The Role of Interactive E-books Problem Based Learning to Enhance Higher Order Thinking Skills Ability: Teacher's Perception

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Abstract: This study aimed to describe teacher's perception toward usage of interactive e-books based Problem Based Learning (PBL) to Envhance Higher Order Thinking Skills (HOTS). The research was conducted in 50 junior high school science teachers. The method used in this research is a mixed method with Sequential Explanatory Design. The method used in this study is a mixed method with Sequential Explanatory Design. Data is retrieved using questionnaire. Data were analyzed using descriptive analysis. The survey results show that students have a positive perception of interactive e-books based PBL. The results of the analysis of e-books, most eachers have not used interactive e-books with a PBL approach to provide an understanding of science. E-books that have not trained students' HOTS are also included in the low category because teacher has not set strategies, methods, models and lack of knowledge about technology. It can be said that interactive e-book based PBL are needed by teachers and students to improve students' HOTS.

Keywords: teacher perception, interactive e-books, problem-based learning, higher order thinking skills.

Abstrak: Penelitian ini bertujuan untuk mendeskripsikan persepsi guru tentang peranan e-book interaktif berbasis Problem Based Learning (PBL) dalam meningkatkan Keterampilan Berpikir Tingkat Tinggi (HOTS). Penelitian ini melibatkan 50 guru IPA SMP. Metode yang digunakan dalam penelitian ini adalah metode campuran dengan Sequential Explanatory Design. Pengambilan data menggunakan kuesioner. Data dianalisis menggunakan analisis deskriptif. Hasil survei menunjukkan bahwa siswa memiliki persepsi positif terhadap buku elektronik berbasis PBL. Hasil analisis e-book, sebagian besar guru belum memanfaatkan e-book interaktif dengan pendekatan PBL untuk memberikan pemahaman IPA. E-book saat ini yang belum melatih HOTS siswa juga termasuk dalam kategori rendah karena guru belum menetapkan strategi, metode, model dan kurangnya pengetahuan tentang teknologi. Dapat dikatakan bahwa e-book interaktif PBL sangat dibutuhkan oleh guru dan siswa untuk meningkatkan HOTS siswa.

Kata kunci: presepsi guru, e-book interaktif, pembelajaran berbasis masalah, keterampilan berpikir tingkat tinggi.

▪ **INTRODUCTION**

Along with the advancement of Information and Communication Technology (ICT) which is developing so fast, the national education sector faces very complex challenges in preparing the quality of Human Resources (HR) that are able to compete in the global era through the education process, namely training higher order thinking skills (HOTS). (Trianto, 2011: 4). This skill is very important in learning, especially science because it can demand an active role, encouraging students to be able to think critically and creatively in solving problems in the learning process, especially learning science (Brookhart, 2010: 42).

In fact, science learning in Indonesia has not been maximal in developing higher-order thinking skills. this fact is obtained from the scientific literacy data of students in Indonesia based on the 2019 For International Student Assessment (PISA) Program ranking, Indonesia, especially in the field of science, ranks 70 out of 78 participating countries, namely the average science score is 396. PISA questions for scientific literacy are questions that require students to be able to use higher-order thinking skills such as questions related to solving real-life problems (OECD, 2019: 8). According to the results of the Trends in Student Achievement in Mathematics and Science (TIMSS) assessment. Indonesia is a country that has low scientific achievement. Indonesia is ranked 70th out of 78 countries with an average score of 406 (TIMSS & PIRLS, 2019).The problem of the low level of high-order thinking skills of students based on then findings from observations in the preliminary study of the questionnaire analysis of the need for e-books conducted on 50 science educators at public and private SMP/MTs in Lampung province, it was found that 72% of teachers had not implemented science-oriented learning. on improving higher order thinking skills, because 36 out of 50 teachers have not chosen the right learning methods and models that are able to direct students in building their knowledge. The ability of educators to develop learning models is one of the most important factors to improve students' conceptual understanding skills (Susantini et al., 2018). One of the learning models that can support the improvement of students' higher order thinking skills is the Problem Based Learning (PBL) model. PBL in learning begins with a problem and students are given time to think together to find information and develop problem-solving strategies (Akinoglu Tandogan, 2007). Problems are presented at the beginning of learning and serve as a stimulus for learning activities (Chin & Chia, 2005). To achieve the expected learning success, in addition to the use of learning models, educators also need to provide appropriate teaching materials to support the learning process.

