Research Article

Dimensions of Students Learning Styles at The University with The Kolb Learning Model

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Abstract: Someone will learn better if the person concerned understands his character in learning. Individuals in learning have various ways; some learn by listening, some learn by reading, and some learn by discovering. These diverse ways of learning by students are known as learning styles. Kolb's learning style is divided into four types, namely converge, assimilator, diverge, accommodator. The purpose of the study was to determine the profile of student learning styles of the Faculty of Engineering, Universitas Negeri Makassar, which is divided into 9 (nine) study programs. Samples taken with an error rate of 5 percent were 177 students. Purposive sampling is used as a sampling technique with special considerations so that it is feasible to be used as a sample. The research measures four types of learning styles, namely Active Experimentation (AE), Concrete Experience (CE), Reflective Observation (RO), and Abstract Conceptual (AC). The results showed that the accommodator learning style was more dominant in students. Of the eight majors that became the research subjects, seven tended to the accommodator learning style, and only one tended to the assimilator learning style. The accommodator learning style combines the poles of active experimentation (doing) and concrete experience (feeling). The use of learning methods following the learning style is Problem-Based Learning which involves all students in the learning process.

Keywords: Abstract Conceptual, Active Experimentation, Concrete Experience, Learning Process, Reflective Observation.

1. Introduction

A person's skills in learning will affect the learning outcomes obtained. Learning outcomes are several experiences students gain covering the cognitive, affective, and psychomotor domains [1]. Learning is mastery of subject theory concepts and mastery of habits, perceptions, pleasures, interests, talents, social adjustments, various skills, ideas, desires, and hopes. Learning is a process of changing human behavior or skills thanks to the interaction between individuals and individuals and individuals with their environment so that they are better able to interact with their environment [2]. Two factors influence student learning outcomes, namely: external factors and internal factors. External factors, which include the family environment, school environment, and community environment, while external factors are: learning styles, numerical abilities, intelligence, talents, interests, motivations, attitudes, and others [3]–[5].

Learning styles are an integral part of learning. Learning styles are crucial to developing performance at work, school, and interpersonal situations [6]. When you know how someone absorbs and processes information, learning and communicating become easy and fun. However, it should be realized that not everyone has the same learning style. Even though they were in school, even sitting in the same class. The level of ability of each student in understanding and absorbing lessons is different. Some are fast, some are medium, and some are slow. Therefore,

they must take different ways to capture and understand the information or lessons they receive. Every child has more than one learning style that is used to achieve his goals. If a teacher can identify students' learning styles, it will benefit the learning process. Some students prefer it when their teacher teaches by writing what is explained on the blackboard. That way, they can read it and then try to understand it. Some other students prefer their teacher to teach by conveying the material orally and listening to understand it. Even some students choose to form discussion groups because, in groups, they think that it will be easier to learn. The teacher cannot force a child to learn in the atmosphere and way he wants because each child has his or her learning style [7], [8].

Students' ability to capture material and lessons depends on their learning style. The ability of the individual concerned determines student learning outcomes. Learning outcomes are closely related to capturing, understanding, and applying their knowledge in solving existing problems. Learning style is a consistent way that is done by a student in capturing stimulus or information, remember, think, and solve problems. Not everyone has the same style. Each shows a difference, but researchers can classify them. This learning style is closely related to a person's personality, influenced by education and development history. The research results by Garcia et al. state that new students who have not received training and lessons from teachers have different backgrounds with different learning styles [9].

From the observations, many children lose their learning outcomes because they are forced to study not according to their learning style at home and school. Children will quickly master the subject matter by using their respective learning styles. DePorter & Hernacki that learning styles are the key to developing performance at work, school, and interpersonal situations. That way, learning styles influence students to absorb and process information that will affect student achievement [10].

The aspect that influences the effectiveness of the learning method is learning style [11]. The success of the learning process itself cannot be separated from student learning styles and lecturers' teaching styles. Everyone learns differently. An individual can feel pressured and frustrated if forced to learn something with a method that is not his learning style.

One learning style does not necessarily work for all individuals. If students understand their learning style, it will be easier to learn something and increase motivation to display their best abilities. From the lecturer's perspective, the more understand the student's learning style, the more likely it is to present a teaching style that suits their needs. In addition, it also allows the lecturer to help if students have learning difficulties [12], [13].

