Meta-Analysis: Improving Creativity through Assessment in a Problem-Based Learning Environment

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Abstract—**This study aims to determine the application of learning models PBL against aspects of the assessment in the authentic learning of physics. Application of the model will be examined from the results of previous research. This research used meta-analysis method. Meta-analysis is a review of a number of research results in similar problems. The unit of analysis in this study is written documents about the research application of authentic assessment in PBL learning model in the form of journal articles and research reports were taken by purposive based suitability with research themes. The main instrument of this study was that the researchers themselves were assisted by a documentation guide. The data analysis used was quantitative data analysis with percentage and qualitative data analysis for the data of result of narrative study to the researches encountered. The results of this study indicate that the assessment is authentic on the physics learning that is packed in PBL activities both cognitively and affectively can improve students' critical and problem-solving skills.**

Keywords-- Authentic Assessment, Problem Based Learning

I. INTRODUCTION

Assessment is an integral part of the learning process. Traditional assessment practices have changed to meet the needs of contemporary society[1]. This meta-analysis is based on the theoretical framework of several authors who identify the parameters for the main components of this paper: 1. problem-based learning, 2. authentic assessment tasks within this framework, there is no rote learning of facts and facts, students brainstorm problems, manage possible solutions, decide collectively on their learning objectives, do individual work to find the necessary information, then report back to synthesize and apply their new knowledge collective to the problem at hand[2]. This feature aligns with the essential factors needed for the original learning environment and to create the original real-world tasks used in the assessment. PBL learning begins with providing information related to the real world, students activate and learn, and relate the material to the problem, and when making solutions to the problems given. The learning process with PBL makes participants developed in the learning process [3].Watts agrees that "active learning, not passive, learning is about possession of skills, lifelong learning, etc[4]. While perhaps there are many that can remember the tedious and boring lessons in school; the main theme of effective learning is active learning[5]. Literature expresses a general consensus on some key elements of an authentic learning environment. It includes authentic contexts, authentic tasks, access to the thinking and modeling of experts about the process, the provision of various roles and perspectives, construction of knowledge, reflection, collaborative articulation to enable tacit knowledge made explicit, coaching and scaffolding, and assessment of authentic learning in the task. [6] added that the task must be had the relevance of the real world, not well defined, consists of tasks that must be investigated from time to time, examining the task from different perspectives, providing opportunities to collaborate, reflect, integrate and apply beyond domain specific results, seamlessly integrate with judgment, creating polished products and enabling diversity of results[7].In addition to the application of assessment, the application of learning models duse also has a role in training students' thinking skills. One of them is the Problem Based Learning model,[8] states that the PBL model is a learning model with student learning approaches to authentic and meaningful problems that serve as the basis for student inquiry, so students can develop their own knowledge, train higher skills and inquiry , memandirikan students, and increase self-confidence. [9]This learning model prioritizes the learning process where the task of the teacher as a facilitator must focus on helping students train thinking skills.[10]Authentic assessment will be meaningful for the teacher to determine the best ways so that all students can achieve the final results, even with different time units. Construction of attitudes, skills and knowledge is achieved through the completion of tasks where students have played an active and creative role. The involvement of students in carrying out tasks is very meaningful for their personal development. [11] asserts that traditional valuation methods for measuring achievement, such as multiple choice tests, are false, match, and others have failed to know the actual performance of students. The practice of learning with PBL that contains assessment changes the direction of teacher-centered learning interactions to learning that allows students to be actively involved in classroom learning activities.

Learning with PBL in which there is an assessment can occur if the teacher designs and implements learning

activities that begin with giving problems to students. The teacher functions as a facilitator, a mediator who provides problems and scaffolding needed by students to construct the knowledge needed. Problems used in the classroom are expected to help students to conduct investigations. The investigation process can motivate students to be actively involved in constructing the knowledge needed and foster a positive attitude towards learning. students taught with PBL have high-level intrinsic goals, can interpret assignments, be creative, be able to think critically, have confidence in their metacognitive and become independent learners and enhance the creativity of students.

TABLE 1:GENERAL CHARACTERISTICS OF PBL AND AUTHENTIC ASSESSMENT

Problem Based Learning	Authentic Assessment
Realworldsituations	Realworldtasks
CollaborativeWork	Collaborativeassessment
Co-constructedsolutions	Co-constructedassessment
Multipleoutcomes	Multipleproductsandartefacts

II. METHOD

The type of research used was a meta-analysis. Meta analysis is research conducted by researchers by summarizing research data, reviewing and analyzing research data from several pre-existing research results.Meta-analysis is quantitative because it uses calculation of numbers and statistics for practical purposes, namely to compile and extract information from so much data that is not possible with other methods [12]. Research data collection was carried out by researchers by tracing articles contained in online journals. The keywords used by researchers in searching the articles are "authentic assessment of," Problem Based Learning,""creativity". From the search results obtained several articles then selected articles that meet the criteria for authentic assessment in PBL to enhance students' creativity. Availability of data in terms of the sample used, objectives, method research design and data analysis. Then obtained score is analyzed by looking for percentages. The analysis technique used is the comparison method. Thus, the percentage level will be known both in terms of the sample used, the purpose, the method research design and the data analysis used in the study of authentic assessment in PBL.

