The Implementation of Problem Based Learning in the 2013 Curriculum

H. Sofyan[1], K. Komariah[2], Wagiran[3]
[1]Automotive Engineering Education Department
[2]Cullinary and Fashion Education Department
[3]Mechanical Engineering Education Department
Engineering Faculty, Yogyakarta State University
Yogyakarta, Indonesia
hermin@uny.ac.id

Abstract— This study was aimed at: (1) describing teachers' readiness to implement problem-based learning in 2013 curriculum context; (2) describing the learning profiles in 2013 curriculum implementation; and (3) describing the potential implementation of problem-based learning in 2013 curriculum context. This survey research was done at 10 Vocational High School in the Special District of Yogyakarta. The population were teachers at Vocational High School, especially in automotive, machinery, and culinary programs. A sample of 100 teachers were determined using purposive sampling technique. Data were collected through questionnaires and interviews. The data were analyzed using descriptive methods. The result of descriptive analysis showed that: (1) teachers' readiness to implement problem-based learning in 2013 curriculum context is in the middle category with a mean of 100,67, grade score of 71,91%; (2) learning profiles in 2013 curriculum implementation curriculum is in the high category with a mean of 150,52, grade score 78,40%; (3) Problem-based learning is highly potential to be implemented in 2013 curriculum context. In the implementation of problem-based learning, teachers need training, guideline book, lesson plan, teaching aids/media, and assessment formula.

Keywords: teachers, vocational high school, 2013 curriculum

I. INTRODUCTION

Vocational education, in this case, the Vocational high schools (SMK) which prepare the students, mainly to work in certain field (Act of The Republic of Indonesia Number 20 of 2003) have strategic role in preparing human resources, specifically a mid-level workforces. Both field experience and development plan projection data showed that in terms of the requirement prospect and economic qualification, vocational education is still a decent investment in order to prepare a mid-level skilled workforces (Sukamto, 1998:110). The paradigm of vocational education development in the future is certainly tied to the characteristics of the working world and workforces required in the upcoming era. In the view of vocational education, the underlying question needed to be answered is how relevant is the learning outcome produced by the educational world with the workforces characteristics required in the future. Several studies formulated the learning outcome needed by the graduates in facing the future employment challenges. The Partnership for 21st Century Skills (www.21centuryskills.org; Wagiran, 2012) formulated 21st century student outcomes and support system shown in Figure 1.
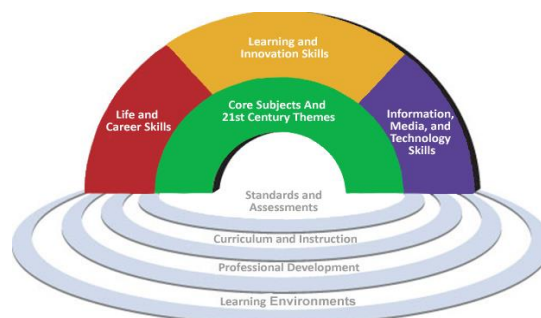

Figure 1. 21st Century Student Outcomes and Support System

The thought illustrated in Figure 1 showed a holistic view about the required learning in order to create a graduate with a comprehensive competence. This competence includes the aspects of basic abilities (language, art, mathematics, economy, science, geography, history, and civics); learning ability and innovation (creativity and innovation, critical thinking, communication, and collaboration); information, media, and information technology processing ability; and also life and career skills. Seen from the dimensions illustrated in the expected competences, it's clear that character building is a must for the graduates in order to prevail in the upcoming era.