Learning styles show how an individual processes information with the aim of learning and applying it. Vermunt uses the term learning style of three domains, namely the process of cognition and affection towards the material, mental learning models, and learning orientation [14]. Learning orientation is defined as the whole domain that contains goals, intentions, motives, hopes, attitudes, and interests towards the learning process. Learning styles are consistent behavior patterns to construct knowledge that integrates with the concrete experiences or real-life of learners [15].

The following is a summary of the four learning styles based on research and clinical observation of the Learning Style Inventory (LSI) score pattern [16], [17].

a. Divergent; a combination of elements of Concrete Experience and Reflective Observation. Individuals with this learning style can see concrete situations from various perspectives. He has a wide range of cultural interests and enjoys gathering information. High social interest, tends to be imaginative, and his feelings are compassionate. Informal learning situations, he prefers to work in groups and receive personal feedback. He can listen with an open mind.

b. Assimilation; a combination of Abstract Conceptualization and Reflective Observation. This individual is skilled in processing much information and putting it into a definite and logical form. Less human-focused, more interested in abstract ideas and concepts. In general, he is more concerned with the logical superiority of a theory than its practical value. Informal learning situations, he prefers to read, teach, explore analytical models, and take the time to think things through in-depth.

c. Converging; a combination of Abstract Conceptualization and Active Experiment. These individuals are best at finding practical uses for ideas and theories. He can solve problems and make decisions effectively. Prefers to deal with technical problems and tasks rather than social and interpersonal issues. Informal learning situations, he tends to experiment with new ideas, simulations, and practical applications.

d. Accommodating; a combination of Concrete Experience and Active Experimentation. These individuals have the advantage of learning from direct experience. He loves acting and getting himself involved in new challenging situations. When faced with problems, he relies more on information from others than on his technical analysis. He prefers to work with others to complete assignments, set goals, do fieldwork, and test various problem-solving informal learning situations.

Learning styles describe the unique way an individual spiral through the learning cycle. Based on their preferences for the four different learning modes, a preferred way of choosing among them was developed due to a person's genetic makeup, specific life experiences, and the demands of today's environment. Most research on ELT focuses on the concept of learning styles using the Kolb Learning Style Inventory to assess individual learning styles. Kolb created a Learning Style Inventory (LSI) to determine a person's learning style. Learning style inventory has two purposes: an educational tool to improve individuals' understanding of the learning process from experience and their unique individual approach to learning and investigate experiential learning theories and characteristics of individual learning styles [17].
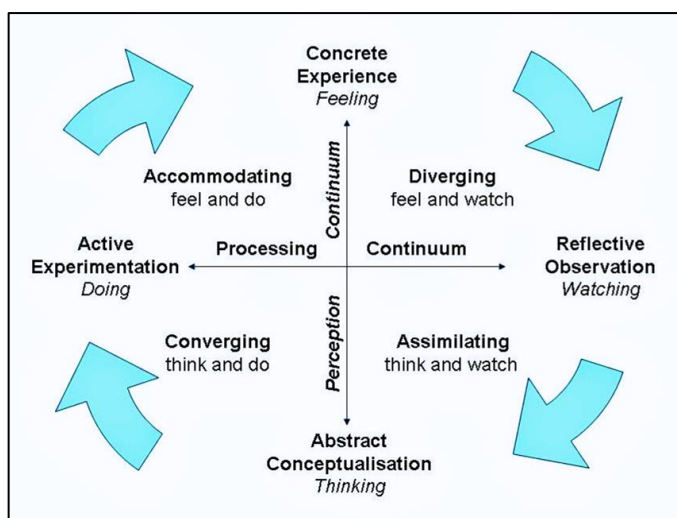

Figure 1. Kolb Learning Style Model

The picture above explains that the Concreate Experience (CE) and Reflective Observation (RO) learning styles produce diverge style students. The Reflective Observation (RO) and Abstract Conceptualization (AC) learning styles produce students with an assimilator style. The combination of Abstract Conceptualization (AC) and Active Experimentation (AE) learning styles resulted in students with a converge style. Meanwhile, Concreate Experience (CE) and Active Experimentation (AE) learning styles produce accommodator style students. This is in line with what is described by Kolb, who argues that there is no individual whose learning style is dominated by just one of these poles [17], [18].

