ISSN: 0974-5823 Vol. 7 No. 1 January, 2022

International Journal of Mechanical Engineering

The Practicality of the Developed Ber2P3 Learning Model

1st* Supartin, 1st Mursalin, 1st Frida Maryati Yusuf, 1st Masri Kudrat Umar
[1]Gorontalo State University, Indonesia

Abstract - The purpose of this research is to produce a practical Ber2P3 learning model. The development of learning tools in this study uses the ADDIE model, which consists of 5 stages of development, namely analysis, design, development, implementation and evaluation. This research was conducted at the Faculty of Mathematics and Natural Sciences, State University of Gorontalo. The results showed that the analysis of the implementation of learning with the Ber2p3 learning model showed that there was consistency between the classification of learning during the limited trial and the extended trial. The implementation of learning with the Ber2P3 learning model in both the limited trial and the extensive trial is categorized as high and very high so that the Ber2P3 learning model can be categorized as a practical learning model.
Keywords: - Ber2P3 learning, Learning Model, Practicality.

INTRODUCTION

Science is knowledge obtained through learning and proof or knowledge that includes a general truth of natural laws that occur, for example, obtained and proven through the scientific method. describe and explain phenomena that occur in nature. Furthermore [1] explained that learning science is an ideal way to acquire competencies such as skills, maintain attitudes and develop concepts related to everyday experience. Concepts are defined as tools used to organize knowledge and experience into various categories [2]. Mastery of concepts is an understanding that not only remembers the concepts that have been studied, but is also able to re-express them in other forms or in their own words so that they are easy to understand, but do not change the meaning [3].

Science learning in schools tends to emphasize memorizing concepts in the learning process, so that there are students who use rote learning to overcome learning difficulties. The students do have some knowledge, but that knowledge can only be obtained from the teacher without them being able to find the concept of their own knowledge. Mastery of concepts is an activity related to the cognitive domain in accordance with Bloom's classification, namely knowledge, understanding, application, analysis, synthesis, and evaluation. In Bloom's taxonomy, at the application level, analysis, synthesis and evaluation contain elements of problem solving. Mastery of concepts is important for every student to have after carrying out a lesson. If students have the ability to construct the meaning of learning materials in the form of oral, written, graphic, and understanding based on their prior knowledge, then in learning students can be said to have understood a concept. Furthermore, [4] stated that students entering the classroom actually already have their respective prior knowledge, but the knowledge they have in the form of basic concepts comes from students' experiences with their environment. Several previous studies have shown that students' mastery of concepts and scientific reasoning is still low [5] [6]. Lack of student preparation before starting learning, dominant assessment of mathematical calculations, and appropriate learning, causes students' mastery of concepts to be low [6].

To overcome this problem, we need a learning model that is specifically designed to foster students' critical thinking skills based on constructivism. Based on the descriptions above, it is necessary to conduct an in-depth study of the implementation of lectures on the concept of elasticity and Hooke's law. Therefore, the development of the lecture model is very necessary to be done in order to improve the quality in the lecture process to produce better physics teacher candidates. In this study, researchers developed a Predic, observation, and explanation (POE) and Think-talk-write (TTW) learning model to train physics students' science process skills on the concept of elasticity and Hooke's law.

The POE model is a model that is able to bring students to predict a situation and experience events that are predicted directly by themselves, so that they are able to explain a situation definitively. then observe what is discussed and this becomes the spirit for students to complete their curiosity about a concept. One of the efforts to improve learning outcomes is to use a variety of models or methods. Based on the findings of [7] science learning in schools tends to be monotonous which is dominated by the application of conventional methods.

A way is needed to overcome the problems above that can change the learning atmosphere in a direction that is more likely to allow students to be more actively involved in it. One of the actions that need to be taken is to apply a learning model that makes students interested in participating in learning. It is possible to overcome this by using the Ber2P3 learning model. With this model, it is expected to improve science process skills. The Thinking, sharing, observing, exposing, reporting learning model (BER2P3) was developed from the POE learning model and the TTW learning model, which consists of six main steps; namely

(1) predict students make guesses, (2) observed students make observations, (3) explain students explain, (4) think students think, (5) talk students talk, (6) write students write.

