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Implementation of the Problem Based Learning Learning Model in Increasing the Motivation of Man 1 Kuningan Students

Komarudin Humaedi Komar[1], Septi Gumiandari[2], Murphy Xavier[3], McCarty Elliot[4]

Institut Agama Islam Nur Jati Cirebon, Indonesia
E-mail: komarudinhumaedi@gmail.com
Institut Agama Islam Nur Jati Cirebon, Indonesia
E-mail: septigumiandari@gmail.com
Institut for Training of Advanced Teachers, Suriname
E-mail: murphyxavier@gmail.com
Atlantic Technological University, Ireland
E-mail: mccartyelliot@gmail.com

Corresponding author: komarudinhumaedi@gmail.com

In learning, teachers need a learning approach that is able to activate learning motivation. An educator is required to be able to design and choose a learning model that suits the needs of students. Problem based learning learning model, which is one of the educational models that help students to develop problem solving skills so as to improve learning outcomes and student motivation. This study aims: (1) to determine the increase in extrinsic motivation through the problem based learning model; (2) To find out the learning outcomes and cooperative attitudes of students after using the problem based learning model. This study uses a qualitative approach by conducting interviews based on a list of questions to the informants. The results of this study prove that the application of the problem based learning model can increase students' learning motivation and also increase students' knowledge and increase student learning outcomes. This is evident from the results of observations and interviews that have been carried out, and the results obtained are: (1) The implementation of learning using the PBL model makes learning motivation increase (2) student learning outcomes through problem based learning are better than before. This shows that in implementing the lesson plan using the PBL model, it fosters students' curiosity about the material provided by the teacher and increases their understanding. The material provided by the teachers increases in the PBL model. The PBL model has a positive impact on learning activities.

***Keywords*— learning motivation, learning model, problem based learning**

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I. INTRODUCTION

One of the most important keys to excellence in global competition is education. Nowadays, education is considered as the most strategic and most important field to achieve people's welfare (Subekti & Kurniawati, 2020). Intelligent and realistic human resources (HR) are a prerequisite for the development of an advanced civilization (Ramadhan, 2019). Therefore, a lack of human resources will lead to a poor civilization. To improve the quality of education, we need to change the thinking underlying curriculum implementation. Previously, learning focused on

educators and paid little attention to students. As a result, learning focused on testing learning outcomes and ignored learning motivation (Suni Astini, 2020). During this time the learning process was dominated by the teacher, therefore there was little chance that students would grow independently through the process of discovery and thinking. The one-sided nature of education (teacher-centric) leads to the accumulation of information and concepts that are not very useful for students. Teachers always ask students to learn, but do not teach how students should learn and solve problems (Chen et al., 2020).

The main elements of learning: teachers, students, objectives, materials, media, methods, assessment (Pane & Dasopang, 2017). These components are interrelated. For example, teachers are responsible for determining appropriate learning methods and models to improve students' understanding of the subject (Puspitasari & Nurhayati, 2019). In reality, the learning that has been taught so far has not been ideal. Many schools still apply a teacher-centered learning system. Students only receive information provided by the teacher so that their collaboration skills do not appear in their learning activities. Moreover, the general thinking ability of Indonesian students is still relatively low. Students' collaboration skills are not covered in learning activities, so the skills need to be strengthened to prepare students for this globalization era. In addition, students' thinking skills are low because many teachers still use the conventional lecture method in the learning process and make the lecture method the main choice for educators (Maqbullah et al., 2018). Education and teaching is a purposeful process. Objectives can be interpreted as an attempt to formulate the results expected of students after completing their learning experience, the ultimate goal of learning is the achievement of developmental tasks in accordance with what has been formulated in the school curriculum.

To improve the quality of education, we need to change the way we think about curriculum implementation (Adiatama, 2020). Previously, the education and learning process was focused on educators, and students did not pay much attention to its existence. As a result, teaching and learning activities emphasize learning tests. The word learning can be interpreted as a process consisting of a combination of two aspects, namely: directed at what students need to achieve, and teaching directed at what educators need to achieve as teachers (Ramadhan, 2019). These two aspects work together in an integrated activity when there is interaction between educators and students, and between students during learning (Pratiwi, 2020). The implementation of education today demands learning where students become active and teachers act as facilitators and motivators. The expected aspects of learning are not only knowledge, but also skills and attitudes (General et al., 2020).