The learning theory behind this research related to learning media is a behavioristic learning theory, where stimuli from the outside/environment affect acquiring knowledge. Thorndike suggests several laws of learning known as the law of effect. According to this law, learning will be more successful if a sense of pleasure or satisfaction immediately follows the student's response to a stimulus. The stimulus-response learning theory proposed by

Thorndike is also called connectionism [19]. This theory states that learning is essentially a process of establishing a relationship between stimulus and response.

Based on this theory, this research will analyze the use of media as a stimulus. Thorndike also stated that the quality and quantity of student learning outcomes depend on the quality and quantity of Stimulus-Response (S-R) in the implementation of student learning activities. According to Griggs, there are three primary levels of learning mode, namely direct experience (enactive), pictorial/image experience (iconic), and abstract experience (symbolic) [19]. The description above provides instructions that students should be invited to utilize all their senses for the teaching and learning process to run well. The teacher seeks to display stimuli that can be processed with various senses. The more senses used to receive and process information, the more likely the information is understood and retained in memory. Thus, it is expected that students will receive and absorb the material presented quickly and well.

2. Research Methods

2.1. Population and Sample

The population is a generalization area consisting of objects/subjects with specific quantities and characteristics determined by the researcher to study and draw conclusions. The population in this study were students of the Faculty of Engineering, Makassar State University, who were still actively studying on campus and had taken five semesters (most of the courses had been taken), totaling about 368 students.

There is no specific standard for the number of samples for qualitative research. In addition to the data collection method that uses observation, interviews, and discussions, which require a long time, it is not possible to take too many samples. As for this study, using a table for determining the number of samples from [20] provides convenience in determining the number of samples based on error rates of 1%, 5%, and 10%. With this table, researchers can directly determine the sample size based on the number of populations and the desired error rate. The sample was taken with an error rate of 5% so that a sample of 177 students of the Faculty of Engineering was obtained. Purposive sampling is used as a sampling technique with special considerations so that it is feasible to be used as a sample.

2.2. Measurement Instruments

Measurement of learning style is done using Kolb's Learning Style Inventory. This instrument contains statements in the form of multiple-choice consisting of two alternative responses. This instrument measures four

types of learning styles, namely active experimentation (AE), concrete experience (CE), reflective observation (RO), and abstract conceptual (AC). In items one to six, the response choices consist of two alternatives, namely CE and AC, while in items seven to twelve, the response choices consist of two alternatives, namely AE and RO.

This dichotomy follows Kolb's theory of learning styles, which states that CE and AC and AE and RO are bipolar learning styles so that the two types of learning styles are paired on a continuum. The scoring is done by adding up each alternative response. The combination of the four learning styles then becomes four learning styles, namely the converge dimension, the sum of AC and AE types scores, the divergent dimension (diverge), the CE and RO type scores, information absorbers (assimilator), the AC, and RO type scores and the accommodator for the sum of CE and AE type scores. A study conducted by [21] found alpha reliability of the Learning Style Inventory scale of 0.73.

Table 1. Kolb Learning Style Instruments

No.	Activities	Diverger	Assimilator	Converger	Accommodator
1	When I was studying	_ I like to engage feelings	_ I like to pay attention and listen.	_I like to think with ideas.	_I like to do things.
2	I learned my best when	_I Trust Feelings and feelings	_ I Listen and watch carefully	_ I rely on Logical thinking	_I Work hard to get things done.
3	When I was studying	_I have strong reactions and feelings.	I am calm and be careful	_I tend to ask for reasons to come out.	_I am Responsible for something
4	I learned with	_feeling	_see	_think	_Do
5	When I was studying	_I am Open to new experiences	_I Looking at problems from all sides	_I like to analyze things, divide them into parts.	_ I like to try something outside.
6	When I was studying	I am an intuitive person.	I am a quick person to observe.	_I am a logical person	_I am an active person.
7	I learned my best when	_Personal relationships	_Observation	_Rational theories	_Opportunity to try and practice
8	When I was studying	_I feel personally involved in something.	_I need much time to act.	_I like ideas and theories.	_I like to see the results of my work.
9	I learned my best when	_I rely on feelings.	_I rely on my observations.	_I rely on my idea.	_I can try something for myself.
10	When I was studying	_I am someone who wants to accept others.	I am a cautious person.	I am a rational person	I am a responsible man
11	When I was studying	_I became involved	I like to observe	_I like to evaluate something.	_I like to be active.
12	I learned my best when	_I accept with an open view	I am careful	_I analyze ideas.	I am practical

