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Skill and Performance Assessment Using Problem Based Learning in TVET

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***Abstract*—The study of performance assessment using the problem based learning approach is not only done in the field of technical vocational education but also in the fields of health education, economic education, environmental education. Development of performance assessment studies in vocational schools with various research objectives is still rare in the technical field. Given the importance of assessment, especially by using the 2013 curriculum which is required to use 21st century learning strategies, one of which is Problem Based Learning (PBL). This article aims to explore whether performance assessment is suitable for use with PBL learning strategies especially in improving students' skills using systematic literature reviews. The results show that many countries have implemented performance assessment using the PBL approach. The fields that are the focus of the review in this article include improving the results of formative assessment, using the context of the problem to assess knowledge and skills and problem solving skills. Using a systematic literature review, this article aims to explore the extent of the current development of school mapping, to analyze the types of mapping tools used as school mapping tools, and to explore data and information presented in school mapping. The result, even though there are recommendations using the Problem Based Learning approach with performance assessment, the reviews in this article show a lack of practical application in general matters. This article provides an overview of opportunities for developing performance assessment using the PBL approach for vocational schools to improve students' skills.**

Keywords—strategy; performance assessment; problem based learning (PBL); skills

I. INTRODUCTION

Assessment is not only done in the field of education, but the assessment process is carried out in various disciplines, such as health, environment, and economics [1-3]. Regarding assessment in education, learning is not only seen as scoring or grading through a series of tests, but also must be an integral part of learning [4]. If done incorrectly it will affect the opportunities of students in the present and the future. Therefore the evaluation must be conducted fairly and transparently [5]. Changes in assessment strategies are needed to measure the skills needed in a highly complex global environment [6]. The role of assessment in learning is used to measure what learners know and need based on data collected from students which serves as evidence of learning [7]. However, most of the assessment process is only used to predict and document student learning outcomes by giving scores and ranking [8,9].

Thus, an assessment strategy is needed that is suitable to be used to support the measurement of student performance in real terms. Authentic assessment is an assessment that allows students to develop their knowledge and skills in accordance with their duties for the future [10]. Performance assessment which is part of authentic assessment is used as a summative evaluation strategy to capture knowledge of something and its skills will apply what students know in real situations [11]. Performance testing as a new assessment to equalize international standards, requires the ability of students not only to do multiple choice tasks and choose answers, but must make responses to their answers. By utilizing thinking skills as the ability to explain their thinking performance appraisal will provide a clearer picture of student advantages and disadvantages [12].

Problem Based Learning (PBL) is a teaching approach that involves students with various student questions related to the real world [13]. PBL is done collaboratively to find solutions to authentic questions and problems that are meaningful in accordance with reality [14]. Therefore PBL is one of the 21st century learning methods that is in accordance with the authentic assessment that became the assessment method in the 2013 curriculum in the Vocational School.

Performance appraisal using PBL strategy is a topic of research that has recently been quite talked about because of its relevance to 21st century skills that require a more in-depth, fair and transparent performance assessment system using PBL learning strategies in the 2013 curriculum including learning strategies in the 21st century The literature review in this paper about the assessment of skills performance in PBL learning strategies for vocational school students will be presented from 2003 to the present. Various views in providing summaries of related topics, criticisms of related topics and the methods used in the study will be presented in this literature. Researchers can use this information to identify and answer problems in this study. The researcher can also determine the research instructions on the assessment of skills performance in PBL learning strategies for vocational school students in the future.

Further discussion will be arranged systematically, starting from the "background" of this article, by providing a brief overview of PBL learning strategies that use performance appraisal techniques. Then proceed with how to find appropriate and relevant studies and literature and how to analyze this study in the method section, so that research can be identified and findings will be presented in the results section followed by the discussion section and conclusions from the literature study conducted

II. THEORETICAL FRAMEWORK

A. Skills

In the Indonesian dictionary (KBBI) skills means skills [14]. Skills means developing the knowledge gained through training and experience by carrying out some task skills not only possessed by every person, but also helping to produce a value more quickly [15]. Skills are an ability to operate jobs more easily and precisely [16]. Skills are divided into 4 categories, namely: 1. Basic Literacy Skill: Basic skills that everyone must definitely have such as reading, writing, counting and listening. 2. Technical Skill: Technical expertise gained through learning in engineering fields such as operating computers and other digital devices. 3. Interpersonal Skill: Everyone's expertise in communicating with each other such as listening to someone, giving opinions and working in a team. 4. Problem Solving: A person's expertise in solving problems using logic [17].

