



Identification of Informatics Engineering Student Learning Styles in the Independent Learning Era

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Abstract

This study aims to analyze the characteristics of student learning styles based on visual, auditory and kinesthetic learning styles as well as the characteristics of learning styles based on the surrounding environment. The research method uses descriptive qualitative. The research sample was using a random technique so that the total sample was 43 students. The instrument of this research is a questionnaire with 3 indicators of visual, auditory and kinesthetic as well as how the role of the surrounding environment in determining student learning styles. Supporting instruments using interview techniques. The data analysis technique used descriptive statistics and qualitative descriptive analysis. Based on the results of the study, it is known that the identification of student characteristics on learning styles is seen from visual learning styles (28%), auditory (31%) and kinesthetic (41%). Characteristics of learning styles in the form of environmental identification based on student interaction are learning alone (23%), studying with others in a calm state (28%) and learning with others by doing something (49%). Identification of the environment based on outdoor learning places is 77% and the percentage of indoor learning is (23%). Based on the identification results, the majority have the habit and desire to learn outside the classroom in developing their competencies, this is in line with the heutagogy learning strategy, namely independent learning, developing their own learning strategies, developing theoretical and practical materials together with people or groups who can work together.

Keywords: learning style, independent learning

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1. INTRODUCTION

Learning can affect the process of thinking skills and behavior change. Learning that runs optimally, can provide a pleasant learning atmosphere and create behavioral changes (Azmi, 2015; Londa, Mete, & Sadipun, 2018). Learning has a role in changing one's behavior as a result of interaction with the environment (Koerniawan & Kholifah, 2016; Rijal & Sofiarini, 2019). Learning is a process or interaction between teachers and students, there is a mutual process so that it is expected to be able to achieve learning objectives (Romadhoni & Relmasira, 2018; Suryani, 2013). Effective learning by using the right procedures has the benefit of helping students to learn (Erina & Kuswanto, 2015; Supriadi, 2017). Learning activities for students carried out at universities are various, this is adjusted to the characteristics of students and the characteristics of the course.

Students have high intelligence, intelligence in thinking and planning before acting. Students have the ability to always think and have complementary principles, student characteristics in the form of direct experience can support effective learning (Ghofur & Raharjo, 2018; Tafonao, 2018). The importance of knowing the characteristics of students is aimed at identifying understanding in learning. Identification of student characteristics includes initial understanding, cultural background, experiences and student learning styles (Rahayu & Samsudin, 2019; Rochman, 2013). One of the student characteristics that need to be identified is learning style. Learning styles are in the form of behavior in receiving new information, then developing new information and storing information (Naldi & Susanti,

2018; Sahimin, 2017). Learning style is the strategy that chosen to determine one's ability, in addition, learning style can be interpreted as a combination of the process of absorbing information and processing information (Henri, Syamsurizal, & Syaiful, 2018; Permatasari, 2015). Students have different learning styles, so lecturers must be able to pay attention to these differences.

Communication between lecturers and students is built since the initial meeting of the lecture, lecturers also need to know the learning styles of students so that it is easier to carry out learning strategies. Bringing the learning strategy closer to the characteristics or habits of students in learning, lecturers can find out the preferred student learning atmosphere. In self-determined learning, lecturers and students at the beginning of the lecture meeting or in filling out a learning contract exchange ideas regarding the basic material to be studied or mastered, how the agreed learning steps are in class (Agustina & Hariyadi, 2018; Wibisono, 2012). Meanwhile, students can develop their abilities or competencies outside the classroom or outside the campus. Students can develop learning resources used to achieve learning goals. In this heutagogy concept, the positions of lecturers and students as learners and facilitators are complementary in learning (Siregar & Manurung, 2020; Sutrisno, 2017).