The implementation of 2013 curriculum is one of the government's efforts to improve the quality of graduates suitable to the goal of education. The changes of 2013 curriculum is expected to produce Indonesian humans who are productive, creative, innovative, and affective through integrated improvements of attitude (know why), skills (know how), and knowledge. This is done in order to welcome the development of science and living in the 21st century, which experienced changes in the characteristics and model of learning. Figure 2 shows the changes of 21st century learning paradigm based on the characteristics of 21st century and the supposed learning model (www.kemdikbud.go.id)
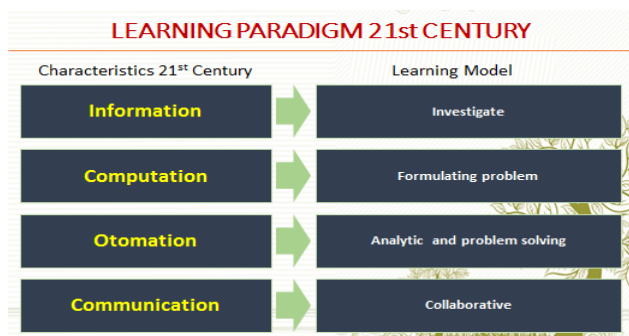
Figure 2. 2013 Curriculum Development Paradigm

Figure 2 shows the position of integrated 2013 curriculum as well as the theme in 2013 curriculum development. In order to achieve the theme, a creativity-supporting learning process is needed. Therefore, a curriculum prioritizing personal experiences through observing, asking, reasoning, and trying process (observation-based learning) to improve the creativity of students need to be made. On the other hand, the students need to be familiarized with working in networks through collaborative learning.

2013 curriculum development is expected to be able to encourage the students to be active and creative in observing, asking, reasoning, and communicating (presenting) what they gained or knew after they received the learning materials. Through 2013 curriculum development, the students are expected to possess a far better attitude, skills, and knowledge competence. The students are expected to be more creative, innovative, and productive. At least there are five entities: each students, teachers and educators, educational unit management, the state and nation, and also general public, that are expected to experience a change.

The change of curriculum demands a change of learning paradigm from teaching to learning from teaching community to learning community. Consequently, teachers are demanded to be creative and innovative in designing a learning so the students are motivated and pleased when a learning occurs. Therefore, there must be efforts from teachers on how to develop learning process to be interesting, pleasing, and motivating the students to do self-learning.

Problem-Based Learning (PBL) is one of a learning method worthy to develop alongside the demand of learning in the 2013 curriculum implementation. This is in-line with the PBL characteristic itself as a constructivistic learning method orienting at student- centered learning that is able to grow a spirit that is creative, collaborative, metacognitive thinking, developing high-level thinking, improving the understanding of meanings, improving independence, facilitating problem-solving, and developing teamwork. Therefore, the formulating effort of this learning model is urgently needed in order to improve the effectiveness of 2013 curriculum implementation. But until now, the suitable model and formula in the PBL implementation to be used as the learning guide, especially in vocational high schools, hasn't been found. Consequently, a study or research to formulate PBL model effectively proven as

a model for vocational high schools. The result of this research is expected to be a reference for vocational high schools in Indonesia in implementing a learning in-line with the learning demand in 2013 curriculum implementation.

Problem-based learning is an approach oriented at constructivistic cognitive view containing contextual, collaborative, meta-cognitive thinking, and problem-solving facilitation characteristics. Students are allowed to learn meaningfully that is able to develop high-level thinking ability through problem solving. This learning is expected to be able to improve the understanding of meanings, independence, high-level thinking skill, motivation, inter-student relation facilitation, and teamwork building skill. *(*http://edweb.sdsu.edu/clrit/learningtree/PBL/PBLadvantages.htm*)*. Problem-based learning is also a learning centered on the students, based on the real world problems (http://www.pbli.org/pbl/pbl.htm). This is in-line with the expected learning paradigm in the 2013 curriculum implementation, as stated in The Regulation of the Minister of Education and Culture of the Republic of Indonesia number 65 by 2013 (*Peraturan Menteri Pendidikan dan Kebudayaan No. 65 Tahun 2013*) that in order to strengthen scientific, integrated thematic (inter-lessons thematic), thematic (in a lesson) approaches, a learning based on discovery / inquiry need to be implemented. In order to boost the ability of students to produce contextual creation, be it individual or group, it is highly suggested to use the learning approach that produces creations based on problem solving (project-based learning), including problem-based learning.