Robbins states that abilities / skills are:

"Ability to refer to individuals' capacity to perform various tasks in the job. It's a current assessment of what one can do. An individual's overall abilities are essentially made up of two sets of skills: intellectual and physical". This opinion explains the ability of individuals to carry out various kinds of tasks in work is a present assessment of what someone can do. The overall ability of an individual is essentially shaped by expertise, namely things that are intellectual and physical. By having skills that can be used in their jobs, they will be ready to work because they already have the skills. In addition to training needed to develop abilities, skills also [18].

B. Performance Assessment

Performance-based assessment "represents a set of strategies for applying knowledge, skills and work habits through meaningful task performance and engaging with students. This type of assessment provides teachers with information about how a child understands and applies it. In addition, teachers can integrate performance-based assessment in the learning process to offer additional learning experiences for students [19]. Authentic tests are called performance appraisals or performance-based assessments, because in this assessment the assessment is directly to measure students' actual (real) performance in certain things, students are asked to do meaningful tasks by using real or authentic assignments or contexts [20], but there are those who state that authentic performance and assessment are not the same, and that performance appraisal is "authentic" so far based on tasks challenging and interesting ones that draw address the context in which adults perform their duties [21].

The benefits of performance-based assessment can be well documented by teachers in their classrooms. These teachers feel they don't know enough about how to judge students' skills fairly. Another reason for reluctance to use performance-based assessments may be previous experiences that are unsuccessful or the results are inconclusive [19].

C. Problem Based Learning (PBL)

Problem-based learning (PBL) in small groups is a teaching method designed to respond to a number of concerns about lecture-based and facts and curriculum-based information [22]. The PBL approach is believed to be an effective learning that encourages students as independent learners. PBL also supports the development of critical thinking skills, leadership, and working in groups [23]. Therefore, students who develop skills in the scientific process will produce solutions to their problems by asking questions, discussing ideas, making observations and predictions, conducting experiments, collecting and analyzing data, and drawing conclusions [24].

According to Barrows, four main objectives must be achieved for a truly problem-based approach: (a) compile knowledge for better memory and application in a clinical context, (b) develop effective clinical reasoning processes (c) learning development independently, and (d) increase motivation to learn [25]. If PBL is done well it is an effective teaching tool [26].

III. METHOD

The method used in this article is a systematic literature review. This method is used as a means of identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or interest phenomenon [27] This method was chosen to reduce bias so that it was done using a strict methodology [28] Systematic literature review can present a fair evaluation of the research topic using a methodology that is reliable, rigorous, and can be audited [29]

The systematic literature review used in writing this article uses a qualitative approach. The use of qualitative approaches in a systematic review is intended to synthesize or summarize the results of qualitative descriptive research [30]. Thus, a systematic literature review with a qualitative approach in this article is intended to synthesize, explore, and summarize various developments in research related to the use of performance assessment using PBL strategies at vocational schools in various places.

The Systematic literature review method using a qualitative approach is carried out with several stages including [31]: 1) Formulating research questions (formulating the review question); 2) Perform a systematic review literature (conducting a systematic literature search); 3) Conduct screening and selection of suitable research articles (screening and appropriate research articles); 4) Carry out analysis and synthesis of qualitative findings (analyzing and synthesizing qualitative findings); 5) Implement quality control (maintaining

quality control); 6) Prepare the final report (presenting findings). The first step is explained in the introduction. The second stage of the literature search is systematic. The literature search process is carried out from various online sources. The database used as literature is Google Scholar, Scopus, Science Direct, Sagepub, ERIC, and Researchgate. The keywords used for the search process are performance assessment, PBL (Problem Based Learning), vocational school, authentic assessment, skill assessment, assessment for vocational education, vocational education, performance assessment skills, learning using PBL, and learning outcomes with PBL. Specific criteria for filtering the literature traced and included in the third stage, namely articles published in the last eighteen years, namely the range between 2000-2018. Articles used in the form of journals, both research articles and literature reviews.

