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Exploring the Relationship between Visual Learning Styles and Learning Outcomes in Limnology Course: A Quantitative Descriptive Study

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ABSTRACT

The objective of this study is to examine the correlation between learning styles and student learning outcomes in the Limnology course within the Biology Education Study Program at FKIP UNTAD, during the odd academic year of 2021/2022. The present study employs a quantitative descriptive research methodology. The data was obtained by administering a learning style questionnaire consisting of 23 items to a sample of 30 students enrolled in the Biology Education Study Program at FKIP UNTAD. The data analysis was conducted using the Product Moment correlation test. The findings of the research indicate that during the odd semester of the 2021/2022 academic year, all students enrolled in the Limnology elective course exhibited a preference for visual learning. Nevertheless, a diminished correlation was observed in relation to the association between learning styles and student learning outcomes. The results of this study make two distinct contributions to the current body of literature. The present study describes a taxonomy of participant learning styles, making anticipatory projections based on analogous investigations. Furthermore, this study investigates the influence of different learning styles on the achievement of learning objectives. Moreover, this study incorporates demographic data to control for its impact on educational achievements. The examination and interpretation of the findings from both analyzes will enhance scholarly comprehension of the essential determinants of success in the learning process and their tangible implementation in the field of Limnology education.

1. INTRODUCTION

The government introduced an online learning policy in 2019, which mandated students and education staff to acquire proficiency in utilising online learning support applications. Subsequently, in 2020, a new policy was implemented, commonly referred to as the "new normal," which was met with great enthusiasm from the majority of students and education staff. The aforementioned policy event does not inherently involve in-person lectures, although in-person learning may be conducted by adhering to specific government-imposed requirements. Nevertheless, the majority of educational institutions and their respective campuses continue to employ online or remote learning methods. A government policy has been implemented to promote a rigorous learning approach aimed at enhancing students' comprehension of its application (Salsabilah et al., 2020).

The role of student education is crucial in the learning process as it aims to engage and empower students to comprehend the entirety of the taught material. The government has implemented initiatives to attain national educational objectives (Agni et al., 2020). However, the prevailing circumstances, wherein online learning necessitates students and education personnel to engage in remote instruction, pose challenges in maintaining the high standards and quality of education (Gusmaweti, 2021). The acquisition of knowledge is a fundamental entitlement inherent to all individuals. The region in Indonesia where the right to education is guaranteed for every child up to 12 years is not specified (Anshori & Khaerati, 2020).

The government has effectively ensured the fulfilment of students' right to education, resulting in a significantly low occurrence of students failing to complete their 12-year educational journey. Nevertheless, variations in economic circumstances, individual character, behavioural tendencies, and personal traits have the potential to influence the learning preferences and styles of each individual learner. Each individual possesses unique characteristics that influence their learning process and ultimately determine the outcomes they achieve in their educational pursuits. Education enables individuals to transform their attitudes, mindsets, behaviours, and self-development in a manner that is advantageous to them. Nevertheless, numerous students encounter difficulties in the process of learning that are shaped by both internal and external factors. Internal factors refer to factors that originate from within students, and one such factor is their learning style (Mulyani, 2018). The concept of learning style refers to the amalgamation of various methods employed to process, assimilate, and comprehend information. In the study conducted by Mulyani, it was found that various external factors have an impact on learning styles (Mulyani, 2018). These factors include body attitude, light, learning process, sound, temperature, seating, and physical environment. Teaching and learning activities play a crucial role in both the education system and higher education. The evaluation of the effectiveness of an educational process often hinges on the extent to which a student demonstrates proficiency in engaging with teaching and learning endeavours. The implementation of an effective pedagogical approach holds the potential to yield favourable outcomes in terms of productivity and achievement (Buntu et al., 2020).

