STUDENT PREFERENCES ON TYPES OF LEARNING MODELS RELATED TO HUMAN AND OUTER SPACE MATERIALS

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**Abstrak**

Penelitian ini menerapkan penggunaan metode penelitian eksperimen. Secara umum, penelitian eksperimen ini memiliki karakteristik meliputi: manipulasi dan pengamatan. Jenis desain penelitian yang digunakan adalah pre experimental design sedangkan analisis data menggunakan analisis atas varians melalui jenjang dua arah Friedman. Metode ini diterapkan guna menentukan ada atau tidaknya perbedaan nilai yang signifikan pada beberapa kelompok populasi. Melalui perhitungan, nilai khai-kuadrat adalah 8.10. Karena nilainya lebih besar daripada nilai khai-kuadrat dalam tabel sebesar 7.815, maka hipotesis nihil ditolak dan hipotesis alternative diterima. Dengan demikian dari sudut model pembelajaran dapat disimpulkan bahwa para siswa memiliki perbedaan preferensi yang signifikan terhadap keempat model pembelajaran terkait dengan materi manusia dan angkasa luar. Pada kondisi ini, para siswa menilai bahwa keempat model pembelajaran memiliki tingkat kelebihan dan kekurangan dalam pembelajaran yang berbeda sehingga preferensi mereka terhadap keempatnya juga berbeda.

**Kata kunci: manusia dan angkasa luar, model pembelajaran, preferensi**

**Abstract**

*This study applies the use of experimental research methods. In general, this experimental research has the following characteristics: manipulation and observation. The type of research design used is pre experimental design, while data analysis uses analysis of variance through the two-way Friedman level. This method is applied to determine whether or not there are significant differences in values ​​in several population groups. By calculation, chi-squared value is 8.10. Because the value is greater than chi-square value in the table of 7.815, the null hypothesis is rejected and the alternative hypothesis is accepted. Thus, from the point of view of the learning model, it can be concluded that students have significant differences in preferences for the four learning models related to human and outer space materials. In this condition, the students considered that the four learning models had different levels of advantages and disadvantages in learning so that their preferences for the four were also different.*

***Keyword: humans and outer space, learning models (CIRC, CTL, CORE, CL), preferences***

**Introduction**

Teaching and learning activities if understood more deeply is a process of communication. The communication process (message delivery process) must be created or realized through the delivery and exchange of messages or information by each teacher and student (Yudasmara & Purnami, 2015). With the development of these learning activities, it is hoped that the expected learning model will be formed. The learning model in question is a form of learning that is able to provide an overview from beginning to end which is presented specifically by the teacher in class (Andriani, 2017).

Students must form in their minds the construction of knowledge, because basically knowledge cannot be separated into separate facts or proportions, but reflects skills that can be applied (Marlina et al., 2011). Warta (2008) also revealed that learning science with a contextual approach, namely by utilizing students' initial experience in learning science can help students construct subject matter, as well as learning by doing can increase student participation actively involved in learning. John Dewey in the results of his research on contextual learning concluded that students will learn well if what is learned is related to what is known, both activities and events that occur around them (Ibrahim, 2018). This learning emphasizes high thinking power, transfer of knowledge, collecting and analyzing data, solving certain problems both individually and in groups (Khusniati, 2012).

Kotler and Keller argue that preference is an attitude towards a product choice that is formed through evaluation of the various options available. Meanwhile, according to Frank, preference is the process of ranking all things that can be consumed with the aim of obtaining a preference for a product or service. Another opinion was expressed by Ha Mi Tah, according to him preference is the level of individual liking or disliking of a certain type. Based on the statements above, it can be concluded that preference is a person's tendency to choose an object based on his desires, interests, and level of preference. Related to the definition of learning model, it is understood that the learning model is a pattern that is applied as a reference in planning learning in class or tutorial learning. The stages that are arranged include the learning approach that will be applied, including touching the teaching objectives, steps or steps in learning activities, classroom management, and the learning environment (Afandi et al., 2013).