Based on the results of observations made to first semester Informatics Engineering students at UIN Sunan Kalijaga Yogyakarta, it is known that first semester students have the ability to cooperate with peers as partners in gaining knowledge and learning experience, but not a few students also use time to study lecture material independently. In this initial observation, some students have difficulty in receiving information or lecture material so that it is difficult to achieve competence, in this case students must repeat the material content when the practice will be carried out so that the achievement of competence is not maximized. On the other hand, some students have been able to understand the concept of the material, so that students find it easy to continue with the next theory and are able to develop theoretical concepts when they want to carry out practical activities. There are differences in the achievement of various material concepts. The same problem was also found by (Darmawan, 2014; Purbosari, 2016), in his research he found the problem that lecturers did not know the tendencies and understanding of characteristics, especially student learning styles. Based on this gap in understanding the concept of students, it is important to know student learning styles and to determine the methods and learning strategies used in learning. Students already have their own learning styles, it's just that one style will dominate.

A person's learning style can be interpreted as the easiest and fastest way to absorb information in learning (Hakim & Sarbiran, 2004; Sakti, Hairunisya, & Sujai, 2019). Students of the Guidance Counseling study program have a tendency to one of the learning styles, both visual learning styles, auditory learning styles, and kinesthetic learning styles (Maharani, 2012; Wijanarko, Supardi, & Marwoto, 2017). Visual learning style focuses on the strength of vision in learning (Cahyaningsih, Siswanto, & Sukanto, 2020; Jatmiko, 2015). Individuals with visual learning styles have the characteristics of speaking louder, able to make more strategic and planned and systematic planning. The auditory learning style usually talks a lot while working, the characteristics that arise are being easily distracted by noise or a noisy atmosphere, reading aloud, having difficulty writing things, and preferring to listen than read alone (Fitri, 2020; Suryaman, 2015). Kinesthetic learning style is using tools as a means of exchanging information (Farihatun & Rusdarti, 2019; Kusumah, Walid, Pitaloka, Dewi, & Agustriana, 2020). A person with a kinesthetic learning style has the characteristics of responding to physical attention, touching others to get attention, learning through hands-on practice, and memorizing things by walking (Hapsari, Sumantri, & Astra, 2019; Sanjaya, Wati, & An'nur, 2013).

Aspects that affect the way of learning include physical, emotional, sociological and environmental factors (Sumarsono, 2020). Everyone's learning style is a combination of environmental aspects, in the form of sound, light, temperature, design. Emotional aspect in the form of motivation, tenacity of responsibility. Social aspect include learning styles alone, in pairs, groups. Physical aspect which include perspective, input, time and Psychological aspects which include brain, global or analytical and impulsive or reflective (Hadinata, Utaya, & Setyosari, 2017; Setyowati, Susilo, & Masrukan, 2016).

This research is supported by several relevant studies, namely the first research conducted by (Henri et al., 2018), obtaining research results that the independent co-op co-op learning model affects problem solving abilities in terms of learning styles. The two studies conducted by (Sakti et al., 2019), obtained research results that teacher pedagogic competence and student learning styles affect student learning achievement. The three studies conducted by (Permatasari, 2015), obtained research results that parenting patterns, learning styles, and motivation affect student achievement. The purpose of this study was to determine the characteristics of the first semester Informatics Engineering students' learning styles based on visual, auditory and kinesthetic learning styles and to determine the characteristics of students' learning styles based on the surrounding environment. In this study, the identification of the environment that will be carried out is not all aspects will be measured, but only certain aspects which include the identification of environmental aspects based on interactions that occur with other people and based on places to learn. The results of this study can be very important for managers of study programs and teaching staff in carrying out variations in learning strategies. Besides also doing various types of learning media such as online campus e-learning media. Maximizing the role of lecturers in the use of campus e-learning for learning, assignment and evaluation of learning. This is important to do considering the results of the study show that there is a distribution of student learning styles, the majority of which are kinesthetic and study in an open environment (outside campus).

