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The Relationship Between Anxiety and Student Organic Chemistry Learning Achievement at SMK AK Nusa Bangsa Bogor

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Abstract: The Relationship Between Anxiety and Student Organic Chemistry Learning Achievement at SMK AK Nusa Bangsa Bogor. Anxiety has many impacts on human life, one of which is the educational aspect. Anxiety during organic chemistry learning is experienced by students. This is caused by several factors, namely emotional, environmental, and assessment factors. The purpose of this study was to determine the relationship between anxiety and students' organic chemistry learning achievement. The research method used is quantitative method and correlational research model. The sample was taken using purposive sampling, namely 104 12th grade students majoring in Analytical Chemistry class of 2022. Anxiety data was collected through a questionnaire that had been validated by expert lecturers, then Organic Chemistry learning achievement data was obtained from the final assessment of the even semester of Organic Chemistry subjects. The correlation technique used is Product Moment. The results of this study indicate that anxiety has a negative correlation of -0.273 and a significant relationship to learning achievement with a significance value of 0.005. Anxiety and learning achievement have a weak correlation.

Keywords: Anxiety, Learning Achievement, Organic Chemistry.

Abstrak: Hubungan Kecemasan Terhadap Prestasi Belajar Kimia Organik Siswa di SMK AK Nusa Bangsa Bogor. *Kecemasan menimbulkan banyak dampak bagi kehidupan manusia, salah satunya adalah aspek pendidikan. Kecemasan saat pembelajaran kimia organik dialami oleh siswa. Hal ini disebabkan oleh beberapa faktor yaitu faktor emosi, lingkungan, dan penilaian. Tujuan penelitian ini adalah mengetahui hubungan antara kecemasan dengan prestasi belajar kimia organik siswa. Metode penelitian yang digunakan adalah metode kuantitatif dan model penelitian korelasional. Sampel diambil menggunakan purposive sampling, yaitu 104 siswa kelas 12 jurusan Kimia Analis angkatan 2022. Data kecemasan dikumpulkan melalui angket yang telah divalidasi oleh dosen ahli, kemudian data prestasi belajar Kimia Organik didapatkan dari penilaian akhir semester genap mata pelajaran Kimia Organik. Teknik korelasi yang digunakan adalah Product Moment. Hasil penelitian ini menunjukkan bahwa kecemasan memiliki*

korelasi negatif sebesar -0,273 dan hubungan yang signifikan terhadap prestasi belajar dengan nilai signifikansi sebesar 0,005. Kecemasan dan prestasi belajar memiliki korelasi yang lemah.

Kata kunci: *Kecemasan,Prestasil Belajar, Kimia Organik.*

▪ INTRODUCTION

Learning is the process of student interaction with teachers and learning resources in a learning environment. Learning is assistance provided by the teacher so that the process of acquiring knowledge and knowledge, mastering skills and behavior, and forming attitudes and beliefs in students can occur. In other terms, learning is a process to help students learn well (Djamaluddin & Wardana, 2019). Why should we study chemistry? Students trust each other that the study of biology is more relevant to their daily lives than the study of chemistry or physics. In fact, chemistry provides a more practical explanation of the science and technology that surrounds us than biology (Sandy Yudha et al., 2021). Learning at Vocational High Schools (SMK) majoring in Analytical Chemistry there are Organic Chemistry subjects. The learning process of organic chemistry is learning starting from the exploration stage of the experience it has, through scientific thinking activities that are preceded by observation to find conclusions that become new knowledge.

Organic chemistry is often encountered in everyday life. Organic chemistry itself is a branch of scientific study from chemistry regarding the structure, properties, composition, reactions, and synthesis of organic compounds. The real definition of organic chemistry comes from the misconception that all organic compounds must come from living organisms, but it has been proven that there are some exceptions. These exceptions can be mentioned for example, many enzymes that base their work on transition metals such as iron and copper, as well as teeth and bones whose composition is a mixture of organic and inorganic compounds. Another example is HCl solution, this solution plays a major role in the process of food digestion where almost all organisms (especially higher organisms) use HCl solution to digest their food, which is also classified as an inorganic compound (Roni & Legiso, 2021). Organic chemistry can be concluded organic chemistry is concerned with chemical compounds of carbon, and especially with compounds in which carbon is combined with hydrogen, oxygen, nitrogen, sulfur, and halogens.