Based on the results of previous studies that have proven the effectiveness of the POE learning model and the TTW learning model, among them is [8] who concludes that the POE learning model can improve creative thinking skills on pressure material. In line with that, research conducted by [9] on the POE learning model affects students' cognitive learning outcomes on respiratory system material. Then based on the results of [10] showed that the TTW learning model can also increase students' mastery of concepts in heat material. In line with that, research conducted by [11] shows that the TTW learning model can improve students' communication skills on material and its forms. Meanwhile, based on the research results of [12] learning physics using the POEW model can improve students' critical thinking skills on temperature and heat material. In line with that, research conducted by [13] POEW learning model can improve understanding of concepts and students' motivation to learn on the material pressure in liquids.

Based on the descriptions above, it is necessary to conduct an in-depth study of the implementation of lectures on the concept of Hook's law and elasticity. Therefore, the development of learning models is very necessary to do in order to improve the quality in the lecture process to produce better physics teacher candidates. In this study, researchers will develop a Ber2P3 model to improve learning outcomes and process skills of prospective physics teachers on the concepts of Hooke's Law and Elasticity in students of the Mathematics and Natural Sciences Faculty of the State University of Gorontalo

METHODS

The development of learning tools in this study uses the ADDIE model, which consists of 5 stages of development, namely analysis, design, development, implementation and evaluation. This research was conducted at the Faculty of Mathematics and Natural Sciences, State University of Gorontalo. The research instruments used in this study were Validation Sheets, Observation Sheets, Mastery of Concepts (learning outcomes) and response questionnaires. Data analysis techniques in this study include data analysis of Ber2P3 Model Validation, Learning Model Reliability Data Analysis, Item Sensitivity, Model Practicality Analysis, Test Data Analysis, N-Gain and Completeness Analysis, Student Activity Data Analysis.

RESULTS AND DISCUSSION

1. The Practicality of the Ber2P3 Model

Observations on the results of the Ber2P3 model management were carried out on two main indicators of the Arends learning model, namely syntax and learning environment. The first indicator that is observed is the implementation of the syntax of the learning model. The syntax of the Ber2P3 model consists of thinking, sharing, observing, exposing and reporting. While the second indicator is the learning environment of the Ber2P3 learning model. The observed learning environment is the classroom atmosphere and time management. The class atmosphere consists of: student enthusiasm in learning, lecturer-student interaction/communication, student-student interaction, the tendency of the student-centered learning process and finally managing time, which only consists of one aspect, namely time according to the allocation of learning time. The highest score for observations is given a number 5 and the lowest is 1. The implementation of the Ber2P3 learning model during teaching and learning activities is observed using the implementation observation sheet. The results of observations of the Ber2P3 learning model are categorized into two, namely limited trials and broad trials.

2. Limited Trial Results

The average percentage of learning management observations based on the Ber2P3 model is shown in Table 1.

TABLE 1

Observations On The Implementation Of The Limited Trial Ber2p3 Model

No	Observed Aspects	Average Percentage of Score Per Meeting					
	Syntax	Lawsuit. 1	Desct.	Lawsuit. 2	Desct.	Lawsuit. 3	Desct.
		Value		Value		Value	
1	Think	76,19	T	83,33	ST	80	T
2	Sharing Information	100	ST	100	ST	100	ST
3	Observation	77,78	T	83,33	ST	88,89	ST
4	Exposure	81,82	ST	80	T	85,19	ST
5	Reporting	66,67	T	77,78	T	88,89	ST

Description T = Height, ST = Very high

The observation results of the observer in the limited trial showed that the initial activity in the problem orientation phase, the interaction between lecturers and students was more dominant than the students. Some students gave responses to the phenomena presented by the lecturer, while others seemed doubtful and did not dare to respond to these phenomena. At the observation stage, most students chose to use a written guide compared to other options. This shows that so far the observation activities carried out by students with instructions on experimental steps have been available in writing. Students are not used to compiling procedures (experimental steps) independently. A small part of the other group chose to follow the experimental modeling by the lecturer in making observations.