2. MATERIALS AND METHODS

The research methodology used is descriptive qualitative. Descriptive research design which includes research procedures or steps based on the characteristics of each activity with real conditions (Defiyanti & Sumarni, 2019; Kristiantari, 2015). Qualitative descriptive research methods are carried out to describe processes, work steps, certain characteristics, images, styles, and so on (Liu, 2019; Putra, Maula, & Uswatun, 2020). Research methods that use objects naturally, research results emphasize meaning (Dardiri, Mujiyono, & Ichwanto, 2017; Wirawan, 2016). The research population is all students of Informatics Engineering in the first semester of UIN Sunan Kalijaga Yogyakarta. The research sample was using a random technique so that the total sample was 43 students. The instrument used in this study was a learning style questionnaire consisting of 3 indicators in terms of visual, auditory and kinesthetic learning styles as well as the role of the surrounding environment in determining student learning styles. The supporting instrument is by interview. The instrument in the form of a questionnaire was used to collect data by providing a statement in the form of points and then filled in by the respondent, the questionnaire used in this study was a closed questionnaire. Supporting data is by interview. Instruments are validated based on content and logical validation. The data analysis technique used descriptive statistics which was strengthened by qualitative descriptive analysis. Data using percentage calculations are used to compare the frequency of each answer in the questionnaire.

3. RESULTS AND DISCUSSION

Results

The result of this study is to convey the research process by looking at the data on 43 respondents who came from first semester students of the Informatics Engineering Study program to find that the tendency of learning styles in terms of visual, auditory and kinesthetic learning styles is on kinesthetic indicators. Furthermore, the process and steps of the research are discussed, namely, questionnaire analysis of learning style identification seen from visual, auditory and kinesthetic indicators with 43 students as respondents. The data can be presented in Table 1.

Table 1. Identification of Informatics Engineering Study Program Students

Learning Style Indicator	Frequency	Percentage (%)
Visual	12	28
Auditorial	13	30,2
Kinesthetic	18	40,8
Jumlah	43	100

The results of the identification of learning styles as presented in Table 1, show a tendency to dominate or have more kinesthetic indicators than other indicators such as visual and auditory. The graph of the percentage identification of the learning styles of first semester informatics engineering students can be presented in Figure 1..

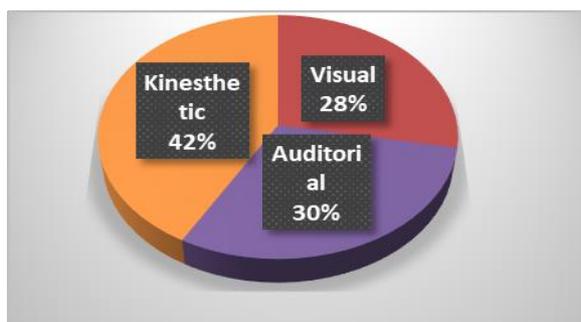


Figure 1. Percentage Graph of Identification of Learning Styles for First Semester Informatics Engineering Students

From the graph presented in Figure 1, it generally shows that students' learning styles in absorbing learning information in general are using vision, hearing, and body movement sensors. The highest percentage is the kinesthetic indicator with a percentage of 41%. The results of this study provide information to lecturers or lecturers, that the use of various learning methods and strategies can touch mixed aspects where the whole must touch all students with diverse learning styles. The application of learning methods to adapt to auditory learning styles by giving lectures and recording or audio media is only 31% likely to be absorbed by students. Likewise, the use of methods and strategies that touch the visuals by presenting powerpoints and videos, only absorbs 28% of students. The application of effective learning methods and strategies will provide direct experience and is expected to achieve learning objectives. If at this time the implementation of learning in the Informatics Engineering study program in semester one only uses lectures and powerpoint delivery, as well as discussions, so it is necessary to apply new methods so that learning is more optimal. The results of the study are supported by research results (Naldi & Susanti, 2018; Sahimin, 2017), the characteristics of student learning styles are dominated by kinesthetic learning

styles, based on these results a learning approach that can accommodate the characteristics of kinesthetic learning styles through movement, body activities, emotions and best memorize information by associating the movement with each fact.