The selection of the right teaching materials also affects the learning process. The teaching materials referred to here are teaching materials that are in accordance with current learning conditions that require the integration of technology in them. Less effective teaching materials make teachers deliver learning using methods that tend to be conventional (Hrin, Tamara, Dusica, Mirjana, & Sasa Horvat, 2017). This is supported by the results of the teacher needs questionnaire analysis as many as 88% of teachers have not used PBL-based teaching materials. In general, educators answered that they had not yet mastered how to make PBL-based e-books due to lack of knowledge in technology (Science and Technology) and still had difficulty choosing materials that matched the PBL syntax. The results of this observation become a reference for researchers to develop e-books that foster higher order thinking skills in students.

The complexity of the problems that occur above must be resolved properly and appropriately so that the learning that occurs becomes more useful and meaningful. One solution to overcome these problems is by developing an interactive e-book. Thus, through the use of models that are in accordance with e-books, it is necessary so that the subject matter is conveyed properly so that later students will be able to develop higher order thinking skills. Based on the theoretical aforementioned, this study aims to describe teachers' perceptions of the role of PBL-based interactive e-books in improving higher order thinking skills.

▪ **METHOD**
Participants

The participants of this research consisted of 50 teachers in academic year of 2021/2022 with science teachers in Lampung.

Research Design and Procedures

This study used a mixed methods research which was adapted from Creswell. The research was conducted on March 24 – April 7, 2021. First, the researcher conducted a literature study with an initial analysis examining the results of the latest research on the use of teaching materials and HOTS. Next, the researchers developed an instrument for analyzing the needs of science learning educators, then the instrument was distributed to 48 schools via google form. The analysis of the questionnaire made has three aspects including the learning model that is applied in learning, aspects of HOTS, and electronic teaching materials.

Instrument

The data collection instrument consisted of a questionnaire made through the google form. In the preliminary study, an instrument in the form of a teacher needs questionnaire was used to find out the learning resources used by students, a learning model that can increase students' HOTS. Student activities in the classroom need learning tools. The right learning tool is an e-book with the use of a problem based learning model.

Data analysis

To analyze the data collected in the study, the data collection combined and analyzed qualitatively and quantitatively by analyzing the responses of 50 teachers. Furthermore, an analysis of the results of the questionnaire analysis of teacher and student needs is carried out which is described in the form of percentages, then interpreted qualitatively. The questionnaire uses the Guttman scale which has answer choices according to the content of the question, namely: "Yes" and "No" with a score of "1" and "0". The results of the questionnaire were analyzed using the percentage of responses from each item and the results of the interpretation of the presentation of respondents' answers in descriptive narrative form were categorized as very good, good, quite good, and not good. The results of the questionnaire were analyzed using the percentage of responses from each item submitted. Both studies have the same priority with triangulation and integration. The schematic research design can be seen in the following figure :
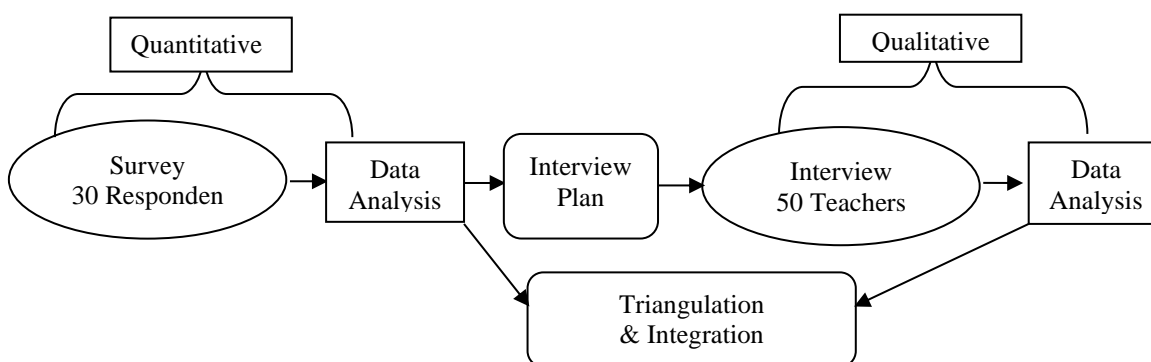