So it was found that in essence the learning model is an important component in learning. There are several reasons for the importance of developing learning models, namely: a) effective learning models are very helpful in the learning process so that learning objectives are more easily achieved, b) learning models can provide useful information for students in the learning process, c) variations in learning models can giving students a passion for learning, avoiding boredom, and will have implications for the interests and motivation of students in participating in the learning process, d) developing a variety of learning models is very urgent because of differences in characteristics, personalities, habits of students' learning ways, e) the ability of lecturers/teachers to use learning models also varies, and they are not limited to only certain models, and f) demands for professional lecturers/teachers to have the motivation and spirit of renewal in carrying out their duties/profession (Asyafah, 2019). In this study, the learning model applied as a stimulus or treatment includes CIRC (Cooperative Integrated Reading and Composition), CTL (Contextual Teaching and Learning), CORE (connecting, organizing, reflecting, extending), and (CL) Cyclus Learning.

The CIRC (Cooperative Integrated Reading and Composition) method is a cooperative method that focuses on developing students' reading and writing skills. In practice this method helps students in understanding a reading in groups. Each group member exchanges ideas with other friends, so that students are active in learning activities (Ulfa, 2015; Supriyadi, 2018). The CIRC model of cooperative learning actively involves interpersonal intelligence, teaches students to be able to work well with others, encourages collaboration (cooperation), compromises and deliberation to reach agreements and in general prepares them to enter the world of personal relationships (Eviliyanto & Gultom, 2017).

While the CTL learning model is a series of learning in the form of a comprehensive system. This system is composed of buildings whose components are interconnected with each other and the parts are inseparable, it will produce an effect that exceeds the results given by the separate parts (M et al., 2019). Meanwhile, Yolanda (2014) states that CTL learning is a learning concept where the real world is shown and presented by the teacher in the classroom and the teacher encourages students to create a relationship between the knowledge possessed and its application in their daily lives, while students acquire knowledge and skills from a limited context little by little and from the process of constructing themselves as a provision to solve problems in their lives as members of society. Learning that is carried out through the Contextual Teaching and Learning (CTL) model is expected to be able to change the way students learn (Nurhidayah et al., 2015), which has been waiting for information from the teacher to meaningful learning to find their own concepts of the material being studied, it is hoped that the quality of the process and student learning outcomes will be better (Susiloningsih, 2016).

The CORE learning model (connecting, organizing, reflecting, extending) is a learning model that emphasizes students' thinking skills to connect, organize, explore, manage, and develop the information obtained (Nasution & Samosir, 2018). Activities linking old concepts/information with new concepts/information students are trained to remember old concepts/information and use old concepts/information to be used in new concepts/information. Activities organize ideas students are trained to organize, manage the information that has been obtained. Reflection activities are deepening activities, digging information to strengthen the concepts that they already have. In the activity of developing information, students are trained to develop, expand the information that has been obtained and use it to find new concepts and information (Trisnowali & Aswina, 2019). Because in learning students are asked to build and increase their knowledge to obtain information, students also carry out activities by exploring the information obtained to be developed more widely with their groups, and students play an active role so that learning becomes meaningful (Luksiana & Purwaningrum, 2018).

The learning cycle is a science teaching approach developed by Robert Karplus (Carin, 1994) for the science learning curriculum improvement program (SCIS). Research shows that through the learning cycle students understand science concepts better and can apply their knowledge in life because students are not only given the opportunity and time to explore natural phenomena but directly students have the opportunity to interact with experienced teachers in serving learning and provide feedback from questions posed by students. Learning with the learning cycle model will be meaningful if the teacher is able to provide direct experience, so that students will actively know how to learn.