Another comment from the observer relates to the implementation time of observation activities, the exposure takes quite a long time. This results in reporting activities that take a long time. The reporting stage is carried out by providing assistance to students in the form of reporting formats from the beginning of the learning stage.

After making improvements for the first meeting, the results of these improvements are applied to the next meeting. Lack of reporting syntax in the previous meeting can be resolved and run more normally. Likewise in the second trial, during the meeting some students seemed hesitant in responding to phenomena or problems. This is possible because of the psychological factors of students at the initial meeting with different learning models and materials. Through the activity of presenting interesting phenomena, students are motivated not to hesitate in responding to problems related to phenomena presented both orally and in writing. At the first meeting, some groups chose to use the help of a writing format that was stiffened in the observation phase, while others preferred lecturer modeling.

The second meeting of the students showed a bolder attitude in responding to the phenomena presented by the lecturer, both in writing and orally. At this meeting the observer's observations showed that students had difficulty in observing activities, and this took longer than the existing time allocation and had an effect on the overall time allocation. In the second experiment, the lecturer's improvement step was to first model all groups so that at the time of observation the students were able to do it independently. At the second meeting, most of the groups used assistance with modeling, the other half asked to use a written guide.

The results of observations at the third meeting of students were more daring in responding to phenomena presented by the lecturer either orally or in writing. In conducting observations, some groups have carried out experimental steps using previous experiences. At the next meeting, it was improved for lecturer activities to motivate students to be more active in all stages and provide equal opportunities to all groups and individual students, so that all syntax can be implemented properly.

3. Extensive Trial Results

Extensive trials for the Ber2P3 model were carried out at the Chemistry Education Study Program, Faculty of Mathematics and Natural Sciences, State University of Gorontalo. The results of the implementation of this activity are used to determine the level of practicality of the learning model. The average percentage of observations on learning management for classes A and B based on the Ber2P3 model is shown in Tables 2 and 3

TABLE 2

Observations On The Implementation Of The Ber2p3 Model For Study Program Pend. Chemistry Class A Fmipa Gorontalo State University

No	Observed Aspects	Average Percentage of Score Per Meeting					
	Syntax	Lawsuit. 1	Desc.	Lawsuit. 2	Desc.	Lawsuit. 3	Desc.
		Value		Value		Value	
1	Think	85,71	ST	88,89	ST	86,67	ST
2	Sharing Information	100	ST	100	ST	100	ST
3	Observation	83,33	ST	88,89	ST	94,44	ST
4	Exposure	84,85	ST	90	ST	88,89	ST
5	Reporting	77,78	T	88,89	ST	88,89	ST

TABLE 3

Observations On The Implementation Of The Ber2p3 Model For Study Program Pend. Chemistry Class B Fmipa Gorontalo State University

No	Observed Aspects	Average Percentage of Score Per Meeting					
	Syntax	Lawsuit. 1	Desc.	Lawsuit. 2	Desc.	Lawsuit. 3	Desc.
		Value		Value		Value	
1	Think	76,19	T	88,89	ST	93,33	ST
2	Sharing Information	100	ST	100	ST	100	ST
3	Observation	77,78	T	83,33	ST	88,89	ST
4	Exposure	87,88	ST	93,33	ST	92,59	ST
5	Reporting	77,78	T	77,78	T	88,89	ST

Based on Tables 2 and 3, it can be described several things related to the implementation of the syntax of the Ber2P3 learning model; (1) The implementation of the learning model syntax in classes A and B of the Chemistry Education Study Program has reached the high category with a percentage in the range of 77.78% -100%; (2) The percentage of overall assessment of the implementation of each stage of the Ber2P3 learning model has increased from meeting one to meeting three. This increase shows the better mastery of lecturers in applying the Ber2p3 learning model when learning in classes A and B of the Chemistry Education Study Program. Some of the obstacles that arise when implementing Ber2p3 learning include time management for each phase and the overall time which is often not in accordance with the time allocation.

