning methods is needed so that high entrepreneurial motivation does not only occur in students who have low cognitive learning outcomes but also in students who have high cognitive learning outcomes.

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