Limnology is a course offered as an elective in the Biology Education Study Programme at FKIP UNTAD. This course is typically offered during the odd semesters, specifically in the fifth semester. Limnology is an elective course that pertains to the study of aquatic ecosystems and their impact on the biota inhabiting them. Living organisms require access to freshwater for various essential activities, including but not limited to bathing, drinking,

irrigation, transportation, hydropower generation, and numerous other purposes. Recognising the significance of the course, the author endeavours to enhance the educational resources utilised in the limnology course in order to attain the desired learning outcomes.

Nevertheless, it is important to note that not all students exhibit active engagement in the learning process, as there exists a subset of individuals who prefer the lecture-based instructional approach. This phenomenon can be attributed to the fact that each student possesses a unique learning style. Therefore, it is imperative for students to acknowledge and identify their individual learning styles in order to facilitate the process of knowledge acquisition. In addition to students, it is imperative for lecturers to acknowledge the diverse learning styles exhibited by their students. This awareness enables educators to develop appropriate instructional strategies, particularly in the context of biology education, with the aim of optimising student learning outcomes (Chania et al., 2017).

Learning outcomes refer to the specific abilities and skills that students acquire as a result of engaging in the process of learning. Learning outcomes play a crucial role in the process of education. The significance of learning outcomes lies in their ability to demonstrate the level of achievement in learning and the extent to which learning objectives have been met. The learning outcomes were derived from the assessment of the subjects' academic pursuits (Chania et al., 2017). Learning style is a student characteristic that exerts an influence on their learning outcomes. The concept of learning style refers to the strategies employed by students during the process of acquiring knowledge, either individually or collaboratively, which engender a sense of engagement and interest in the learning process.

The aforementioned description pertaining to the learning styles and learning outcomes of students presents a challenge for educators in making generalisations about students' abilities due to the diverse range of learning styles exhibited by students. Individuals often opt for a learning style that aligns with their personal preferences in order to facilitate comprehension of the subject matter. By doing so, they aim to enhance their learning outcomes and successfully attain their educational goals. It is imperative to possess an understanding of learning styles prior to engaging in the process of instruction. Researchers will conduct a study on the identification of relationships between learning styles and learning outcomes among biology education students in the context of the "new normal" period, specifically focusing on Limnology courses.

2. METHOD

Research Methodology

The present study employs a quantitative approach, specifically utilizing a quantitative descriptive design.

Population and Sample

The population under study comprises the students enrolled in the Biology education program at FKIP UNTAD, totaling 162 individuals who are divided into 5 distinct classes. The sample utilized in this study was obtained from the entire population through the application of a purposive sampling technique. The primary selection criteria for the sample population consist of students enrolled in the Limnology course during the 2021/2022 academic year, specifically in the odd semester, and taught by the identical instructional team. The sample size consisted of 30 students, as determined by the specified criteria.

Instruments for Data Collection

Instruments for Data Collection:

- Survey Instrument: In this study, a questionnaire utilizing a Likert scale was employed to gather data pertaining to the visual, audio, and kinesthetic learning styles, which serve as the dependent variables.
- Methodology: The researchers employed observation techniques to gather data pertaining to student learning outcomes, which were identified as the dependent variable in this particular study.
- Documentation serves as a means of gathering information pertaining to student learning outcomes.

Data Analysis

The process of examining and interpreting data in order to extract meaningful insights and draw conclusions.

- The validity and reliability of the questionnaire will be assessed through data analysis.
- Normality and Homogeneity Test: Following the acquisition of questionnaire data, an assessment will be conducted to determine whether the data adheres to the assumptions necessary for the subsequent statistical analysis. This evaluation will involve conducting normality and homogeneity tests.
- Correlation Analysis: Following the assessment of normality and homogeneity, the data will undergo a correlation analysis employing the Product Moment test. This analysis aims to ascertain the association between visual, audio, and kinesthetic learning styles and student learning outcomes.