1. Discussion of Ber2P3 Learning Model

The purpose of this research is to develop a learning model that can be used to improve students' mastery of concepts. With the mention of Ber2P3, the Ber2P3 learning model has five stages, namely thinking, sharing, observing, exposing and reporting. This model was developed based on behavioristic theory, constructivism theory, social cognitive theory and information processing theory. Through Basic Physics lectures, it is expected to increase students' mastery of concepts. The belief in an increase in students' mastery of concepts is supported by relevant theories and research. The relationship between the learning objectives (outcomes) achieved, supporting theories, learning stages, and the management of the learning environment are characteristics of the learning model. Following are the characteristics of the Ber2P3 model.

The first characteristic of the Ber2P3 model is that collaborative and cooperative work is reflected in the several phases that exist in the Ber3P3 model. In the thinking phase and sharing tasks in groups, students work and help each other in group work. Group work can provide stronger problem solving, because the total knowledge contained in the group tends to be greater than that of the individual. This is also in line with the study of [14] which states that joint regulation shows two characteristics, including: (1) children who work through collaboration allow reducing the burden of cognitive processing that is in themselves, can facilitate metacognitive activities. (2) At the same time the child can monitor and regulate the mutual use of shared task representations, which requires him to externalize and articulate his ideas and concepts to others. In learning the Ber2P3 model, all the dominant phases in cooperative and collaborative work in Ber2P3 learning are in terms of thinking, sharing, observing, exposing, reporting. Cooperative and collaborative activities include discussing designing observations/experiments, carrying out experimental observations and analyzing the results of observations. Each group member supports and helps each other in achieving goals.

The second characteristic is that it can provide an overview of students' initial ideas, motivate students to work to explore concepts, can generate a desire to investigate. In addition, students not only have to think and discuss orally, but also have to write down what the results of their thoughts and discussions are, this is in line with the theory of [15] Students who are given the opportunity to discuss can: (1) connect the language they know from their own experience and background with the language of mathematics, (2) analyze and synthesize mathematical ideas, (3) foster collaboration and help build learning communities in the classroom. In addition, [15] stated that “Discussion can increase word exploration and test ideas. Discussing can also increase understanding. When students are given many opportunities to discuss, understanding will be built in students' writing, and then writing can contribute to building understanding. In essence, at this stage students can discuss their knowledge and test their new ideas, so that they know what they really know and what they really need to learn. [16] talk (talking) is important in mathematics because as the main way to communicate in mathematics, forming ideas through the process of talking, improving and assessing the quality of thinking because talking can help determine the level of understanding of students in learning. learn math.

2. Discussion of the Practicality of the Ber2P3 Model

The practicality of the Ber2P3 learning model can be viewed from the level of implementation of the learning stages, classroom atmosphere and time management. Based on observations of the implementation of the Ber2P3 model, it can be seen in Table 1 for the Science Education Study Program class in a limited trial, and the broad trial can be seen in Table 26 for class A and Table

3 for class B Chemistry Education Study Program, the results of the analysis show that in general the Ber2P3 learning model can be categorized as a practical learning model and all stages of the Ber2P3 learning model can be implemented. The average percentage of syntax assessment by observers in the limited trial class and the wide trial class showed an increase in observer ratings from the first meeting to the third meeting. Likewise, the average assessment of the implementation of learning has increased.

The results of the analysis of the implementation of learning with the Ber2p3 learning model show that there is consistency between the clasification of learning during the limited trial and the extensive trial. The implementation of learning with the Ber2P3 learning model in both the limited trial and the extended trial were categorized as high and very high. This shows that the Ber2P3 learning model meets practical criteria as stated by [17] the research prototype is said to be actually practical if it can be applied to a condition that has been designed.