Figure 1. The schematic research design

The description of figure is a schematic research design in successive stages of research, starting with qualitative research and continuing with quantitative research (Shorten & Smith, 2017). The priority of collecting and analyzing qualitative data is carried out at an early stage. Building on the results of the exploratory analysis in the first stage. Then proceed to the next stage with quantitative methods (survey of 30 respondents) to test or make generalizations based on the initial findings and interpret how the results of qualitative research are built with initial findings (interviews with 50 teachers). Build an instrument based on findings at an early stage to obtain overall prevalence in a larger sample. Data analysis in quantitative and qualitative analysis is triangulated and integrated. Researchers organized the data collected through questionnaires and calculated in the form of percentage responses and then analyzed using the SPSS 21 program to determine the validity and reliability of the instrument. Calculating the percentage of each item in the questionnaire using the formula adapted from Sudjana (2005):

$$\%Jin = (\Sigma\ Ji\ /\ N)\ x\ 100\%$$

Description:
  % *Jin*   = Percentage of answer choices i
  $\sum Ji$ = Number of respondents who answered answer i
  N   = Total number of respondents

Moreover, explain the results of the interpretation of the presentation of respondents' answers in descriptive narrative form.

▪ **RESULT AND DISCUSSION**
The validity and reliability score are shown in Table 1. The results of the analysis showed a significant correlation at the 0.05 level. Cronbach's Alpha score for teacher's questionnaire was 0.846. According to Arikunto (2016) this results confirm that the instrument were valid and reliable.

Table 1. The result of instrument's validity

Teacher's questionnaire	Sig.
Q1	0.905
Q2	0.909
Q3	0.213
Q4	0.909
Q5	1
Q6	0.796
Q7	0.453
Q8	0.494
Q9	0.534
Q10	0.578

The results and discussion of the data obtained in the form of a questionnaire. teacher perception results using interaktive e-books based PBL to enhance students' HOTS in Table 2

Table 2. Teacher's Perception Questionnaire Results (n= 50)

No	Question	Persentase (%)	
		Yes	No
1	Teacher knowledge about higher order thinking skills	74	26
2	Teacher's understanding of making test questions by practicing higher order thinking skills	72	28
3	The teacher's way of applying higher order thinking skills during science learning	73	27
4	The use of teaching materials that increase high order thinking skills ability	94	6
5	Teaching materials used by teachers in the learning process	58	32
6	How teachers obtain teaching materials	82	18
7	The need for teaching materials that can be accessed by mobile learning	100	0
8	Implementation of interactive teaching materials	88	12
10	The application of the learning model	24	76

The results showed that that 72% are not accustomed to assessing higher order thinking skills in science learning. Some educators already know that higher order thinking skills are about how to apply processing in remembering, analyzing, and learning strategies used to solve problems as much as 28% through educators' statements on the results of observations. However, it is still difficult for educators to apply questions that meet the HOTS standards and are still confused about what to do determine the appropriate models and methods in learning. learning activities are still centered on educators and students are less active in learning activities so that there are still many educators who have not empowered higher-order thinking skills in the learning process. The lack of effective teaching materials makes teachers deliver learning using methods that tend to be conventional (Hrin, Tamara, Dusica, Mirjana, & Sasa Horvat, 2017). This is supported by the results of observations in a preliminary study that as many as 58% of teachers only use e-books when learning online, namely Electronic Books (BSE) which are not interactive.

These problems need to be addressed. One way is to involve students to be more active in learning (Liliawati, 2011). To develop science learning, educators are required to design teaching materials that support learning. In the current era of digital technology, E-Learning is experiencing rapid development. In this case, educators need to use relevant learning media and learning resources to achieve the learning objectives as a whole (Development Team, 2007). This fact is supported by the results of observations in a preliminary study that as many as 100% of teachers need electronic-based teaching materials that can be accessed online. E-Learning leads to learning through electronic resources, and supports distance interactive learning. One of the supporting factors in the education system is to apply a learning model. With the learning model, it is expected to be a very important thing for increasing students' ability to get the knowledge that has been given by the teacher (Basaria & Leonard, 2018). Therefore, to apply E-learning learning strategies and models by applying teaching materials through electronic books

Problem Based Learning is suitable to be applied because it involves thinking activities to solve problems, correlates with cognitive function which contains various kinds of thinking activities (Izzaty, 2006). Educators only use ready-made e-books from the internet rather than preparing their own. Learning e-books circulating generally come

from electronic book centers issued by the government, and are not yet interactive so they are only read like ordinary textbooks. This fact was found in the field from the results of a preliminary study showing that 44% of educators who have used e-books downloaded from the internet and 36% obtained from publishers and only 4% of e-books made by educators themselves. Another fact shows that as many as 88% have not used PBL-based e-books. In general, educators answered that they had not yet mastered how to make PBL-based e-books due to lack of knowledge in technology (Science and Technology) and still had difficulty choosing materials that matched the PBL syntax. The results of the teacher's questions and responses are in Table 3.