Organic chemistry has always been a sub chapter of chemistry that is considered difficult by students in school. One study analyzed three main difficulties in learning organic chemistry consisting of the material having a new extensive vocabulary, no algorithmic problem solving, and it requires three-dimensional thinking, macroscopic, submicroscopic and symbolic (Ellis, 1994). Macroscopic are simple changes that can be identified by the researcher through simple readily available equipment such as osmosis (Gilbert & Treagust, 2009). Submicroscopic describes the arrangement of chemical matter at the molecular atomic stage. Symbolism in chemistry is defined as the use of symbols such as letters, numbers or symbols to explain chemical concepts, such as to represent the number and type of atoms in a compound, to represent ionic charge or electric charge, and to determine the phase of a compound as a solid, gas, liquid, or solution. This difficulty can also be evidenced by the results of the End of Semester

Assessment (PAS) for the even semester of the 2021/2022 academic year given by the organic chemistry teacher, data obtained that 25% of class XII students majoring in Analytical Chemistry have met the Minimum Completion Criteria, the rest have not been completed in understanding organic chemistry material.

The factors that cause student difficulties when learning organic chemistry in the classroom are various, one of which is student anxiety while learning. Anxiety is a physical and emotional response when someone anticipates the occurrence of a situation, real or imagined. Mild anxiety generally occurs and is felt by someone. Signs of anxiety include sweating on the upper lip and head, sweating hands, dry mouth, dilated pupils, increased heart rate and breathing, stomach spasms and often diarrhea, the urge to urinate repeatedly, saliva thickens (Stewart, 2014). Anxiety caused in students will lead to various problems related to motivation, achievement, learning achievement, and psychology.

The general description is that anxiety is a feeling of distress and uneasiness and chaotic thinking with regret. Students who experience anxiety about organic chemistry will show a variety of emotional responses. Emotional responses such as worrying about things that are not certain to happen, heart beating hard and difficulty focusing (Katelyn M. et al., 2018). Students very rarely ask questions in the learning process, so the teacher is less able to find out about students' difficulties in following the learning process. So the teacher does not know the obstacles that are being experienced by students. As a result, it worsens the situation and student learning achievement.

The Semester Value Assessment scores of SMK AK Nusa Bangsa students have decreased every year in the subject of organic chemistry. Since 2021-2023, this organic chemistry subject has always received the lowest chemistry score among other chemistry sub-materials such as basic chemistry, inorganic chemistry, and analytical chemistry. This is thought to be due to students' lack of understanding of organic chemistry material and the anxiety they feel, because organic chemistry is considered difficult chemistry material for students.

Based on the description above, this research is important to do, because student anxiety in facing organic chemistry subjects affects student learning achievement. According to Ferguson & Bodner (2008) there is a very clear negative correlation between anxiety and organic chemistry learning achievement. If left unchecked, it will have an impact on the condition of students who are not optimal in receiving organic chemistry material delivered by the teacher. In Indonesia itself, research on student anxiety about organic chemistry is still small. Based on this background, the author is interested in examining more deeply about the relationship between anxiety and student learning achievement.

▪ METHOD

This type of research is a quantitative method research, which the process of finding answers to a problem by using data in the form of numbers as a tool to analyze the information to be known. In this method, the data is translated into numbers so that it can be analyzed and interpreted (Sari et al., 2022: 2). According to Ibrahim et al., (2018: 47), the research model used is correlational. Correlational research is research that aims to determine the relationship between two or more variables, as well as how much correlation exists between the variables studied.