Problem-based learning is also a learning approach using real world problems as a context for students to learn about how to think critically and problem solving skill, and also to gain essential knowledge and essence from study materials (Nurhadi, 2004). Therefore, PBL is a learning guided by problems. Initially, students are given problems. In this case, a new knowledge to solve it is needed (http://chemeng.mcmaster.ca/pbl/pbl.htm). Similar thought was stated by James Rhem, that:

"PBL seems self-evident: it's learning that results from working with problems. Official descriptions generally describe it as "an instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions". (www.ntlf.com/html/pi/9812/pb)

Problem-based learning is also a learning centered on the students, and based on real world problems (http://www.pbli.org/pbl/pbl.htm). More PBL characteristics are: (1) students have to be keen to the learning environment, (2) problem simulation used should be ill-structured, and encouraging free discovery (free for inquiry), (3) the learning is integrated in various subjects, (4) the importance of collaboration, (5) the learning should encourage students' independence in solving a problem, (6) problem solving activity should be representative of real world situations, (7) the scoring should reveal the students' progress in achieving the goal of the problem solving, (8) PBL should be the base of the curriculum, not only a learning.

II. METHODOLOGY

This study is a descriptive research conducted to teachers in five vocational high schools (SMK) of machinery, automotive, and culinary fields. Sample is determined purposively a number of 100 teachers. Data gathering is done by using questionnaire and interviews. Data was analyzed descriptively.

III. STUDY RESULT AND DISCUSSION

Teachers' Readiness in 2013 Curriculum Implementation

Vocational School teachers' readiness in 2013 curriculum implementation variable data was obtained by using closed questionnaire with 35 number of items. Minimum score per item is 1, and 4 is maximum (4 alternative answers). Therefore, the determined score range for headmaster leadership variable is from 35 to 140; average criteria (Mi) is 87,5; and the standard deviation (Sdi) is 17,5. Based on the research data, the score range was found at 61 – 140; mean is 96,73; median is 96,50; mode is 101; and standard deviation is 15,242.

The tendency and readiness of vocational school teachers in 2013 curriculum implementation can be known by comparing the empirical research result averages with the determined criteria averages. From the calculations, the empirical research result average value was found at 100,67. The value is larger compared to the criteria averages of 87,5. This shows that the readiness of vocational school teachers in 2013 curriculum implementation on overall was higher than average. Subsequently, the tendencies of each scores was differentiated into four categories ranging from 35 to 140. The detailed illustration is shown in Table 1.

TABLE 1. PERCENTAGE OF SCORE TENDENCIES OF VOCATIONAL SCHOOL TEACHERS' READINESS IN 2013 CURRICULUM IMPLEMENTATION

No.	Category	Total	Percentage (%)
1	Very High	15	15
2	High	45	45
3	Average	38	38
4	Low	2	2
5	Very Low	-	-
		100	100

Based on the tendency percentage on Table 1, it can be known that the vocational school teachers' readiness in 2013 curriculum implementation in general is on the high to very high category. This is in-line with the analyzed averages of research result.

By using the descriptive analysis, the achievement score of vocational school teachers' readiness in 2013 curriculum implementation can be known by comparing the achieved total score (empiric) with the determined highest total score. For the vocational school teachers' readiness in 2013 curriculum implementation variable, the total score was 100,67, and the determined highest total score was 140,00, so the vocational

school teachers' readiness in 2013 curriculum implementation variable achieved 71,91% of the determined highest score.

Vocational school teachers' readiness in 2013 curriculum implementation can also be observed from the averages and score achievement of instrument items. Top ten of the aspects that show the vocational school teachers' readiness in 2013 curriculum implementation can be seen in Table 2.

TABLE 2. TOP 10 VOCATIONAL SCHOOL TEACHERS' READINESS IN 2013 CURRICULUM IMPLEMENTATION ASPECTS WITH THE HIGHEST SCORE.