In an effort to improve the quality of learning and delivery of lecture material as a whole, it is necessary to add more varied learning methods and models by balancing aspects of diverse learning styles. The results of the study by looking at the highest percentage is kinesthetic so that first semester Informatics Engineering students have the ability to accept learning by taking actions, for example by doing practical work directly and using visual aids based on the theory that has been studied. Students have a tendency to have physical contact and a lot of movement, preferring to take action and practice something (Mustika & Ain, 2020; Suhendar & Ekayanti, 2018). Some learning support media with a kinesthetic learning style tendency are the facilities owned by the study program in the form of adequate multimedia computers, network computers, intelligent computer systems. Learning media uses online e-learning which can be used for asynchronous learning so that it helps in implementing practical activities as an effort to support learning (Herliana & Anugraheni, 2020; Widiana, Rendra, & Wulantari, 2019). The next student characteristic is auditory learning style with a percentage of 31%. Auditory learning style is more sensitive by using the sense of hearing in doing learning. Some students with a tendency to auditory learning style by listening. The most important sense is the ear. Students will focus and concentrate when reading aloud. Supporting learning media for the tendency towards auditory learning styles is video showing with certain sounds, rhythms and tones. In learning, various video examples can be presented to facilitate the tendency of auditory learning styles (Armadi & Astuti, 2018; Astuti, Sumarni, & Saraswati, 2017).

Students with visual learning styles are 28%. The characteristics possessed by students with visual tendencies are that they prefer to read and are very strong in everything they see. Understanding lecture material by reviewing writing, understanding commands by starting with reading, and staying concentrated when the surrounding atmosphere is busy. Learning media that can be used are presentations using colorful writing, pictures, graphics, slides and showing actions using doodles (Afandi, 2015; Ernasari & Amboro, 2017).

Based on the above analysis, lecturers as educators must be sensitive to differences in student learning style tendencies. Furthermore, it can assist students in identifying their respective learning styles and assist students in facilitating media and its use to support learning. The next analysis is to identify the student learning environment with the learning style possessed by each student. The identification of the environment is seen from the interaction of students and the role of the atmosphere and the comfort of the place as a supporter. Based on student interaction, identification was carried out using a questionnaire and supported by interviews. The results of the data obtained are divided into two, namely the identification of interactions which include how students do learning more likely to be alone, together with other people in a calm state and together with others by doing something. The following are the results of the analysis conducted by students, which can be presented in Table 2.

Table 2. Environmental Identification (Interaction) for First Semester Informatics Engineering Students

Interaction	Frequency	Percentage (%)
1. Alone	10	23
2. Together with others in a calm state	12	28
3. Together with others by doing something	21	49
Jumlah	43	100

Based on Table 2 it can be seen that the identification of the environment based on student interaction is learning together with others by doing something has the highest percentage of 49%, while studying together with others in a calm state is 28% and learning alone with a percentage of 23%. The graph of the percentage of environmental identification (interaction) of informatics engineering students can be presented in Figure 2. The large percentage of students who choose to study together with other people is in accordance with the results of interviews which explain that students tend to like to discuss with colleagues, students interact together with friends to solve problems in learning. The activities that students do are to share experiences in understanding the material during the learning process (Linuwih & Sukwati, 2014; Wahyuni, 2018). Some courses are suitable for discussion and collaboration between students. The activity of asking each other was also carried out by students on understanding material that had not been understood during lectures, so that students used the time to find information outside of class time by asking friends. The next identification of the environment is a place for student learning. This analysis is carried out by looking at how students are more focused and concentrated when they are in a comfortable condition to study. The analysis was carried out by distinguishing between outdoor and indoor learning places. The following are the results of environmental identification based on where students study. The identification is presented in Table 3.