III. RESULTS AND DISCUSSIONS

The research on assessments in PBL obtained is 15 researches. The studies were obtained from various sources, namely: articles (research results) in research journals and research reports. In general, the data obtained by downloading from the internet.Then the data was reported back in a qualitative and quantitative descriptive way. Data from the analysis of Problem Based Learning models can be seen as follows:

1. Meta-analysis based on research objectives

TABLE 2.OBJECTIVES OF THE ASSESSMENT STUDY

NO	Research purposes	Frequency	%
1	Test impact / influence	4	26.66
2	Develop / improve learning	3	20
3	Know the relationship	6	40
4	describe	2	13.33
Amount		15	100

2. Meta analysis based on the design

Assessment studies use several research designs: experiments, Research and development (R & D), correlational descriptions, comparative, survey and classroom action research. Based on the study of 15 research journals on assessment, the design used canbe seen in the following table:

TABLE 3.DESIGN IN ASSESSMENT RESEARCH

No	Research design	Frequency	%
1	Experiment	4	26.66
2	R & D	3	20
3	Survey	5	33.33
4	PTK	3	20
amount		15	100

3. Meta-analysis based on population / sample

The population / sample used in the assessment studies or who were the subjects of the study were students at the school from three levels. Based on the study of 15 research journals on assessment, the people who made the population / sample can be seen in the following table:

TABLE 4.POPULATION AND SAMPLE IN ASSESSMENT STUDY

No	Research design	Frequency	%
1	Elementary / Equal Students	1	6.66
2	Junior / Equal Students	1	6.66
3	High school students / equal	5	33.33
4	College student	8	53.33
	Amount	15	100

The application of assessment in learning can improve student / student competence, one of which is to increase students' critical thinking skills in problem based learning which uses authentic assessment in the form of: performance assessment, self assessment and peer assessment [13] use of assessment Aoutentik is able to stimulate students / students to carry out creativity and students' problem solving skills through formulation of problems to conclusions and communication techniques.

4. Meta-analysis based on methods / techniques of data collection

Methods/techniques of data collection used in research assessments consist of: test methods, observation, questionnaires and interviews. Based on the study of 15

studies of teaching style, the methods / techniques of data collection used can be seen in the following table:

TABLE 5.METHODS / TECHNIQUES OF DATA COLLECTION

No	Research design	Frequency	%
1	Test	3	20
2	Observation	6	40
3	Questionnaire	5	33.33
4	Interview	1	6.66
	amount	15	100

5.Meta analysis based on data analysis

Analysis of data used in research on assessment consists of:

TABLE 6.POPULATION AND SAMPLE IN ASSESSMENT STUDY

No	Data analysis	Frequency	%
1	Quantitative descriptive	5	33.33
2	Qualitativedescriptive	3	20
3	Test t	4	26.66
4	Anova	3	20
Amount		15	100

Based on the results of the study, it was found that based on the highest research objective the percentage was to know the relationship with the percentage of 40% while the lowest percentage was to describe, 13.3%. For research design, the highest percentage is survey of 33.33% while the lowest are R & D and PTK. For population / sample, College student is the highest 53.3%, while the lowest is Junior / Equal Students and Elementary / Equal Students 6.66%. Meta-analysis based on methods / techniques of data collection with the highest percentage is observation, 40%,; the lowest percentage is interview, 6.66%.For data analysis, the highest percentage is quantitative descriptive, 33.33% while the lowest percentage are descriptive qualitative and ANOVA, 20%.

Based on the results of the above, it can be seen that each research carried out results in different percentages of research. The author analyzes that differences in technique research that has been conducted by researchers is caused by several factors, such asrespondents' criteria and the level of target inaccuracy to research subjects. Population and research samples also influence the research results obtained because they come from different criteria. The level of ability of research subjects is also different so that it also affects the learning outcomes obtained. Application of different research objectives can also be an impact of learning outcomes. Likewise, the data analysis used will explain and describe the decisions taken.

Overall, assessment in PBL has almost a positive effect on Increased creativity of students. From the subject of the different levels of education in which the assessment in PBL is applied, the research findings show that the application of PBL is more effective for students in senior high school and higher education compared to students at the primary and junior secondary levels. this means that the assessment in PBL can be applied to students at the education level of senior high school and college. But the results of the meta-analysis show that the application of PBL is more effective for students at the tertiary level. This is because the learning burden and learning material of students at the higher education level is higher than the students in the high school level, so that the influence of PBL on the creativity of students at the higher education level is higher than the students at the high school, high school level First and elementary school.

From the assessment of learning objectives, assessment in PBL has the highest positive effect on knowing the relationship, but gives a low effect on the development / improvement of learning. Assessment in PBL provides the highest positive effect on students' creativity and problem solving skills. This is a logical thing, because in learning, assessment in PBL starts with giving problems related to the real world, students then actively formulate problems and identify their knowledge, learn and associate material with problems, and ultimately make solutions to problems given is accompanied by an assessment in the learning process. So that creativity and problem solving skills in learning that use PBL will be formed.

IV.CONCLUSION

Based on the results of research and discussion, it can be concluded that the assessment in PBL of the research objectives that are widely reviewed is toknow the relationship, 40%. Then the research design used is survey, 33.3%. For the population and sample, the students were 53.3%. Then the method of data collection is observation as much as 40% while the data analysis used is quantitative, 33.3%.assessment in PBL is very good when used on level students High school and tertiary institutions, because high school students and students are good at carrying out solving activities through the formulation of coming to conclusions and being able to communicate in the learning process. Meanwhile for data collection techniques, namely surveys because by conducting surveys can see all student activities in the problem-based learning process.

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