2.3. Research Procedure

This research procedure goes through the stages described in detail in the following description:

a. Research Preparation

- Conduct preliminary observations to identify and obtain data on the number of students of the 5th semester of the Faculty of Engineering.
- Develop research instruments, namely questionnaires and interview guidelines. The questionnaire to determine the dominant learning style in students was adopted from the standard questionnaire De Porter & Hernacki [10], which has been tested for reliability and used by previous researchers, which were modified in terms of structure and language.
- Validating research instruments through two kinds of validity, namely construct validity and instrument validity.
- The questionnaire was validated by conducting a search for the appropriate theory and supporting the variables studied.

b. Research Implementation

- We distribute questionnaires to determine learning styles to respondents and then analyze them to find the dominant learning style in students.

- If the questionnaire results cannot determine the dominant learning style, then a re-check is carried out to find the dominant learning style by distributing questionnaires and conducting interviews.

3. Result and Discussions

3.1. Learning Styles and Methods

Individuals with divergent styles have CE (Concrete Experience) and RO (Reflective Observation) abilities as dominant. Students with this learning style are best at seeing concrete situations from many points of view. Students with divergent learning styles have broad cultural interests and like to gather information. They are attracted to people, tend to be imaginative and emotional, have broad cultural interests, and specialize in the arts. Informal learning situations, students with divergent styles prefer to work in groups, listen with an open mind, and receive personalized feedback.

Individuals with assimilator style have AC (Abstract Conceptualization) and RO (Reflective Observation) as dominant abilities. Students with this learning style are best at understanding various information and putting it concisely, logically. Students with assimilator style focus less on people and are more interested in abstract ideas and concepts. Generally, students with this style realize that it is more important to have a logical theory than practical values. The assimilator learning style is vital for information effectiveness and a science career. Informal learning situations, students with this style prefer readings, lecturing, exploring analytical models, and having time to think things through.

Individuals with converger styles have AC (Abstract Conceptualization) and AE (Active Experimentation) dominant learning abilities. Students with this learning style are best at finding practical uses for ideas and theories. They could solve problems and make decisions based on finding solutions to questions or problems. Students with a converging learning style prefer to deal with technical tasks rather than social and interpersonal problems. These learning skills are essential for effectiveness in specialist and technology careers.

Informal learning situations, people with this style prefer to experiment with new ideas, simulations, laboratory assignments, and practical applications. An individual with an accommodator style has CE (Concrete Experience) and AE (Active Experimentation) learning as dominant abilities. Students with this learning style could learn from experience. They enjoy executing plans and involving themselves in new and challenging experiences. Their tendency may be to act on a feeling of "sense of courage" rather than logical analysis. In solving problems, individuals with an accommodator learning style rely heavily on people for information rather than their technical analysis. This learning style is vital for effectiveness in action-oriented careers such as marketing or sales. Informal learning, students with an accommodator learning style prefer to work with others to get assignments done, set goals, do fieldwork, test different approaches, and complete a project.