This study has two variables, namely the independent variable and the dependent variable. The dependent variable is the variable that can be influenced by the independent

variable, while the independent variable is the variable that can affect the dependent variable and the cause of the dependent variable. independent variables are variables that can affect the dependent variable and the cause of the dependent variable. changes in other variables (Munandar, 2014: 25). The dependent and independent variables in This research is:

1. Independent variable (X): Anxiety
2. The dependent variable (Y): Student Organic Chemistry Learning Achievement

Population is defined as the entire object under study, both how many people, objects, events, values and things that often occur in a study (Suharyadi and Purwanto S. K, 2016). The population in this study were students of SMK AK Nusa Bangsa Bogor majoring in Analytical Chemistry. The data collection technique in this study used purposive sampling. According to Sugiyono (2013: 85) purposive sampling is a sampling technique with certain considerations. The reason for using purposive sampling technique is because sampling is a respondent who is easy for researchers to get and can provide the information needed for research on condition that they have taken organic chemistry subjects so that this method is appropriate for this study. In the context of this study, the message was sent via Google Forms media and the number of respondents was 104 students. 104 students who are class XII students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor.

The data collection techniques in this study used questionnaires and interviews. This study uses a pre-existing instrument, which is an instrument from an anxiety questionnaire developed by Wahid, Yusof, & Razak (2014). The scale used in filling out the questionnaire is a five Likert scale. The instrument was adapted and developed according to research needs. The research instruments used in the study were questionnaires for quantitative data and interviews for qualitative data.

Quantitative Analysis

The stages of quantitative data analysis used include 1) Descriptive statistical stage of data, 2) Prerequisite testing stage of analysis, and finally 3) Hypothesis testing stage. According to Sugiyono (2013: 147), descriptive statistics serve to describe the object under study using sample data. The prerequisite test is a test that must be carried out before conducting hypothesis testing, to fulfill the research requirements. The prerequisite test of analysis consists of normality test and linearity test. The hypothesis test carried out consists of a correlation test and simple linear regression.

The correlation technique used is Pearson product moment correlation. Product moment correlation is used because the data variance is homogeneous, comes from the same subject and the number of samples is large (>30). The conclusion in hypothesis testing is if the significance value <0.05 then the results show that there is a relationship between the variable anxiety towards organic chemistry and student learning achievement in organic chemistry, otherwise if the significance value> 0.05 then there is no relationship between variables.

▪ RESULT AND DISCUSSION

The first data results obtained are statistical analysis of anxiety and statistical analysis of learning achievement. Descriptive analysis of anxiety obtained an average score of 51.24 in the moderate category. Table 1 shows the anxiety towards Organic Chemistry learning achievement owned by 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor.

Table 1. Anxiety Categorization

Score Interval %	Category	Anxiety	
		Frequency	%
≤ 20	Very Low	1	0,96
21-40	Low	27	25,96
41-60	**Medium**	**57**	**54,81**
61-80	High	16	15,39
81-100	Very High	3	2,88
Total		104	100

Based on table 1 shows that anxiety towards Organic Chemistry learning achievement owned by 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor is at a moderate category level with a percentage of 54.81%. The results of the general data description of the anxiety variable show that 57 students equivalent to 54.81% prove that student anxiety leads to a moderate category level and the average value obtained of 51.24 shows a moderate category, which is in the score range 41-60. In accordance with research conducted by Kodirun et al., (2017) stated that anxiety towards learning achievement is in the moderate anxiety category. And the results of other research conducted by Linda Anggraeni et al., (2019) show that students tend to have anxiety that falls into the moderate category, where the results of the percentage are 58%. Furthermore, there are aspects of anxiety aspects in table 2.