3. RESULTS AND DISCUSSIONS

The purpose of the normality test is to demonstrate that the sample is drawn from a population that follows a normal distribution (Chania et al., 2017). The statistical test employed to assess normality in this study is the Shapiro-Wilk test, and it was conducted using SPSS 25.0 software. The determination of normality in the research data can be ascertained by examining the significance value of 5% (0.05). If the p-value exceeds 0.05 ($p > 0.05$), it can be inferred that the data follows a normal distribution. If the p-value is less than 0.05 ($p < 0.05$), it indicates that the data does not follow a normal distribution. Upon conducting statistical testing, the obtained significance value was determined to be 0.200, which surpasses the predetermined significance level of $\alpha > 0.05$. Therefore, it can be inferred that the learning outcomes pertaining to the field of limnology exhibit a normal distribution.

The purpose of the homogeneity test is to demonstrate that multiple sample data groups are derived from populations with equivalent or homogeneous variance (Silaban & Napitupulu, 2011)**.**. The process of analyzing the test employs the utilization of SPSS 25.0 software. The process of interpretation involves the selection of a statistical measure, specifically the mean-based statistics. If the obtained significance value is greater than the predetermined alpha level of 0.05, it can be concluded that the variances in each data group are homogeneous. Conversely, if the obtained significance value is less than the alpha level of 0.05, it can be concluded that the variances in each data group are not homogeneous. Upon conducting statistical analysis, the obtained test results yielded a significance value of 0.901, surpassing the predetermined significance level of $\alpha > 0.05$. Therefore, it can be inferred that the learning outcomes pertaining to the field of limnology exhibit a consistent or uniform variance.

The data collected in this study was analyzed using the SPSS application for Windows version 25.0, specifically employing the Product Moment correlation test to evaluate the study's hypothesis. The obtained r value will serve as a reference for comprehending the interpretation of the correlation between learning styles and learning outcomes among students enrolled in the Biology Education Study Program at FKIP UNTAD. This correlation specifically pertains to the limnology course offered during the odd semester of the 2021/2022 academic year. If the obtained r count from the results of the correlation test indicates a value of less than 0.000, it can be inferred that there is no discernible relationship between the two variables. The study found a negative correlation coefficient of -0.378 between learning styles and learning outcomes of the research subjects. This correlation was statistically significant, as indicated by a two-tailed significance value of 0.039. Based on the observed data, it can be inferred that there exists a correlation between learning styles and student learning outcomes. The Pearson correlation coefficient, which is -0.378, suggests a negative relationship. Furthermore, the obtained p-value of 0.039, which is less than the significance level of 0.05, indicates that this relationship is statistically significant.

Learning style refers to an individual's preferred approach to acquiring knowledge, which is tailored to their personal preferences and comfort levels. This enables students to effectively process and comprehend the necessary information. Additionally, there exist learning styles that are predicated upon sensory modalities. The prevailing approach frequently employed involves the utilization of learning styles centered around sensory modalities, specifically visual, auditory, and kinesthetic learning styles (Irham, 2017). The learning style of students is a factor that impacts their learning outcomes. Consequently, educators can utilize knowledge of students' learning styles as a framework for designing instructional approaches that align with their individual preferences.

The findings from the researcher's data analysis indicate that the predominant learning style among 30 students enrolled in the biology education study program at FKIP UNTAD, specifically in the limnology elective course, is visual learning. The findings of this study indicate that all research participants possess a visual learning style, as evidenced by the 100% prevalence rate. In their study, the most suitable learning style for students pursuing biology education, finding that the visual learning style is predominant Titin (2018). This particular learning style exhibits a predominant emphasis on visual perception. The utilization of a visual learning style involves the engagement of the visual senses, such as observation, drawing, demonstration, and reading of various forms of media. Individuals with a preference for visual learning tend to find it more conducive to their learning process to engage with prominent visual stimuli, which may manifest in the form of vibrant colors, distinct lines, and various shapes. Children with a visual learning style rely on direct observation of the teacher's body language and facial expressions in order to comprehend the subject matter (Chania et al., 2017).