3.2. Dimension Learning Styles

Learning styles describe differences in learning that individuals have based on their preferences. This difference affects the ways that individuals must do so that their learning gains are maximized. This condition must be understood by the teacher so that it can organize appropriate learning. Teachers can learn effectively and create a learning environment to improve the learning process, increasing learning acquisition [22]. Some students learn in many ways, but some learn better than others [1]. From the results of the research conducted, the dimensions of learning styles were obtained as follows:
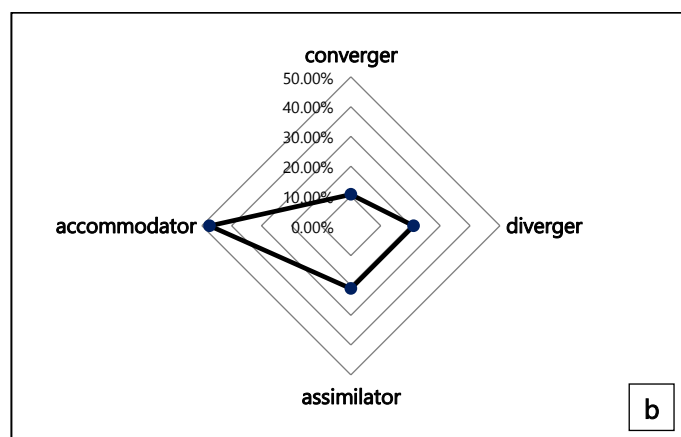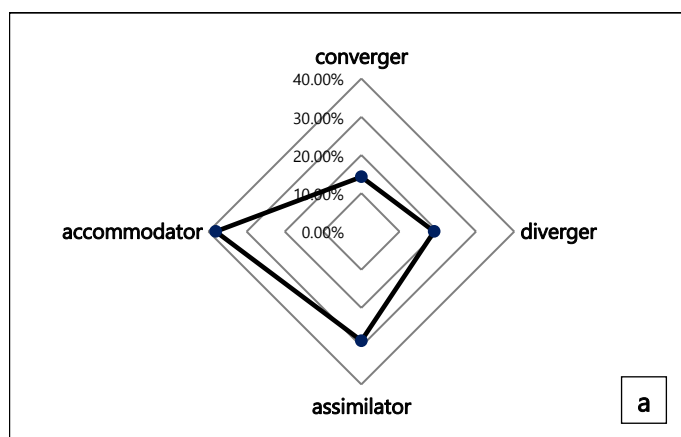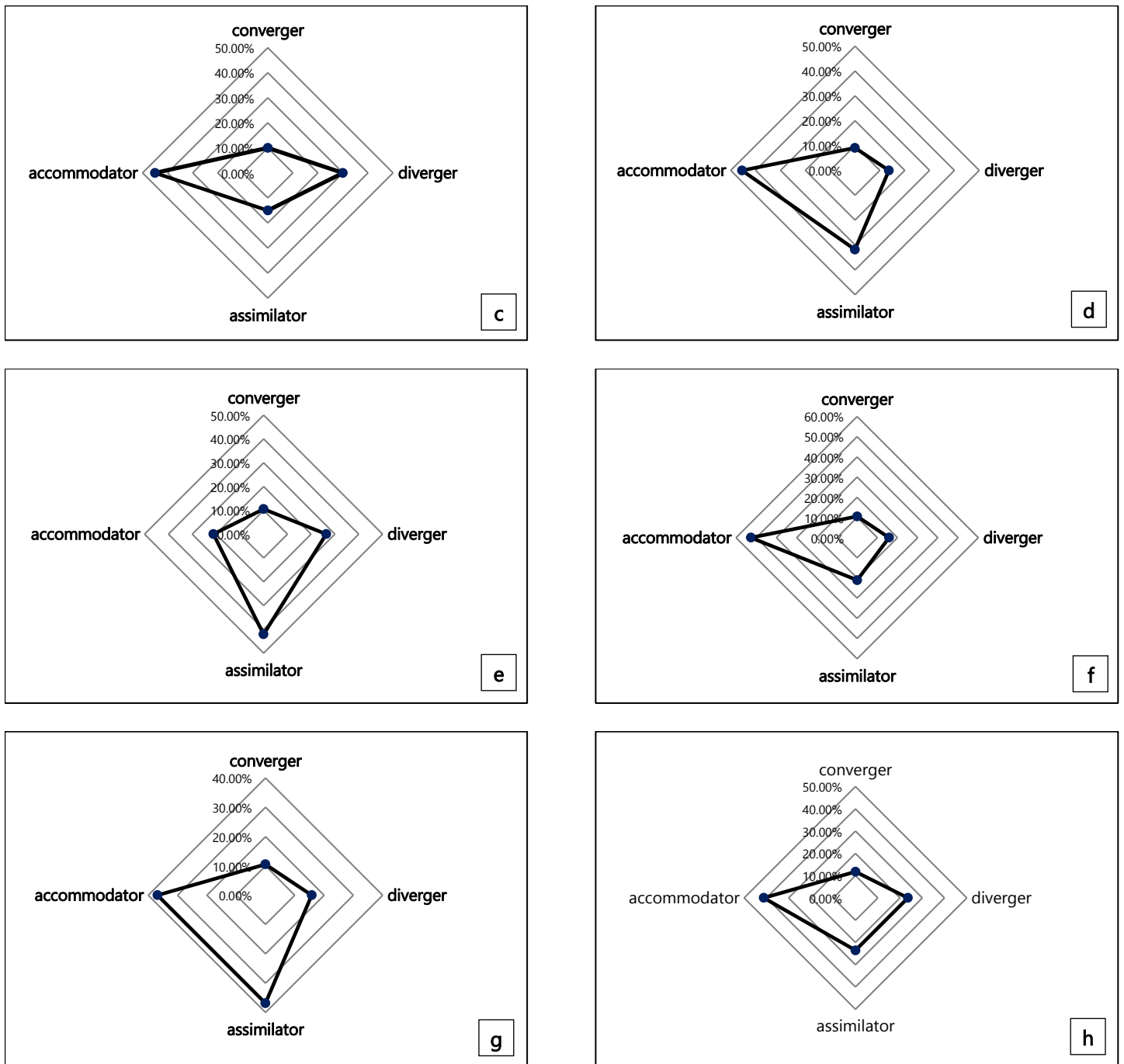
Figure 2. Dimensions of Learning Style (a) Department of Electrical Engineering; (b) Department of Mechanical Engineering; (c) Department of Electrical Education; (d) Department of Informatics and Computer Engineering; (e) Department of Civil Engineering and Planning; (f) Department of Automotive Engineering; (g) Department of Agricultural Technology; (h) Department of Family Welfare Education.