Judging from the number of students who became research subjects, both in the broad 1st trial, and the 2nd wide trial where the number was less than 30 students. The number of students like this allows a more conducive learning. This is as expressed by [18] which states that the number of students per class can affect the classroom climate, where smaller classes often show a warmer and more supportive atmosphere. The following describes the activities of the Ber2P3 learning model in each learning phase; (1) In the initial phase (Prediction) the lecturer attracts students' attention by presenting phenomena related to the concepts to be studied. The phenomena presented are real. This is in line with Piaget's theory and the view of constructivism or intellectual development theory regarding the readiness of children to be able to learn, in relation to constructivism learning theory, Piaget emphasized that knowledge is built on children's minds. Related to the presentation of the phenomena in phase 1, the activities in phase 2 are responses to the phenomena presented in order to keep students' attention focused on learning; (2) The next activity is sharing. In this phase, students are expected to be able to share in problem formulation for the phenomena given in the initial phase. In this phase, it provides opportunities for students to write questions or statements related to the phenomena presented. In this phase, students can discuss with their group of friends. This is in accordance with the statement of [19], sabaya friends are children with approximately the same level of maturity, one of the most important functions of peer groups is to be able to provide information and comparisons about the world outside the family world, that peers become models in the classroom. Therefore, that they can follow the good and bad habits of their friends, achievement orientation and so on. After students discuss the phenomena presented, it is hoped that students can understand the problems they discuss in their groups. So that in group sharing activities can really happen; (3) The third phase is observation. In this observation phase, students work in groups to solve problems in groups through observation. This phase is a research activity to test the hypothesis. The activity starts from collecting experimental data in the form of notes or descriptions, tables, or diagrams. During the activity there are basic process skills that will have to be performed properly. For example, how to observe, how to classify, namely classifying based on similarities and differences, how to conclude and make reports for presentations. When designing experiments students have identified variables, in carrying out experiments' students must pay attention to how to conduct experiments so that the data remains controlled; (4) The next phase is exposure. In this phase, students explain what they have been doing in their groups. Previously, students had discussed the results of their work in their groups. In this activity, students also compare what they do with other groups. In this phase, students also prove what they are doing according to the theory. This is related to scientific communication. Communication as "the process of sending, receiving and understanding ideas and feelings in the form of verbal or nonverbal messages intentionally or unintentionally" [20]. Meanwhile, There are three frameworks for understanding communication, namely: (1) communication as a one-way action; (2) communication as interaction; and (3) communication as a transaction [21].

Thus, it can be concluded that communication is the process of conveying a message from the sender of the message to the recipient. The success of science communication owned by students also determines the learning success of the students concerned. A student's communication needs to be continuously improved in order to improve intellectual abilities, emotional maturity, and social maturity.

The reporting phase is the phase where students rewrite what they have done in groups into a writing. Writing is a productive and expressive activity. Writing is an aspect of language activity that is considered difficult. It was complained by many students in primary and secondary education, students in college also complained about the difficulty of writing. As a result, the complaint eventually became public opinion, that writing was difficult [22] Related to this, it is hoped that students can learn to write a report in scientific writing

CONCLUSION

Based on the results of data analysis of the validity, practicality, and effectiveness of the learning model that refers to the problem and research objectives, the conclusion of this study is that the Ber2P3 learning model is categorized as a practical learning model for all stages of the Ber2P3 learning model can be implemented

REFERENCES

[1] Ali, D., Syarifudin, M., & Bakhtiar, N. Penerapan Model Pembelajaran Berbasis Masalah Untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V SD Negeri 028 Rimbo Panjang Kecamatan Tambang. *Instructional Development Journal*, *3*(1), 1-7. 2020

[2] Arends, R.I. *Learning to Teach, Fifth Edition*. New York: McGraw-Hill, Inc. 1997.

[3] Purwanto, B . *Eksperimentasi Model Pembelajaran Kooperatif Tipe Think-Talk-Write (TTW) dan Tipe Think-Pair-Share (TPS) Pada Materi Statistika Ditinjau dari Kemandirian Belajar Siswa SMA di Kabupaten Madiun* (Doctoral dissertation, UNS (Sebelas Maret University). 2012.

[4] Docktor, J. L., & Mestre, J. P. Synthesis of discipline-based education research in physics. *Physical Review Special Topics-Physics Education Research*, *10*(2), 020119. 2014.