The learning cycle model is oriented to natural events, relationships, or principles involving several concepts. The learning cycle provides students with concrete experiences with the aim of developing conceptual understanding. This model consists of three stages, namely Exploration (exploration), Invention (concept introduction), and Discovery (concept application). The purpose of this learning model is to help develop students' thinking patterns from concrete to abstract thinking (or from concrete to formal). The learning cycle is a great strategy for teaching science at junior and senior secondary levels because this teaching model is flexible and places realistic needs on both teachers and students (Liana, 2020).

Based on the above background, this study aims to provide an overview of students' preferences for types of learning models related to human and outer space materials. This material includes how humans began to enter a new area, namely outer space. Humans go on adventures to space because it is the last limit that must be crossed. Space is now an exciting arena where pioneers can make new discoveries and explore unknown areas.

**Methods**

The method used in this research is experimental research. Frenkel et al. (2012) said that "Experimental research is one of the most powerful research methodologies that researchers can use. Of the many types of research that might be used, the experiment is the best way to establish cause-and-effect relationships among variables”. In general, the characteristics of experimental research in this study include: manipulation and observation. The type of research design used is pre-experimental design because this design is not yet a real experiment. This is because there are still external variables that also influence the formation of the dependent variable. So, the experimental results which are the dependent variable are not solely influenced by the independent variable. This happens because there is no control variable and the sample is not chosen randomly.

The research design used is the one-shot case study design, the paradigm in this study is illustrated as follows:

X O

**Figure 1. The One-Shot Case Study Design**

Information:

X = treatment given (independent variable)

O = posttest (observed dependent variable

Meanwhile, data analysis used analysis of variance through Friedman's two-way level. This method is applied to determine whether or not there are significant differences in values in several population groups. Through this method, the sample data is arranged in a two-way table consisting of a number of rows and columns. Rows represent objects and columns represent conditions or impacts caused by certain treatments on objects. Data regarding the condition of each object or the impact caused by certain treatments to the object are arranged in the form of levels or ranks.

**Results and Discussion**

Manipulations carried out in this experimental research are in the form of: the researcher manipulates the independent variable by giving treatment. The treatment aims to achieve what the researcher expects in the research. The independent variables that were manipulated in this study included: learning models/methods and teaching materials.

Teaching materials given as treatment (humans and outer space) are as follows:

1. Timeless Style

Humanity's most ancient and ever-present friend is gravity. Gravity is the central force that guides our lives, determines the years of the planets and shapes the structure of the universe. The invisible spokes of this timeless style reach the limitless expanses of outer space. All objects in outer space whether stars, galaxies or parts of rockets must obey the laws of gravity. There is no exception, neither stones thrown into the air, nor the eruption of stars.

2. Circular and The Orbit Time

The orbit time is the time it takes for a satellite to complete one rotation around the earth, determined by the radius of the circle of the orbit. The position of a satellite is shown in an enlarged orbital. Because air resistance slows the object down, its maximum height or apogeum drops faster than the perigium. Eventually the orbit becomes circular and further deceleration causes the satellite to circle in toward the earth.

3. Humans in a Orbit

A major issue involved in orbital flight is concerned with the safety of astronauts during the perilous moments, during ascent and re-entry. If it is in orbit, the astronaut is in a relatively safe condition, provided that the life-sustaining system runs perfectly. But on ascending and reentering it faces far greater dangers due to the many possible failures of the propulsion, control and brake devices.

4. The Moon

One thing that experts agree on is that the moon is an arid place, which has no water on its surface. The absence of water on its surface and the lack of an atmosphere make the moon an open body. This means that the moon maintains the integrity of its past, unchanged by the destructive forces of rain, wind, and water flow. On the moon you will find, if you can read it, records for billions of years.

5. Satellite usage

The number of artificial moons, around the earth, is increasing rapidly. Many of these orbiters, which are fired into near-Earth space, have pathways that will keep them in orbit for decades and even centuries. With the life of most electronic devices relatively short, the satellites in their orbits quickly move from the active group to the dead group. By "active" is means the satellites that have a power source and broadcast signals. While the word "dead" is used to describe a distribution device that can no longer carry out its duties.