Table 3. Teacher's Questions and Responses

No	Question	Teacher's Respons
1	What are the 21st century learning skills that students should have?	- Critical thinking and problem solving skills - Creativity skills - communication skills - HOTS skills
2	Have you ever heard the term higher order thinking skills?	- the ability to understand problems, by connecting the information obtained to get solutions in solving problems/scientific phenomena in a coherent manner - thinking skills that apply processing in activities to remember and restate something, related to the material given.
3	Have you trained in higher order thinking skills in science learning?	- Not yet, because it is difficult to determine suitable models and methods, lack of science and technology, lack of media, relevant teaching materials and teacher training need to be improved - Not yet, due to inadequate facilities, internet quota and lack of time for online learning - Not yet, because considering the diverse cognitive abilities of students, the HOTS questions have not yet been applied
4	What teaching materials have you been using?	- LKPD - Modul - Printed book
5	During this pandemic, how did you get books in science learning?	- Downloading from the internet - Teacher's book - Purchase at the publisher
6	Have the teaching materials used so far been interactive and able to develop students' higher-order thinking skills?	- Not yet mastered how to make interactive e-books - lack of science and technology

		•	lack of explanation and training to create interactive books that can develop HOTS
7	According to you, do you need to develop interactive e-books PBL in science subjects to enhance students' higher-order thinking skills ability?	•	Yes, because there are still not many relevant interactive e-books to serve as sources or guidelines in the learning process, as well as the use of language that is still difficult to understand for junior high school students
		•	So that students will be able to compete in the global world and collaborate to improve their abilities

Based on the explanation above, learning is still not optimal due to limited facilities and infrastructure so that teachers cannot integrate science and technology, limited learning resources, it is difficult to determine suitable models and methods so that they can affect students' cognitive abilities. The teacher is the dominant and influential factor in determining the quality of learning. Good quality learning, of course, will produce good learning outcomes as well (Wulandari & Surjono, 2013).

To overcome these problems, teachers must explore to find out what approaches and strategies might be used in the virtual classroom so as to support the success of the learning process. In involving student participation, the teacher said that technological support and facilities were important. The use of digital-based media must be balanced not only from the material or students, but no less important is the readiness of teachers to use e-book learning media. Teachers who are able to combine e-book media with appropriate learning models will create good learning so that the indicators outlined in the 2013 curriculum can be achieved (Kurniasih, 2019: 52). , schematics and appropriate graphic material (Bybee, 2013). E-book media is a combination of two things, namely a way to produce and deliver material that combines several forms of media that are controlled by computer technology (Arsyad, 2011). With computer technology, the development of learning programs becomes more focused, flexible, able to increase students' imaginations, concrete abstract chemical concepts through modeling, animation-simulation and more interesting and interactive learning (Mukhtar & Iskandar, 2010).

The use of learning media will be more effective if the teacher in the learning process optimizes learning activities in the classroom using a learning model that is in accordance with the material being studied by students (Yu, 2012). One of the science materials that is very close to the context in real life is environmental pollution because it is not enough to only teach science concepts, but science concepts must be prepared to answer the problems of everyday life (Hendri & Defianti, 2015). Problem based learning helps students use knowledge in understanding problems related to real life (Sanjaya, 2010). Learning with the PBL model provides an opportunity for students to develop the ability to identify phenomena that exist in the surrounding environment as a local area that has the potential to be used as learning media (Vasminingtyas (2014: 3). By using a problem based learning model, it will have a significant impact on the results. student learning in the form of knowledge, understanding, and thinking skills (Endogan & Senemuglu, 2014).

▪ **CONCLUSION**

The survey results show that teachers have positive perceptions of improving students' higher order thinking skills which are implemented through PBL-based interactive e-books. Based on the teacher's perception of the HOTS analysis that most teachers have not utilized students' higher-order thinking skills in the learning process. This is because the models and methods used by the teacher are not in accordance with the current learning process. The challenge of a teacher is to provide an education system that connects knowledge and skills that are not yet familiar to every student so that students are more dominant by memorizing concepts rather than connecting concepts with everyday life.

Despite the challenges of teaching science through virtual classrooms, teachers realized that they had to create a new learning environment. They are also aware of developing new interactive learning media to make online classes interesting. Based on these findings, it can be concluded that teachers need learning activities that can improve higher order thinking skills. In this regard, science learning requires the help of PBL models and interactive e-books that can actively involve students in the learning process.

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