Table 3. Identification of the Environment (Learning Place) for First Semester Informatics Engineering Students

Learning Place	Frequency	Percentage (%)
Outdoor	33	77
Indoor	10	23
Jumlah	43	100

Based on Table 3, it can be seen that the largest percentage is when students study outdoors with a percentage of 77% and indoor learning is 23%. This result is very significant to know that most students choose the outdoors as a place to study. The graph of the percentage of environmental identification (study places) for first semester informatics engineering students can be presented in Figure 3. Environmental identification data based on the place of study was further strengthened by the results of interviews. Students who choose to like the outdoors to study are meant that students have a tendency to seek information outside of lectures by studying learning materials in open places such as parks and gazebos around the campus. Outdoor learning activities provide a new atmosphere in learning. Understanding some students who use time outside of class hours to discuss and complete assignments by choosing a place in an open area through online e-learning media (Dewi, 2020; Yunitasari & Hanifah, 2020). Identification of students who choose indoor learning activities are students who choose to use their study time in libraries and laboratories. Indoor activities provide comfort for students to understand lecture material. Based on the identification that has been carried out in this study, analytical activities in the form of identification of learning styles and identification of the environment provide information to educators to be more selective in applying learning methods. Identification of learning styles and identification of the environment that has been carried out can be useful for effective and efficient learning to take place (Henri et al., 2018; Sakti et al., 2019).

Based on the identification results, the majority of Informatics Engineering new students have more habits and desires to learn outside the classroom than students study in the classroom. The follow-up and consequences of learning outside the classroom are that students explore, test programming practice, do trial and error n learn, students want to do independent learning that is centered on themselves by exploring experiences with people or

study groups around them, with their friends. The desired atmosphere is a relaxed open environment while discussing problem solving. In essence, students prefer to do independent learning. This is in line with the heutagogy learning strategy, namely independent learning, developing their own learning strategies, developing theoretical and practical materials together with people or groups through a discussion process (Nursa'ban, 2013; Prameswari, 2018).

A recapitulation of the Informatics Engineering student data of each individual which is then accumulated as a whole to describe a general description of his learning style, as done by (Henri et al., 2018; Sakti et al., 2019), prosedur analisis untuk mengidentifikasi the analytical procedure to find student learning styles carried out to students that it is easy for lecturers to determine models, media and strategies in implementing learning. This research is supported by several relevant studies, namely the first research conducted by (Henri et al., 2018), obtaining research results that the independent co-op co-op learning model affects problem solving abilities in terms of learning styles. The two studies conducted by (Sakti et al., 2019), obtained research results that teacher pedagogic competence and student learning styles affect student learning achievement. The three studies conducted by (Permatasari, 2015), obtained research results that parenting patterns, learning styles, and motivation affect student achievement. The implication of this research is that it can maximize the role of lecturers in the learning process, assignment and evaluation of learning. This research is important because the results of the study show that there is a distribution of student learning styles, the majority of which are kinesthetic and study in an open environment (outside campus).



Figure 2. Graph of Environmental Identification (Interaction) Percentage of Informatics Engineering Students

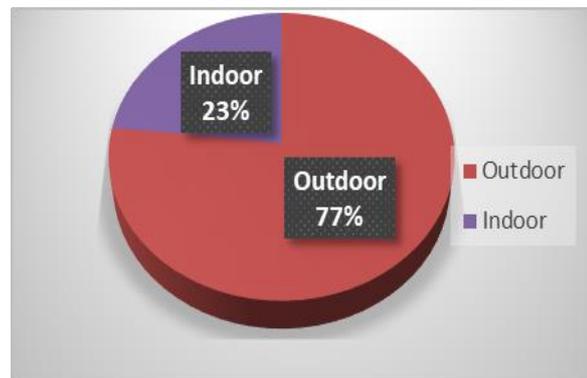


Figure 3. Graph of Environmental Identification Percentage (Place of Study) for First Semester Informatics Engineering Students

4. CONCLUSION

This study concludes that students prefer to learn outside the classroom using learning aids as well as with independent study groups. Students have very diverse learning styles and have different learning needs. However, from the results of this study, the tendency of students to have a kinesthetic learning style and carried out outside or outside the classroom, the authors hope to further test the extent of academic success, inhibiting and supporting factors in conducting independent learning or heutagogy for the next semester. The importance of conducting further research that is broader to students of all generations.

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