6. The sun and the stars

The interplanetary flights are governed with an iron fist by the force of the sun's gravity, which reaches great distances and determines the motion of all objects in the solar system. The sun holds command over the planetary family because of its mass. The sun is 332,000 times heavier than the earth and 743 times heavier than the entire family of nine planets. The sun is not only a great center of gravity for the solar system. The sun is a giant heat engine precisely balanced to liberate in an orderly fashion the elemental energy. By studying the sun we can understand more about other stars that are further away from the earth.

Learning Models used in Experimental Manipulation

1. Cooperative Integrated Reading and Composition (CIRC)

The CIRC learning model includes activities that lead to one type of cooperative learning model where the learning phase combines reading activities with other activities, such as writing, discussion, and presentation in an integrated manner. The stages of CIRC learning in this study include:

**Table 1. Stages of Cooperative Integrated Reading and Composition**

|  |  |
| --- | --- |
| Phase | Description |
| Partner Reading | The teacher divides the students into several reading groups (reading partners) consisting of 2-3 people |
| Story Structure and Related Writing | The teacher provides reading material containing material that must be understood by students |
| Words Out Loud | Students read the reading material aloud so that other students can listen carefully |
| Word Meaning | Students look for keywords or meanings contained in the reading material given |
| Story retell | Students retell their reading findings |
| Reflection | Reflection |

2. Contextual Teaching and Learning (CTL)

Contextual Teaching and Learning or contextual learning is a learning that seeks so that students can explore their abilities by studying concepts while applying them to the real world around the student's environment. As stated by Johnson (2002), that contextual learning is a system that stimulates the brain to compose patterns that connect academic content with context in everyday life so as to produce a meaning.

This learning emphasizes the use of higher order thinking, knowledge transfer, collection, analysis and synthesis of data from various sources and perspectives, as well as an evaluation system that emphasizes authentic assessment obtained from various sources and its implementation is integrated with the learning process (Lestari & Yudhanegara, 2017). The stages of learning in the applied CTL.

**Table 2. Stages of Contextual Teaching and Learning**

|  |  |
| --- | --- |
| **Phase** | **Description** |
| Grouping | Students are grouped into several heterogeneous groups |
| Modeling | Focusing, motivation, and delivery of learning objectives |
| Questioning | Includes exploration, guiding, guiding, instructing, directing, developing, evaluating, inquiring, and generalizing |
| Learning Community | The learning activities carried out involve a certain social group (learning community). This learning community plays a very important role in the learning process because in it there is an interaction process in which all students actively participate in group study, work on questions, and share knowledge and opinions. |
| Inquiry | Includes identification, investigation, hypothesis, conjecture, generalization, and discovery activities |
| Constructivism | Students build their own understanding, construct rule concepts, and perform analysis and synthesis |
| Authentic Assessment | Assessment during the learning process and after learning, assessment of each student activity, and portfolio assessment |
| Reflection | Reflection on the learning process carried out |

3. Connecting, Organizing, Reflecting, Extending (CORE)

CORE is a learning model that has a design to construct students' abilities by connecting and organizing knowledge, then rethinking the concepts being studied. Through this learning, students are expected to be able to expand their knowledge during the learning process. The stages of the CORE learning model are:

**Table 3. CORE Learning**

|  |  |
| --- | --- |
| **Phase** | **Description** |
| Connecting | Connections of old and new information between topics and concepts, connections between other disciplines, and connections with students' daily lives |
| Organizing | Organization of ideas to understand the material |
| Reflecting | Rethink, explore and dig |
| Extending | Develop, extend, discover and use |

4. Cyclus Learning (CL)

Cyclic learning is a student-centered learning model. The cycle in question is a series of activity stages that are organized in such a way that students play an active role in mastering the competencies that must be achieved in learning objectives. The cyclical learning model was first introduced by Robert Karplus. The learning cycle is one of the learning models with a constructivism approach consisting of five stages, namely:

**Tabel 4. Cyclic Learning Stages**

|  |  |
| --- | --- |
| **Phase** | **Description** |
| Engagement | The teacher tries to arouse and develop students' interest and curiosity about the topic to be taught. This is done by asking questions about factual processes in everyday life (related to the topic of discussion). |
| Exploration | Students are formed into small groups of 2-4 students, then given the opportunity to work together in small groups without direct learning from the teacher. In this group, students are encouraged to test hypotheses and or create new hypotheses, try alternative solutions with a group of friends, conduct and record observations and ideas or opinions that develop in the discussion. At this stage, the teacher acts as a facilitator and motivator. Basically, the purpose of this stage is to check the knowledge that students have whether it is correct, still wrong, or maybe partly wrong, partly right. |
| Explanation | Teachers are required to encourage students to explain a concept with their own sentences/thoughts, ask for evidence and clarification of student explanations, and listen critically to each other's explanations between students or teachers. |
| Elaboration | At this stage, new experiences are designed to help students build a broader understanding of the concepts that have been explained. Students expand the concepts they have learned, make connections with other related concepts, and apply their understanding in the real world. Students work cooperatively, identify, and complete new activities. At this stage, the teacher expects students to use the definitions, identifications, and explanations given previously, encouraging students to apply or expand concepts and skills in new situations. |
| Evaluation | Teachers can observe students' knowledge or understanding in applying new concepts. Students can conduct self-evaluation by asking open-ended questions and seeking answers using observations, evidence, and explanations obtained previously. The results of this evaluation can be used by the teacher as an evaluation material about the process of implementing the cyclical learning model that is being applied, whether it is running very well, good enough, or still lacking. Likewise, through self-evaluation, students will be able to identify deficiencies or progress in the learning process that has been carried out. |

Observations and measurements were made by the researcher after the treatment was given for a certain period of time to determine the effect of the manipulation/treatment given to the variables studied. Observations were made through data collection. The conclusion to be ascertained from this study is related to whether or not there are significant differences in students' preferences for the four learning models related to human and outer space materials.

The following is a description of the respondents involved in the research

**Figure 2. Description of Respondents by Gender**

Based on the data obtained in this study, the respondents who were included in the research sample consisted of 6 female respondents and 4 male respondents.

After the data collection activity through distributing questionnaires to students was carried out, the data on students' preferences was simplified in a table. Several values in the Likert scale range are the basis. Within the range of the Likert scale applied in this study, each value has a different meaning. In more detail, the meaning of each value is explained in the following table.

**Table 5. Students’ Preference Score Scale**

|  |  |
| --- | --- |
| **Mark** | **Mean** |
| 1 | Really Dislike |
| 2 | Dislike |
| 3 | Neutral |
| 4 | Like |
| 5 | Like Very Much |

The data on the preferences expressed by the students towards the four learning models related to human and outer space are shown in the following table.

**Table 6. Preference Values Expressed by Students**

|  |  |
| --- | --- |
| **No** | **Level Value for Learning Model** |
| **CIRC** | **CTL** | **CORE** | **CL** |
| 1 | 5 | 4 | 2 | 3 |
| 2 | 3 | 4 | 5 | 1 |
| 3 | 3 | 4 | 5 | 3 |
| 4 | 1 | 3 | 4 | 4 |
| 5 | 2 | 3 | 3 | 2 |
| 6 | 1 | 3 | 4 | 2 |
| 7 | 4 | 5 | 4 | 5 |
| 8 | 5 | 5 | 4 | 4 |
| 9 | 4 | 2 | 1 | 4 |
| 10 | 3 | 3 | 4 | 5 |

Some of the procedures carried out in testing the hypothesis of this study include:

Formulating the hypothesis, in essence the null hypothesis states that students do not have a significant difference in preferences for types of learning models related to human and outer space materials. Meanwhile, the alternative hypothesis states that students have significant differences in preferences for the four learning models related to human and outer space materials. The formulation of the two hypotheses in this study are:

H0 : The students do not have a significant difference in preferences for the four learning models related to human and outer space materials

H1: The students have a significant difference in preferences for the four learning models related to human and outer space materials.