Although learning has been directed through the Student Activity Sheet (LKS) which contains discussion and question and answer material with the aim of continuing learning from the teacher, the teacher still plays a major role in completing the LKS (Ismi Darman, 2020). Students cannot fully participate in learning because they are reluctant to seek information on their own, thus reducing the importance of active and effective learning. Students answer exam questions by understanding the material, analyzing the problem, and memorizing the material rather than solving problems they may face on a daily basis so critical thinking is not well trained. As a result, the cognitive measure of student learning is also lacking as indicated by the average acquisition of learning outcomes in the previous ability which is still below the minimum ability criteria (Jeklin, 2016).

To overcome these problems, effective learning activities are needed so that students can learn independently without forgetting cognitive, emotional, and psychomotor aspects, such as using project-based learning.

Problem-based learning (PBL) is called project-based learning by Thomas (2000) and Kamdi (2007).PBL is an innovative learning approach that emphasizes contextual learning through complex activities (Rusdiana et al., 2021). The focus is on research that engages students in problem-solving research and other meaningful tasks, giving students the opportunity to work independently to build their knowledge and culminate in making actual products in the field (Insyasiska et al., 2015).

The problem-based learning (PBL) approach is a teaching and learning approach that can be one of the factors of learning success.In this learning model, student orientation to the problem allows the

teacher to explain what the main objectives of learning are, what problems are discussed, and how the teacher discusses them.This is done to teach basic concepts to students.The teacher must be able to motivate students to actively participate in solving the chosen problem (Hidayat, 2014).

The basis of problem-based learning is collaborativeism which claims to build knowledge by drawing conclusions from all the knowledge students already have and all the knowledge gained through interaction with others (Asmuni, 2020). It also means that the learning process shifts from communicating information to a process of social and personal knowledge building (Suhendro, 2020). According to constructivism, humans can only understand through what they have built. From this information, problem-based learning is a learning model where students face real problems to start learning, and is one of the innovative learning models that can provide active learning conditions for students (In et al., n.d.).

This research raises issues related to the implementation of the problem-based learning model in increasing the extrinsic motivation of MA Unggulan Amanatul Ummah 02 Leuwimunding students. Before conducting this research, the author also reviewed several journals related to how this research was conducted. Among them is research conducted by Arief, H.S, Maulana, & Sudin, A. (2016) with the title: "Improving Learning Motivation through the Problem Based Learning Approach" the research was conducted at SDN Corenda which acted as an experimental class, and was also conducted at SDN Jatiputri as a control class (drh. Ida Malati Sadjati, 2017). This study uses learning motivation tools in the form of attitude measures, observation forms, interviews, and magazines. The results of the study at the 0.05 level of significance showed that learning with a problem-based learning (PBL) approach can significantly motivate students to learn, as is the case with the traditional approach (Sulistiadi et al., 2020). The increase in learning motivation was significantly better in the experimental class using the problem-based learning (PBL) approach than in the control class using the traditional approach. Learning with the problem-based learning (PBL) approach was well received by students in the experimental class.

Second, research conducted by Lia Lestari (2015) entitled "Application of Problem Based Learning Model to Increase Students' Motivation to Learn Mathematics (PTK on Even Semester VII Class Students of SMPN 1 Jatiroto, Wonogiri 2013/2014 Academic Year)". The application of problem-based learning models can motivate students to learn mathematics. This can be seen from the achievement of motivation indicators in the percentage of student enthusiasm in answering questions which was previously only 18.75% after the action was taken.

Then the enthusiasm of students in working on assignments, before the action was only 15.625%, and after the action was taken it reached 87.5%.

Third, research conducted by Untung Teguh Budianto (2021) entitled "Application of Problem Based Learning Model to Improve Problem Solving Skills and Student Motivation". This research was conducted to analyze the implementation of the Problem Based Learning learning model in improving problem solving skills and student learning motivation in class XI of SMA Negeri 1 Moga, Pemaran Regency in the 2019/2020 school year. This class action research consists of planning, action, observation, and reflection. Data collection was done through observation, tests, and documentation. The data analysis method in this study used descriptive analysis method. The results showed that students' problem solving skills improved compared to the initial conditions. The average problem solving ability in the initial state was 46.36, increased to 69.88 and then increased again to 76.03.