The incorporation of a visual learning style is highly beneficial for students pursuing biology education, particularly those engaged in programming Limnology courses. This course necessitates students to engage in direct observations or practical fieldwork in order to analyze inland water ecosystems. According to (Suwono 2011), students demonstrate favorable learning outcomes when engaging in limnology courses due to their ability to conduct research, observe, and identify environmental issues. As a result, students are equipped with the skills to effectively anticipate and predict problems pertaining to inland waters. The visual learning style places emphasis on the ability of students to effectively

absorb information through direct observation or visual stimuli (Titin 2018). Furthermore, the utilization of technology for retrieving visual references, such as images and videos pertaining to the subject matter, renders this source appropriate for accommodating visual learning preferences. The utilization of visual learning style involves the utilization of visual senses, such as observing, drawing, demonstrating, and reading learning media, as outlined by (Ma'rifah et al., 2019).

The findings of the study examining the learning styles of biology education students enrolled in limnology courses demonstrate a lack of variation. It is commonly believed that students possess only one learning style, specifically the visual learning style. This particular learning style is highly compatible with the curriculum designed for students enrolled in the program. This information proves to be highly beneficial for educators, as it facilitates the effective facilitation of the learning process. This research can serve as a valuable resource for educators, providing them with a foundation for developing instructional strategies that align with the diverse learning styles of students. By incorporating various learning methods, approaches, media, and techniques that facilitate the learning process, educators can create a more effective and tailored learning experience for their students (Ardila et al., 2015).

Furthermore, the researcher gathered additional data indicating that the correlation between visual learning styles and learning outcomes demonstrated a weak or low association. This suggests that while learning styles may have some influence on learning outcomes, the relationship between the two variables is not particularly strong. The author posits that this phenomenon is attributed to students who fail to utilize their authentic learning style. The weak correlation between learning styles and student learning outcomes can be attributed to various factors, including teachers, students, and research errors. According to Nurnaifah, there are additional factors that exert an influence on the association between learning styles and learning outcomes (Nurnaifah 2022). These factors encompass learning resources, learning environment, learning media, interests, and motivation.

Significant factor contributing to the relationship between learning styles and learning outcomes is the discrepancy between the teaching methods employed by instructors and the diverse range of learning styles exhibited by students (Chania et al., 2017). In addition, students may fail to employ a learning style that aligns with their individual characteristics. Many individuals tend to imitate the learning styles of others without being aware of their own specific learning style requirements. When considering the research perspective, the reason for this oversight can be attributed to the failure to initially analyze the learning styles of students prior to conducting research. Numerous reasons and research findings assert a significant correlation between learning styles and student outcomes. However, the present study yielded contrasting results. However, the presence of varying research outcomes provides valuable insights for researchers. Furthermore, researchers serve as evidence to support established theories. While numerous studies have demonstrated a significant impact of learning styles on learning outcomes, it is important to acknowledge the potential existence of exceptions.

4. CONCLUSION AND SUGGESTION

The study's findings indicate that the learning style exhibited by all participants in the research sample is predominantly visual. The findings from the correlation analysis indicated a minimal association between learning styles and learning outcomes among students enrolled in the limnology elective course within the Biology Education Study Program at FKIP

UNTAD. Based on the findings of this study, it is recommended that various stakeholders consider the following implications: In order to enhance students' comprehension of their learning style, it is imperative for them to acquire knowledge and insight into this aspect. In order to enhance educators' comprehension of student learning styles, it is imperative to adapt instructional approaches to align with the teacher's own learning style. In order to enhance familiarity among the campus community regarding student learning styles, it is imperative to prioritize the allocation of resources towards the development and maintenance of facilities that effectively support the learning process.

Researchers can provide guidance on the preparation of research projects by emphasizing the need for specificity in the chosen research topic. Furthermore, it is recommended to align the learning outcomes document with the objectives of the course under study. Additionally, researchers should consider increasing the sample size to enhance the reliability and validity of the findings.

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