Determining a certain level of significance, in this study, the level of significance is determined at 5%. The number of learning models is 4. Thus, the degrees of freedom are 3 (4 – 1). From the table, chi-squared value for the 5% significance level and the 3rd degree of freedom is 7.815. Chi-squared value of 7.815 is the basis for the formulation of the test criteria and the final conclusion in the description of this study.

In formulating the test criteria, chi-square value in the table is known to be 7.815. Based on this value, the applicable testing criteria in the description of this study is that the null hypothesis is accepted if

$$X\_{r}^{2} \leq 7,815$$

And the null hypothesis will be rejected if

$$X\_{r}^{2}>7,815$$

Calculating chi-square value, if the hypothesis testing procedure through Friedman's two-way level has reached this stage, chi-square value must indeed be calculated. However, before that some steps must be taken. One of them is counting the number of levels. The calculation steps that must be taken to determine chi-square value are briefly shown in the table. Grade values are assigned to sample members in each row.

**Table 7. Calculation of the Number of Preference Levels of Students**

|  |  |
| --- | --- |
| **No** | **Level Value for Learning Model** |
| **CIRC** | **CTL** | **CORE** | **CL** |
| 1 | 1.50 | 3.50 | 3.50 | 1.50 |
| 2 | 2 | 3 | 4 | 1 |
| 3 | 1.50 | 3 | 4 | 1.50 |
| 4 | 1 | 3 | 3.50 | 3.50 |
| 5 | 1.50 | 3.50 | 3.50 | 1.50 |
| 6 | 1 | 3 | 4 | 2 |
| 7 | 1.50 | 3.50 | 1.50 | 3.50 |
| 8 | 3.50 | 3.50 | 1.50 | 1.50 |
| 9 | 3.50 | 2 | 1 | 3.50 |
| 10 | 1.50 | 1.50 | 3 | 4 |
| R | 18.50 | 29.50 | 29.50 | 23.50 |

Through the calculations in the table above, the total number of levels in the first (R1), second (R2), third (R3), and fourth (R4) sample groups is 18.50, 29.50, 29.50, 23.50. Then chi-squared value is found by applying the calculation through the formula. In the description of this study, the magnitude of chi-squared value is

$$X\_{r}^{2}= \left[\frac{12}{\left(n x k\right) x \left(k+1\right)} x \sum\_{j=1}^{k}\left(R\_{j}\right)^{2}\right]- \left[\left(3n\right) x \left(k+1\right)\right]$$

$$X\_{r}^{2}= \left[\frac{12}{\left(10 x 4\right) x \left(4+1\right)} x \left(18.50^{2}+ 29.50^{2}+ 29.50^{2}+ 23.50^{2}\right)\right]- \left[\left(3 x 10\right) x \left(4+1\right)\right]$$

$$X\_{r}^{2}= \left[0.06 x 2635\right]- \left[150\right]$$

$$X\_{r}^{2}= \left[158.10\right]- \left[150\right]=8.1$$

**Conclusion**

The final conclusion in this study can be formulated by comparing the chi-square value in the table with the calculated chi-square value and aligning it with the existing test criteria. Through the above calculation, the chi-squared value is 8.10. Because the value is greater than the chi-square value in the table of 7.815, the null hypothesis is rejected and the alternative hypothesis is accepted. Thus, from the point of view of the learning model, it can be concluded that students have significant differences in preferences for the four learning models related to human and outer space materials. In this condition, the students considered that the four learning models had different levels of advantages and disadvantages in learning so that their preferences for the four were also different.

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