From the three studies above, it is clear that by using a problem-based learning model, students will learn to solve problems that encourage them to try to find the knowledge they need. This means that the learning is in the context of concept application. The problem-based learning model can also improve critical thinking skills, increase students' initiative in working, increase learning motivation and develop interpersonal relationships in group work (Rahma Elvira Tanjung, 2019). Learning can become more meaningful and expansive when situations where the concept applies and is presented to students. In addition, problem-based learning allows students to properly and continuously integrate knowledge and skills and apply them to relevant contexts. So that what they do is in accordance with the application of concepts and theories found during the learning

process (Muhamad Farhan & Retnawati, 2016). So that researchers are interested in conducting research by combining the three. Thus the author will examine each student's understanding, activeness in the learning process, increased motivation and student learning outcomes by using a problem-based learning model. Therefore, the author raised the title "Implementation of Problem Based Learning Model in Improving Extrinsic Motivation of MAN 1 Brass Students".

This study aims to determine the increase in motivation through the problem-based learning model and to determine the learning outcomes and cooperation attitudes of students after using the problem-based learning model. The benefit of writing this article is that hopefully readers can apply it in classroom learning by using a problem-based learning model that can help students develop thinking skills and problem-solving skills in increasing their learning motivation.

II. METHOD

This research was conducted at MAN 1 Kuningan through a qualitative approach by conducting interviews based on a list of questions to the sources. Then the results of this study were analyzed by researchers descriptively and also supported by several existing references. Such as supporting books, then electronic media and also several articles related to the problems discussed by researchers. This qualitative research produces descriptive data in the form of speech, writing, and behavior of the people observed. Through this qualitative research, researchers can recognize and identify subjects and feel their experiences in everyday life (Ghony & Almanshur, 2012: 13).

Data was collected through online searches on Google Schoolar. The keywords used to collect data were learning motivation, learning outcomes, and problem-based learning (PBL) model. Analysis of 20 journals from relevant sources showed that the problem-based learning (PBL) model helps students actively learn and solve their own problems. According to the survey of 20 journals, the application of problem-based learning model can improve students' learning outcomes.

III. RESULTS AND DISCUSSION

- Research Results

Interviews were conducted with two MAN 1 kuningan with the names Tia nurahmah, hereinafter referred to as the initials TN, and Lala Maulidiya, hereinafter referred to as the initials LM. Interviews with TN and LM were conducted on Saturday, December 10, 2022. Based on information from the two students that in the learning process in the classroom the chemistry teacher had applied the PBL Model. The following research results are described based on the focus of the research question:

- Implementation of learning by using the PBL model in increasing student learning motivation

If students are motivated to learn, the learning process will be successful. Therefore, as a teacher it is necessary to foster student motivation to learn. In arousing learning motivation, one of them is by using a variety of creative and interesting learning presentation methods, so that curiosity and enthusiasm in learning activities can arise, which in turn will increase student motivation in learning.

According to TN explained that:

"this learning model can definitely increase my learning motivation, the different learning processes are interesting and also not monotonous can help me increase my learning motivation. I am required to be actively involved in solving problems given by the teacher".

This is in line with the explanation from LM, namely:

"yes, in the PBL model I am encouraged to follow and solve problems given by the teacher, so I am motivated to follow the learning".

In addition, indications of increased student learning motivation with the PBL model can be seen from the following description which is reinforced by interview data:

- By using the PBL model, learning materials are easier for students to understand.

According to TN explained that:

"The PBL learning model makes it easier and helps in understanding the lessons being studied, because before doing the learning, the teacher first explains what competencies/objectives my friends and I want to achieve in class, so we are more focused and know what to learn".

This is in line with the explanation from LM, namely:

"if the teacher uses the PBL model, it makes it easier for me to understand the lesson, so we make the concept so we understand the lesson better".

Based on the results of the interviews above, the authors can conclude that the application of the PBL model can facilitate understanding of the material being studied, so that this can increase student motivation in learning. Because the material presented is more focused on what will be learned and students themselves determine the concepts in problem solving.

- The use of the PBL model can determine the understanding of each student in group discussions.

Students' motivation to learn is also influenced by how close they are to their friends in class so that learning can run smoothly without any obstacles. By allowing students to build interpersonal relationships and provide social support to their friends, they have the opportunity to practice independently, make their own decisions, and dare to express their opinions.

TN explained that:

"I think the PBL model can find out the understanding of each of us as students in the learning process. Because in learning, all students take an active role in problem solving based on the knowledge and skills possessed by each student, so we can find out the extent of understanding of each student".

This is in line with the following answer from LM:

"I also feel so, when compared to learning as usual the teacher still dominates learning while students are passive, it will affect student understanding".

- By using the PBL model, students are more active in the learning process.

Learning with the PBL model can also lead to student learning activities. In the learning process, students are more active in performing learning tasks, asking questions, solving problems in groups, answering and commenting on the work of other students and groups, and presenting the results of their work in class. The emergence of student learning activities can improve understanding of the material and make it more memorable because they experience the learning process themselves.