Teachers in the learning process should be able to pay attention to the characteristics of their students. One of the characteristics of students in learning that needs to be considered by the teacher is the students' learning style. Learning styles affect the effectiveness of learning and learning.

This study indicates David Kolb's learning style (diverger, assimilator, converger, accommodator) on student learning outcomes. This can be seen from the difference in the dominant value of learning styles shown in Figure 2. The difference in learning outcomes is because each student has different ways of receiving and processing information during the learning process. Based on the learning outcomes data, the accommodator learning style excels in the majority in each major. The accommodator learning style combines the poles of active experimentation (doing) and concrete experience (feeling).

Students learn through action (doing), tend to be strong in carrying out tasks, dare to take risks, and influence others through their actions. Students will appreciate his success in completing work, his influence on others, and his achievements. Students use theory to solve problems and make decisions. Kolb's experiential learning style is made up of two bipolar descriptions. The description of the first bipolar in the vertical position is a concrete experience (feeling) and abstract conceptualization (thinking) that intersects with the description of the second bipolar in a horizontal position, namely doing, observing.

Students learn through feelings by emphasizing aspects of concrete experience, being more concerned with relationships with others, and sensitivity to the feelings of others. Students involve themselves fully through new experiences, and students tend to be more open and adapt to the changes they face. In learning, students with the accommodator learning style have good learning abilities from the results of authentic experiences that they do themselves. The accommodator learning style does not prioritize analytical power as required in the Environmental Pollution material. Students with the accommodator learning style learn more from experience dealing with various pollution problems in the surrounding environment.

Students with the type of accommodator learning style usually ask what if. The role and function of the teacher that is suitable for dealing with this type of student are trying to expose students to open-ended questions, optimizing students' opportunities to learn and explore things according to their choice. The use of the Problem-Based Learning Method is more suitable for this fourth type of student.

Problem-based learning is defined as a learning model that involves students in an activity (project) to produce a product [23]. Student involvement starts with planning, designing, implementing, and reporting the results of product activities and reports on their implementation [24]. This learning model emphasizes the long-term learning process. Students are directly involved with various issues and problems of daily life, learn how to understand, and solve real problems, are interdisciplinary, and involve students as the main actors in designing, implementing, and reporting results of activities (student-centered).

This learning model aims to encourage students to learn through various real problems in everyday life that are associated with the knowledge they have learned or will learn [25]. The problem-based learning model's problems are not "ordinary" problems or just "practice." Problems in PBL require an explanation of a phenomenon.

The focus is on how students identify learning issues and then look for alternative solutions.

Methods and strategies are often used interchangeably to explain the same meaning. Learning methods are referred to as methods used under certain conditions to achieve the desired learning outcomes. Meanwhile, learning strategies are referred to as structuring ways so that a sequence of steps can be realized that can be used to achieve the desired results.

4. Conclusion

Two students who grow up in the same environment do not necessarily have the same understanding, thoughts, and views on the world around them by receiving the same treatment. They will have a different perspective on every event they see and experience. For teachers, by knowing each student's learning style, they can apply appropriate techniques and strategies, both in learning and in self-development. Only with proper implementation will the success rate be higher. A student must also understand the type of learning style. Thus, he can know himself better and know his needs. The introduction of learning styles will provide the exemplary service for what and how it should be provided and done so that learning can occur optimally.

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