Table 2. General Description of Anxiety Aspects

No	Aspects of Anxiety	Percentage (%)	Category
1	Anxiety in learning organic chemistry (environment)	43,27%	Medium
2	Anxiety in organic chemistry evaluation (emotions)	44,23%	Medium
3	Anxiety in organic chemistry learning achievement (assessment)	48,08%	Medium
Average		**47%**	**Medium**

The first aspect is anxiety in learning organic chemistry (environment). In the research results in Table 2, the percentage of achievement of the anxiety aspect of 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor is a moderate category of 43.27% which can have a positive and negative effect on students. In line with research conducted by Nurul Fadhilah and Andi Muhammad (2021) which explains that the environmental aspect of anxiety is in the moderate category. Moderate level anxiety is positive towards learning, for example, it can increase motivation in learning. The second aspect is anxiety in organic chemistry evaluation (emotion). Table 2 shows that students have a moderate emotional anxiety category, namely at a percentage of 44.23%. According to Sri Nurdaniati's research, (2022) explains that the percentage of emotional anxiety is in the moderate category. Where in the emotional aspect of students the ability to control themselves so as not to repeat the same mistakes in studying organic

chemistry and ultimately can affect wrong behavior. It can be proven that students who have a moderate level of anxiety can be due to having unfavorable experiences with organic chemistry and a different understanding of chemistry. The third aspect is anxiety in organic chemistry learning achievement (assessment). Table 2 shows that students have an assessment anxiety level in the moderate category, namely a percentage of 48.08%, this is caused by loss of focus and ignoring Organic Chemistry learning. In line with Nurhalida (2019), anxiety at a moderate level allows students to focus on what is important and ignore other things, so that students experience selective attention but can do something more directed, in this case students only focus on the assessment at hand rather than other things that interfere when doing the exam.

The percentage of 12th grade learning achievement majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor can be seen in Table 3.

Table 3. Percentage of Learning Achievement

Score Interval %	**Category**	**Learning Achievement**	
		Frequency	**%**
00 – 54	Very Low	43	41,35
55 – 64	Low	26	25,00
65 – 79	Medium	25	24,04
80 – 89	High	10	9,61
90 – 100	Very High	0	0,00
Total		104	100

Based on Figure 1, the results of the general data description of the learning achievement variable show that 39 students are equivalent to 37.50% proving that student anxiety leads to a moderate category level and the average value obtained of 56.31 shows a moderate category, which is in the score range 41-60. In accordance with the results of research conducted by Arif Candik (2017), it shows that chemistry learning achievement are at a moderate level, namely 22 students with a percentage of 68.8%. Students get less than optimal learning achievement because they appear to lack practice in finding and solving problems, are easily influenced by friends' answers and do not hesitate to follow the opinions or answers of friends even though their friends' answers or opinions are not necessarily correct, as well as the anxiety that engulfs students during learning.

Table 4 presents the results of the correlation test between anxiety and student organic chemistry learning achievement that occurred in 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor.

Table 4. Correlation Test Results

Data	**Statistics**
Pearson Correlation	-0,273
Sig. 2-*tailed*	0,005
A	0,05
Eligibility	Sig. <0.05, then the anxiety variable is related to the Organic Chemistry learning achievement variable.
Conclusion	Anxiety variable related to Organic Chemistry learning achievement variable

This study found a negative significant relationship between anxiety and organic chemistry learning achievement of 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor, based on Table 4 the results of the Pearson Product Moment correlation test obtained a coefficient value of r = -0.273 with a p-value of 0.005 (<0.05), this means that the higher the anxiety, the lower the value of students' organic chemistry learning achievement. The results of this study are in line with research conducted by Stephen Chinedu Nwafor et al., (2023) explaining the negative correlation between anxiety and student chemistry learning achievement with a coefficient value obtained of -0.236. Based on other research conducted by Citra Berliana et al., (2021) stated that there is a significant negative correlation between anxiety and learning achievement as evidenced by the coefficient value of -0.286. This explains that there is a significant negative relationship between anxiety and student learning achievement. And the direction of the negative relationship means that the higher the student's anxiety, the lower the value of the learning achievement obtained by the student.

Simple linear regression analysis in table 5 was conducted to analyze the relationship of anxiety to Organic Chemistry learning achievement.