TN explained:

"that's right, PBL learning emphasizes active participation from students to foster problem-solving skills and critical thinking skills and encourages students in identifying their own knowledge and skills".

This is in line with the explanation from LM, namely:

"if students are not active in learning, then the problem will not be solved. The name is also problem-based learning, surely every student is required to be active in learning".

- Student learning outcomes through problem-based learning models.

Learning with the PBL model can also affect student learning outcomes. By evaluating learning, student learning outcomes can be seen.

According to TN explained that:

"when viewed from learning outcomes, in my opinion there is an increase, this is because when using the PBL model all students are active in learning. Compared to before, students just come to learn, and their understanding is still questionable, as well as student cooperation can be seen more closely".

LM also explained that:

"Well the difference that I feel more is the learning outcomes and cooperation, my friends and I feel satisfied with the learning outcomes, the cooperation is getting closer because in solving a

problem if done in collaboration it is easier and faster".

- Discussion

- Implementation of learning by using the PBL model in increasing student learning motivation.

The learning model can be interpreted as a plan or pattern, the purpose of the learning model is as a guide in planning the learning process in the classroom, and the model is configured to achieve the expected learning skills or objectives. According to Jihad and Haris (2010: 25), a learning model is a plan or pattern used to prepare or compile curriculum, manage student materials, direct teachers in teaching in class, and plan lesson processes.

By using the right learning model, students will feel comfortable and satisfied with the learning activities provided, so that student learning motivation including in dealing with teacher assignments will increase and it is also easier for students to understand the lesson. This is because the thinking of each student is not monotonous, allowing them to obtain better learning outcomes than before.

Problem-based learning model is a learning model that can develop students' rational thinking abilities: the ability to analyze situations, apply knowledge to new situations, recognize facts and discrepancies, and develop skills that students carry out objectively. Creative and interesting PBL learning presentation methods can foster a sense of curiosity and enthusiasm in learning activities which will further increase student motivation in learning (Nafiah, 2014). As stated by TN and LM that learning problem-based learning models in Chemistry lessons can encourage active participation in learning because each student is also required or involved in order to solve problems. So that students feel more challenged and interested in finding solutions than the problems given by the teacher.

The advantages of the problem-based model, namely: (1) train students in designing a discovery, (2) train students to think critically so as to foster creativity, (3) train students to solve problems faced realistically, (4) train students to identify and conduct investigations, (5) train students to interpret and evaluate the results of observations made (Agusmin et al., 2018).

When students feel happy in the learning process and there is a sense of curiosity, enthusiasm for learning, it can be concluded that these students have motivation in learning. According to Sardiman (2011: 75) learning motivation can be interpreted as the overall driving force within students that can create a desire to carry out learning activities, therefore the learning objectives that must be achieved by students can be carried out.

Motivation itself comes from the word motive which can be interpreted as an action or force that drives an individual (Uno: 2011: 3). Meanwhile, according to the Big Indonesian Dictionary (2008: 27), the definition of motivation is the tendency that occurs in a person to act with certain goals or efforts in a person or group of people. The definition of motivation is a tendency that occurs consciously or unconsciously to take action or effort with a specific goal, so that a person or group of people is moved to do what they want to achieve (Kholida, 2015). So from this description, the author can conclude that motive is an action or potential energy of an action, while motivation is the process of moving and strengthening motives that are realized by actual action. (Anatin, 2021).

In general, in the learning process, experts agree to classify motivation into two types, namely intrinsic and extrinsic motivation. As stated by Hamalik (2007: 8899) based on its source, motivation can be divided into two types, namely 1) intrinsic motivation where this motivation is driven by factors originating from the students themselves, especially recognition of the usefulness of the subject for students. 2) External motivation is learning motivation that comes from outside the student himself. An example of negative external motivation is students' fear of punishment given by the teacher. According to Hamalik (2007: 8899) based on its source, motivation can be divided as follows. 1) Essential motivation, namely learning motivation that comes from the student himself. This motivation is driven by factors that come from the students themselves, especially recognition of the usefulness of the subject for students. 2) External motivation, which is learning motivation that comes from outside the student himself. An example of negative external motivation is a student's fear of being punished by the teacher by asking students to do homework, and an example of positive external motivation is praise for students who do the tasks given by the teacher.

(UMMA, 2019). Motivation and learning achievement are two interrelated aspects because increased achievement is caused by high learning motivation (Nurtanto, 2016).