Articles that have been traced are then examined by the researcher with reference to the discussion in this article, namely assessment, learning strategy, and the place where they are applied. Then the fourth stage analyzes and synthesizes articles that have been obtained, provides a review of argumentation theory and provides logical argument writing. In the fifth stage, a re-check of the articles used is carried out. The final stage of the article is arranged in its entirety from beginning to end in the conclusions section. Articles collected, reviewed with help Table 1.

TABLE I. SUMMARY OF PERFORMANCE ASSESSMENT ARTICLES WITH PBL

No.	Title	Context	Method	Participants	Main Point	Relations with the research topic
1.	Nendaz, Mathieu R Tekian, Ara Assessment in Problem-Based Learning Medical Schools: A Literature Review	This work focuses on the research literature published on assessment in PBL curricula, with the following goals: Report the published assessment experiences of PBL medical schools, analyze how recommendations are fulfilled, and highlight potential areas to be improved or investigated	Literature Review	94 citations found, 19 dealt with general aspects of assessment in PBL, 60 addressed assessment issues in the context of PBL applied totally or partially to the curriculum, and 15 were related to PBL applied to a single discipline	Despite the existence of general practical recommendations on assessment in PBL settings, this review reveals a lack of uniformity and consensus on the practical application of general principles	Assessment with a problem based learning
2.	Brualdi, Amy. Implementing Performance Assessment in the Classroom	The purpose of this digest is to outline the basic steps that you can take to plan and execute effective performance-based assessments.	Rubric criteria development	Student	While it is a standard procedure for teachers to assess students' performances, teachers may wish to allow students to assess them themselves. Permitting students to do this provides them with the opportunity to reflect upon the quality of their work and learn from their successes and failures.	Implementing Performance Assessment
3.	Gijbels, David Dochy, Filip Van den Bossche, Piet Segers, Mien Effects of Problem-Based Learning: A Meta-Analysis From the Angle of Assessment	This meta-analysis investigated the influence of assessment on the reported effects of problem-based learning (PBL) by applying Sugrue's (1995) model of cognitive components of problem solving	Literature review than each study had to be conducted in a real-life classroom or programmatic setting rather than under more controlled labora-tory conditions	Student	From the homogeneity analysis, it is clear that the method of assessment has an important influence in the reported effects of PBL, as stated above, but also that other moderators of PBL play a substantial role when the effects of PBL are exam-ined. Study design, scope of implementation, and year of study have been shown to be possible moderating variables in the reporting of the effects of PBL	Assessment with a problem based learning

IV. RESULT AND DISCUSSION

Based on the results of systematic literature studies, learning carried out using PBL learning strategies with performance assessment is still not widely discussed. Though based on one study explained that helps explain the reliability and validity of PBL with performance assessment tools, which can be adopted or easily adapted for use by other institutions. On the other hand it is also stated that the valuation method has an important influence on the PBL effect. In addition, using performance-based assessments can be well documented and can help teachers in their classrooms.

The implications of assessment and the degree of measured knowledge structure must be considered when one examines the effects of problem-based learning, and may have to be considered in all comparative education research. The teacher can also involve students in the process of developing criteria in making rubrics by showing them examples of the same tasks performed / projects completed at different levels and discussing the extent to which the different elements of the criteria are displayed.

The following areas seem to need special attention in subsequent research: continuous improvement of formative evaluation; use of the context of work problems to assess knowledge and skills; solve the problem; prevention of negative effects by selecting content, instruments and time of assessment. Despite the various assessment methodologies used in PBL, no single choice arises, and the diverse triangulation of instruments is needed to get a fair assessment of students. In addition, the choice of instruments must depend not only on their individual nature, but also on the characteristics that can be brought to the instructional value globally from an assessment plan.

V. CONCLUSION

The valuation methodology used in PBL is not only performance assessment, but also towards fair and transparent student assessment, not subjective in conducting assessments. However, with performance assessment the teacher can organize neatly the assessment of students and can see the development of students as a whole. Fair and transparent assessment will certainly trigger students' motivation gradually in understanding a learning material.

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The researcher recommends the use of a performance assessment to assess students 'skills by using problem based learning in vocational school learning because it can assess students' skills thoroughly because students are required to solve problems according to their respective skills so as to produce an assessment of each student differently from one another.

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