Table 5. Correlation Test Results

Variables	Regression Coefficient
Constant (a)	71,612
Anxiety (b)	-0,206

Based on table 5 linear regression results, the coefficient for the anxiety variable is -0.206 with a constant of 71.612. So that the data is entered into a simple linear equation as follows:

$$\mathbf{Y = 71,612 - 0,206X}$$

There is a negative impact caused based on the negative relationship obtained. The decline in student organic chemistry learning achievement is influenced by anxiety, from the results of linear regression shows a regression coefficient value of -0.206 which indicates that any change in the form of an increase of one point in the anxiety variable, the student organic chemistry learning achievement will decrease by 0.206 points.

Researchers in this study also conducted interviews as qualitative data by interviewing 10 students. The 10 students had different levels of anxiety, representing very low, low, medium, and high anxiety according to the results of the quantitative data. Student A, Student B, and Student C represent high anxiety; Student D, Student E, and Student F represent moderate anxiety; Student G, Student H, and Student I represent low anxiety; finally Student J represents very low anxiety. Based on this qualitative data, it is found that several factors influence the occurrence of anxiety on students' organic chemistry learning achievement, one of which is the different understanding of each student and also the teaching methods carried out by the teacher. These factors can come from internal factors and external factors. The level of difficulty in organic chemistry experienced by students varies based on the factors that influence it. Like the following interview excerpt:

"Organic chemistry is quite scary and scary for me, the lesson is difficult to understand, I also think organic chemistry is difficult and I lack motivation to learn and interest in organic chemistry, besides that, understanding the teacher's mood, if the teacher is not in the mood, I am afraid to say that I don't understand, and usually if the

teacher is in a bad mood, I can understand the whole class, but if the teacher is in a good mood, I immediately understand." (Student B, interview on June 26, 2023)

"Sometimes it is difficult to focus and concentrate if there are distracting thoughts, such as problems at home or other personal problems" (Student I, interview on June 26, 2023).

Internal factors such as self-efficacy and metacognition in each student also influence success in learning in research conducted by Riyadi, et al (2018) it can be concluded that there is a relationship between internal factors including self-efficacy and metacognition with strong chemical literacy and can improve learning outcomes. Similar to research conducted by Rusli, Adithia et al (2023) from research that has been conducted that there is a relationship between the difficulties experienced by students based on several factors such as external factor can affect student learning outcomes. And also this is in accordance with the statement of Abu Ahmadi and Widodo (2013) in (Afnibar et al., 2020) stating that the factors that influence students' learning difficulties are grouped into two, namely:

1. Internal factors

   This internal factor consists of physiological and psychological factors. Physiological factors, which can cause learning difficulties such as illness, lack of health, and disability. Meanwhile, psychology includes a generally low level of intelligence, lack of interest in learning and motivation.

2. External factors

   External factors that affect learning difficulties so that they can cause anxiety can be in the form of learning provided by teachers, the quality of learning, learning facilities and devices, as well as the surrounding natural and social environment.

▪ CONCLUSION

Based on all the data and research results that have been discussed, it can be concluded that there is a significant relationship because the significance value is smaller than sig. α 0.05 which is 0.005, besides that it has a negative relationship between anxiety and student organic chemistry learning achievement in 12th grade students majoring in Analytical Chemistry at SMK AK Nusa Bangsa Bogor because the significance value shows a negative number, namely -0.273. Factors causing anxiety are dominated by environmental factors such as unfavorable learning times, besides internal factors such as lack of interest in learning and lack of motivation to learn. And anxiety caused from three aspects, namely anxiety in organic chemistry learning (environment), anxiety in organic chemistry evaluation (emotions), and anxiety in organic chemistry learning achievement (assessment). All three are in the medium anxiety category. For students' anxiety levels on organic chemistry learning achievement get a percentage of 0.96% in very low anxiety, 25.96% in low anxiety, 54.81% in moderate anxiety, 15.39% in high anxiety, and 2.88% in very high anxiety. Anxiety and learning achievement have a weak correlation.

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