This is in line with what is revealed by Sardiman (2012: 89-91), motivation consists of: 1) Intrinsic motivation is motivation that is active and functional that does not need to be stimulated from outside because individuals already have the urge to do something. 2) External motivation is active and functional motivation that occurs due to external stimuli (Septian & Komala, 2019).

There are several characteristics to determine learning motivation in a person as explained by Sardiman (2011: 83), namely:

- Persevering with the task, not stopping before completing the task.
- Tenacious in facing difficulties (not easily discouraged even though facing difficult problems)
- Show interest in various problems
- Prefer to learn and work independently
- Easily bored with routine tasks (repetitive so that it is less creative).
- Can defend his opinion if he is sure of something.
- Love to solve problems or problems.

While the characteristics of motivated students in relation to the implementation of learning activities according to Dimyati and Mujiono (2002: 94-100) are:

- Actively participate in learning
- Researching and preparing materials provided by the teacher
- Actively participate in discussions and problem solving
- Completing tasks given by the teacher
- Using existing learning resources
- Answering teacher questions
- Using free time to read and study
- Enjoying the task
- Cooperate with other students

So that the author can conclude that every student who has the above characteristics shows that the student has learning motivation. Indicators of motivation arising from the PBL learning model according to TN and LM are as follows:

- By using the PBL model, learning material is easier for students to understand.

Through the implementation of the PBL (problem-based learning) model used by the Chemistry teacher MA Unggulan Amanatul Ummah 02 Leuwimunding, according to TN and LM, it can facilitate understanding of learning materials, because learning is more focused on solving problems conceptualized by students themselves, so that students better understand the concepts and lessons.

As said by Smith (in Amir 2015: 27) the benefits of applying the PBL learning model for students can improve problem solving skills, increase understanding of class material provided by the teacher, expand relevant knowledge in the real world, motivate students, encourage critical thinking and teamwork that can improve social skills. So that students become more remembered and increase their understanding of the teaching material.

- The use of the PBL model can determine the understanding of each student in group discussions.

Basically, this problem-based learning model tries and challenges students to work in groups to find solutions to real problems. The problem given is used to stimulate students' curiosity in learning the lesson.

As said by TN and LM, they concluded that in the learning process of the PBL model, although in groups, all students participate actively in problem solving, so that the knowledge and skills possessed by each student in problem solving can be known by other students. In this case, group work helps students discover more knowledge and exchange information from one student to another, so as to increase their knowledge through cooperation in groups.

Problems are given to students before learning concepts or materials related to the problem to be solved. Teachers must be able to guide and recognize students in problem solving. Especially if learning activities need to be assisted so that they are not interrupted, in this case the teacher's role is as a facilitator.

The learning steps using the PBL model according to Yazdani (in Nur, 2011) which refers to Arends, are as follows;

- The Orientation Stage is to orient students to the problem, the teacher explains to students related to the competencies that must be achieved and mentions the supporting facilities or tools needed to motivate students to get involved in the selected problem solving activity.
- The Organization Stage is organizing students to learn, the teacher assists students in

defining and organizing learning tasks related to the problem (such as in determining topics, tasks, schedules, and others).

- The inquiry stage is to assist independent and group investigations, the teacher encourages students to gather relevant information and knowledge, experiments to obtain explanations and problem solving, data collection, hypotheses, problem solving.

- Presentation or data presentation stage, namely developing and presenting work and exhibiting it. Then the teacher presents, and displays the results of his work and then the teacher helps students plan appropriate work such as reports and sharing tasks with his friends. In this stage, students' skills, knowledge and understanding can be recognized by other students...

- Analysis and Evaluation Stage, which is analyzing and evaluating the problem solving process. The teacher helps students to reflect or evaluate their experiments and the procedures they use.

The steps above can be applied in the learning process. By applying the steps of the PBL learning model correctly, it is expected that students can experience an increase in learning motivation, as well as knowledge and understanding of the lessons being carried out (Arief & Sudin, 2016).

- By using the PBL model, students are more active in the learning process.

Learning with the PBL model according to Sanjaya (2011: 214) has three main characteristics, namely:

- PBL is a series of learning activities. In other words, when implementing PBL, students need to complete a series of activities. In this case, students are required not only to listen to the material, record and memorize it, but also to think actively, communicate, search and process data, and finally reach a conclusion.

- Learning activities are aimed at solving problems. In problem-based learning, problem is the key word in the learning process.

learning process. In other words, there is no learning process without problems.

- This problem is solved scientifically through a proactive approach. Because learning involves students' scientific activities through group work, students are accustomed to obtaining sources of knowledge from libraries, the internet, interviews, and observations.