[5] Sofianto, E. W. N., & Irawati, R. K. Upaya Meremediasi Konsep Fisika pada Materi Suhu dan Kalor. *Southeast Asian Journal of Islamic Education*, *2*(2), 107120. 2020.

[6] Gunawan, I., Suraya, S. N., & Tryanasari, D. Hubungan kemampuan berpikir kreatif dan kritis dengan prestasi belajar mahasiswa pada matakuliah konsep sains II prodi PGSD IKIP PGRI MADIUN. *Premiere Educandum: Jurnal Pendidikan Dasar dan Pembelajaran*, *4*(01). 2016.

[7] Imastuti, I., Wiyanto, W., & Sugianto, S. Pemanfaatan Laboratorium dalam Pembelajaran Fisika SMA/MA Se-Kota Salatiga. *UPEJ Unnes Physics Education Journal*, *5*(3), 51-58. 2016.

[8] Nurjanah, A . *Penerapan Model Pembelajaran Predict-Observe-Explain (POE) untuk Meningkatkan Penguasaan Konsep Tekanan dan Keterampilan Berpikir Kreatif Siswa Mts*(Doctoral dissertation, Tesis Pendidikan IPA. Bandung: UPI). 2009.

[9] Rani, M . *Students'metaphor Interpretation Of Edgar Allan Poe's Short Stories In Literature Class (A Descriptive Study at 3rd Semester Students of TBI IAIN Bengkulu in Academic Year 2018/2019)* (Doctoral dissertation, IAIN Bengkulu). 2019

[10] Setiawati, I., & Zuniati, M. Improving The Students' Writing Ability In Descriptive Text Through Think-Talk-Write Strategy. *Attractive: Innovative Education Journal*, *1*(1), 72-79. 2019

[11] Taufik, A., Usodo, B., & Saputro, D. R. S. Contribution of Learning Independence and Think Talk Writing Learning Model Toward Student Mathematical Communication Skill. In *3rd International Conference on Learning Innovation and Quality Education (ICLIQE 2019)* (pp. 402-410). Atlantis Press. 2020.

[12] Sukiminiandari, Y. P., Budi, A. S., & Supriyati, Y. Pengembangan modul pembelajaran fisika denganpendekatan saintifik. In *Prosiding seminar nasional fisika (e-journal)* (Vol. 4, pp. SNF2015-II). 2015

[13] Dewi, R. A., & Nugroho, S. E. Pengaruh media computer based instruction (CBI) berorientasi POE dalam meningkatkan motivasi dan keterampilan memprediksi IPA siswa kelas IV. *Journal of Primary Education*, *4*(2), 139-146. 2015.

[14] Whitebread, D., Bingham, S., Grau, V., Pasternak, D. P., & Sangster, C. Development of metacognition and self-regulated learning in young children: Role of collaborative and peer-assisted learning. *Journal of Cognitive Education and Psychology*, *6*(3), 433-455. 2007

[15] Huinker, D., & Laughlin, C. talk-write" for improving the written communication of mathematics. *Yearbook*, 81. 1996.

[16] Martini, R., Cramm, H., Egan, M., & Sikora, L. Scoping review of self-regulation: What are occupational therapists talking about?. *American Journal of Occupational Therapy*, *70*(6), 7006290010p1-7006290010p15. 2016

[17] Nieveen, N., & Folmer, E. Formative evaluation in educational design research. *Design Research*, *153*, 152-169. 2013,

[18] Muijs, D., & Reynolds, D. *Effective teaching: Evidence and practice*. Sage. 2017.

[19] Santrock, J. W. Child development. *New York: McGrow*. 2007.

[20] Iriantara, Y. Komunikasi Antarpribadi dalam Kehidupan Manusia. *Universitas Terbuka 3 (302.2)*, *7*. 2014

[21] Mulyana, D. Human communication: Prinsip-prinsip dasar. *Bandung: PT. Remaja Rosdakarya*. 2005.

[22] Sukirman, D. S. Pembelajaran Menulis Laporan Perjalanan dengan Menggunakan Pendekatan Kontekstual pada Siswa Kelas VIII. *Bandung: STKIP Siliwangi*. 2013.