So it can be concluded that the results of the application of the problem-based learning model include students' ability to assess their learning progress, students' ability to communicate scientifically in discussion activities and work presentations, and individual learning difficulties can be overcome through group work.

In accordance with the explanation from TN and LM during the interview, both of them stated that in the learning process, students were more active in carrying out learning tasks, asking questions, solving problems in groups, daring to accept answers and opinions about the work of other students and groups, and presenting them in front of the class. The emergence of student learning activities can improve understanding of the material and make it more memorable because they experience the learning process themselves.

According to Fathurrohman (2015: 113) The purpose of the problem-based learning model is not to equip students with a lot of knowledge, but to develop critical thinking and problem solving skills while developing students' ability to actively build knowledge (Indriasari, 2016).

These learning objectives are designed to stimulate and involve students in learning problem-solving patterns. According to Yamin (2013: 63-64) states that:

"The purpose of the PBL model is to help students develop flexible knowledge that can be applied in situations that are opposite to inert knowledge. Inert knowledge is that students appear to master a lot of factual knowledge but in fact they do not understand it deeply or do not unite or organize it systematically with the context of daily experience ".

While the PBL model according to Abidin (2016: 161) has the following characteristics:

- The problem is the starting point for learning

- The problems used are contextual and original.

- The problems used can develop students' knowledge, attitudes, and skills and abilities.

- Has the aim of developing independent learning

- Utilizes various learning resources.

- Conducted through learning that emphasizes activity, collaborative, communicative, and cooperative.

- Emphasizes the importance of acquiring research skills, problem solving, and mastery of knowledge,

- Encourage learners to be able to think at higher levels such as analysis, synthesis, and evaluative.

- It ends with evaluation, review of learning experiences, and review of the learning process.

While the characteristics of PBL according to Sani (2014: 113) are as follows:

- Learning begins with the study of problems.

- Problems are based on complex real-world situations.

- Students work in groups.

- Some of the information required to solve the problem is not readily available.

- Students identify, locate and use appropriate resources.

- Learning is active, integrated, cumulative and connected.

Based on the main characteristics, objectives and characteristics of the PBL model proposed by the experts above, as well as the results of the interviews of the two MAN 1 brass students, the author can conclude that the PBL model can increase student activeness in participating in the learning activity process. Where this will also generate student motivation to engage in learning activities.

Motivation to learn is also influenced by how close they are to their friends in class and how learning helps them. By allowing students to build relationships and provide social support to their peers, they have the opportunity to practice independently, make their own decisions and take risks. Teachers can create an environment that helps develop interpersonal relationships. One of them is the formation of research groups by emphasizing the interaction and contribution of each group member.

- Student learning outcomes through problem-based learning model.

The use of the PBL model turns out to be able to improve student learning outcomes in Chemistry learning materials. According to explanations from TN and LM students of MAN 1 brass, the PBL model can improve learning abilities and results, this is because the PBL model requires all students to be active in learning. Increasing student learning outcomes means learning with PBL models that can provide students with learning process experiences through group exploratory inquiry activities to solve contextual problems suggested by the teacher (Agustin, 2013).

The learning process that takes place in the PBL model can actually cause students to experience changes in behavior as a result of learning. Learning outcomes are shaped by students' understanding of the subject. Students' skills and learning outcomes not only improve their knowledge, but they can also express their knowledge by passing it on or presenting to their friends. The knowledge presented will become new knowledge for their friends and will grow students' knowledge. In this case students expand their knowledge so that they can answer questions related to learning, including having an impact on students' ability to answer questions asked when working on learning assessments.

According to Hamalik (2008: 5) argues that learning outcomes are changes in behavior in a person after participating in the learning process, for example from not knowing to knowing and from not understanding to understanding. Meanwhile, according to Purwanto (2010: 44), learning outcomes are often used as a benchmark to determine the extent to which a person can understand and master the material being taught.

From some of the descriptions above, the author can conclude that the use of the PBL model can increase the knowledge possessed by students and increase student learning outcomes.

IV. CONCLUSIONS

The application of the problem-based learning model can increase student learning motivation. This can be seen from the indicators and characteristics of someone who has motivation, namely the urge to be actively involved in learning. In this case, the PBL model consists of a series of learning activities, meaning that in the implementation of PBL there are a number of activities that students must do. The problem presented by the teacher encourages students to study it and solve it.

In addition, with the application of the PBL model, students' skills not only increase knowledge,

but students can also express their knowledge in front of the class. Students learn to speak well in front of the class and convey their knowledge, not just the knowledge they receive. The new knowledge presented to their peers will grow students' knowledge. Therefore, the application of problem-based learning models can increase student knowledge and improve student learning outcomes.

REFERENCES

Abdul Muthalib, S., M. Jakfar, T., Maulana, M., & Hakim, L. (2021). Changes in Congregational Prayer Practices During the Covid-19 Pandemic in Aceh from Maqashid al-Sharia Perspective. *AL-IHKAM: Jurnal Hukum & Pranata Sosial*, *16*(2), 421–449. https://doi.org/10.19105/al-lhkam.v16i2.5250

Al-Far, A., Qusef, A., & Almajali, S. (2018). Measuring Impact Score on Confidentiality, Integrity, and Availability Using Code Metrics. *2018 International Arab Conference on Information Technology (ACIT)*, 1–9. https://doi.org/10.1109/ACIT.2018.8672678

Alqahtani, J. S., Njoku, C. M., Bereznicki, B., Wimmer, B. C., Peterson, G. M., Kinsman, L., Aldabayan, Y. S., Alrajeh, A. M., Aldhahir, A. M., Mandal, S., & Hurst, J. R. (2020). Risk factors for all-cause hospital readmission following exacerbation of COPD: A systematic review and meta-analysis. *European Respiratory Review*, *29*(156), 190166. https://doi.org/10.1183/16000617.0166-2019

Andrés-Hernández, L., Baten, A., Azman Halimi, R., Walls, R., & King, G. J. (2020). Knowledge representation and data sharing to unlock crop variation for nutritional food security. *Crop Science*, *60*(2), 516–529. https://doi.org/10.1002/csc2.20092

Boyd, R. L., Blackburn, K. G., & Pennebaker, J. W. (2020). The narrative arc: Revealing core narrative structures through text analysis. *Science Advances*, *6*(32), eaba2196. https://doi.org/10.1126/sciadv.aba2196

Chiang, M., Reid-Varley, W. B., & Fan, X. (2019). Creative art therapy for mental illness. *Psychiatry Research*, *275*, 129–136. https://doi.org/10.1016/j.psychres.2019.03.025

Danielson, K., Wong, K. M., & Neuman, S. B. (2019). Vocabulary in educational media for preschoolers: A content analysis of word selection and screen-based pedagogical supports. *Journal of Children and Media*, *13*(3), 345–362. https://doi.org/10.1080/17482798.2019.1585892

De Villiers, J., Iglesias, A., Golinkoff, R., Hirsh-Pasek, K., Wilson, M. S., & Nandakumar, R. (2021). Assessing dual language learners of Spanish and English: Development of the QUILS: ES. *Revista de Logopedia, Foniatría y Audiología*, *41*(4), 183–196. https://doi.org/10.1016/j.rlfa.2020.11.001

Han, W., Tian, Z., Zhu, C., Huang, Z., Jia, Y., & Guizani, M. (2021). A Topic Representation Model for Online Social Networks Based on Hybrid Human–Artificial Intelligence. *IEEE Transactions on Computational Social Systems*, *8*(1), 191–200. https://doi.org/10.1109/TCSS.2019.2959826

Hart, D. P., Branchford, B. R., Hendry, S., Ledniczky, R., Sidonio, R. F., Négrier, C., Kim, M., Rice, M., Minshall, M., Arcé, C., Prince, S., Kelleher, M., & Lee, S. (2021). Optimizing language for effective communication of gene therapy concepts with hemophilia patients: A qualitative study. *Orphanet Journal of Rare Diseases*, *16*(1), 189. https://doi.org/10.1186/s13023-020-01555-w

Hoff, C. E., Movva, N., Rosen Vollmar, A. K., & Pérez-Escamilla, R. (2019). Impact of Maternal Anxiety on Breastfeeding Outcomes: A Systematic Review. *Advances in Nutrition*, *10*(5), 816–826. https://doi.org/10.1093/advances/nmy132

Improving the Quality of ICT-Based Arabic Learning Assessment With Online Applications. (2023). *Journal of Higher Education Theory and Practice*, *23*(11). https://doi.org/10.33423/jhetp.v23i11.6216

Kay, D., & Pasarica, M. (2019). Using technology to increase student (and faculty satisfaction with) engagement in medical education. *Advances in Physiology Education*, *43*(3), 408–413. https://doi.org/10.1152/advan.00033.2019

Korol, A., Blashkova, O., Kravchenko, V., & Khilya, A. (2021). WEB-TECHNOLOGIES AND MULTIMEDIA SYSTEMS IN THE TRAINING OF PROFESSIONALS IN THE EDUCATION SYSTEM. *ENVIRONMENT. TECHNOLOGIES. RESOURCES. Proceedings of the International Scientific and Practical Conference*, *2*, 244–248. https://doi.org/10.17770/etr2021vol2.6570

Livingstone, C., & Rintoul, A. (2020). Moving on from responsible gambling: A new discourse is needed to prevent and minimise harm from gambling. *Public Health*, *184*, 107–112. https://doi.org/10.1016/j.puhe.2020.03.018

Misra, D. P., & Agarwal, V. (2020). Integrity of clinical research conduct, reporting, publishing, and post-publication promotion in rheumatology. *Clinical Rheumatology*, *39*(4), 1049–1060. https://doi.org/10.1007/s10067-020-04965-0

Nenohai, J. A., Rokhim, D. A., Agustina, N. I., & Munzil, M. (2022). Development of Gamification-Based Wordwall Game Platform on Reaction Rate Materials. *Orbital: The Electronic Journal of Chemistry*, 116–122. https://doi.org/10.17807/orbital.v14i2.16206

Ng, R., Chow, T. Y. J., & Yang, W. (2021). Culture Linked to Increasing Ageism During COVID-19: Evidence From a 10-Billion-Word Corpus Across 20 Countries. *The Journals of Gerontology: Series B*, *76*(9), 1808–1816. https://doi.org/10.1093/geronb/gbab057

Ocloo, J., Garfield, S., Franklin, B. D., & Dawson, S. (2021). Exploring the theory, barriers and enablers for patient and public involvement across health, social care and patient safety: A systematic review of reviews. *Health Research Policy and Systems*, *19*(1), 8. https://doi.org/10.1186/s12961-020-00644-3

Oikarainen, A., Mikkonen, K., Kenny, A., Tomietto, M., Tuomikoski, A.-M., Meriläinen, M., Miettunen, J., & Kääriäinen, M. (2019). Educational interventions designed to develop nurses' cultural competence: A systematic review. *International Journal of Nursing Studies*, *98*, 75–86. https://doi.org/10.1016/j.ijnurstu.2019.06.005

Qiu, D., Li, Q., He, Y., Zhang, Y., Li, B., Cao, L., Prabhavalkar, R., Bhatia, D., Li, W., Hu, K., Sainath, T. N., & McGraw, I. (2021). Learning Word-Level Confidence for Subword End-To-End ASR. *ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 6393–6397. https://doi.org/10.1109/ICASSP39728.2021.9413966

Soldan, A., Moghekar, A., Walker, K. A., Pettigrew, C., Hou, X., Lu, H., Miller, M. I., Alfini, A., Albert, M., Xu, D., Xiao, M.-F., Worley, P., & The BIOCARD Research Team. (2019). Resting-State Functional Connectivity Is Associated With Cerebrospinal Fluid Levels of the Synaptic Protein NPTX2 in Non-demented Older Adults. *Frontiers in Aging Neuroscience*, *11*, 132. https://doi.org/10.3389/fnagi.2019.00132

Solis, M., Reutebuch, C. K., Falcomata, T., Steinle, P. K., Miller, V. L., & Vaughn, S. (2021). Vocabulary and Main Idea Reading Intervention Using Text Choice to Improve Content Knowledge and Reading Comprehension of Adolescents With Autism Spectrum Disorder. *Behavior Modification*, *45*(1), 66–98. https://doi.org/10.1177/0145445519853781

Sorenson Duncan, T., Karkada, M., Deacon, S. H., & Smith, I. M. (2021). Building Meaning: Meta-analysis of Component Skills Supporting Reading Comprehension in Children with Autism Spectrum Disorder. *Autism Research*, *14*(5), 840–858. https://doi.org/10.1002/aur.2483

Verma, Y. (2019). Diverse image annotation with missing labels. *Pattern Recognition*, *93*, 470–484. https://doi.org/10.1016/j.patcog.2019.05.018

Wijewickrema, M., Petras, V., & Dias, N. (2019). Selecting a text similarity measure for a content-based recommender system: A comparison in two corpora. *The Electronic Library*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/EL-08-2018-0165

Yang, S., Chu, S., Gao, Y., Ai, Q., Liu, Y., Li, X., & Chen, N. (2019). A Narrative Review of Cancer-Related Fatigue (CRF) and Its Possible Pathogenesis. *Cells*, *8*(7), 738. https://doi.org/10.3390/cells8070738