Item No.	Statement	Average	Score Achievement (%)
1	Understanding the need of mindset change in 2013 curriculum implementation	3,12	78
2	Understanding the signs of RPP preparation	3,08	77
3	Understanding the rationale behind the 2013 curriculum	3,03	76
4	Understanding the future challenges that underlies the enactment of 2013 curriculum	3,03	76
5	Creating a design of book usage as the learning source	3,03	76
6	Analyzing the theme suitability with the competence of which a student is expected to master	2,99	75
7	Preparing RPP with scientific approach	2,99	75
8	Designing examination assessment	2,99	75
9	Understanding the strategy of using teachers books for learning activity	2,96	74
10	Master the materials, structures, and scholarly thought patterns of lesson materials	2,96	74

Based on the data in Table 2, it can be observed that teachers have high level of readiness in the need of mindset change, RPP preparation, and understanding the rationale behind the enactment of 2013 curriculum. Other aspects felt to have high level of readiness are the understanding of future challenges, creating book usage design, preparing RPP with scientific approach, designing examination assessment, and using teachers books. Another delightful aspect is the mastery of whole lesson materials.

The teachers' unpreparedness aspect in 2013 curriculum implementation can be observed from the top 10 of items with the lowest score achievement, shown in Table 3.

TABLE 3. TOP 10 ASPECTS OF TEACHERS' UNPREPAREDNESS IN 2013 CURRICULUM WITH THE LOWEST SCORE.

No.	Statement	Average	Score Achievement (%)
1	Assessing RPP made by colleague teachers / friends	2,69	67
2	Designing a learning with project-based learning approach	2,72	68
3	Analyzing the suitability of student books with the curriculum (SKL, KI, KD)	2,75	69
4	Designing a learning with discovery	2,75	69

No		Averages	Score Achievement (%)
	approach		
5	Designing an assessment with authentic assessment approach	2,75	69
6	Designing an assessment with performance assessment approach	2,75	69
7	Applying a learning with discovery learning approach	2,75	69
8	Applying a learning with project-based learning approach	2,75	69
9	Applying an assessment with authentic assessment approach	2,75	69
10	Applying an assessment with performance assessment approach	2,75	69

Based on the data in Table 3, it can be observed that the main aspects that show the teachers unpreparedness in 2013 curriculum implementation stems from the planning and applying the discovery, authentic assessment, and project-based learning approaches. Other aspects are including the ability to analyze the linkage of SKL, KI, KD with the teachers books content, the application of performance assessment approach, and the application of scientific approach. The teachers unpreparedness seemed to stem from the lack of understanding about the learning and assessment expected from 2013 curriculum implementation.

1) The Learning Application in 2013 Curriculum Implementation

Learning implementation with 2013 curriculum demands variable data was obtained by using closed questionnaire with 48 items. The per item score at minimum is 1, and 4 at maximum (four alternative answers). Therefore, the score range determined for the learning implementation with 2013 curriculum demands suitability variable is from 48 to 192, criteria averages (Mi) of 120, and criteria standard deviation (Sdi) at 24. Based on the data of research result, the score range was between 115 and 198, the mean value is 152,26, median is 149, mode is 149, and standard deviation is 19,639.

The tendency of learning implementation with 2013 curriculum suitability variable data can be known by comparing the value of empirical research result averages with the averages of the determined criteria. From the calculation result, the obtained empirical average is 150,52. This value is larger than the criteria average of 192,00. This shows that the suitability of learning implementation with 2013 curriculum demands on overall is categorized as above average. Subsequently, the tendency of each scores can be differentiated into five categories that has a range of 48 to 192. The detailed illustration is shown in Table 4.

TABLE 4. THE PERCENTAGE OF LEARNING IMPLEMENTATION WITH THE 2013 CURRICULUM DEMAND VARIABLE SCORE TENDENCIES

No	Category	Total	Percentage (%)
1	Very High	30	30
2	High	61	61
3	Average	9	9
4	Low	-	-
5	Very Low	-	-
		100	100

Based on the percentage of variable data tendencies, it can be known that the suitability of learning implementation with the 2013 curriculum demand in general is categorized as high to very high. This is in-line with the analyzed research result averages.

By using the descriptive analysis, it can also be known the suitability variable score achievement of learning implementation with 2013 curriculum demands by comparing the total achieved empirical score with the determined highest total score. For the learning implementation with 2013 curriculum demands suitability variable, the total score is 150,52, and the determined highest score is 192,00, so the learning implementation with 2013 curriculum demands variable score achieved 78,40% from the determined highest score with "high" category.

The aspects of learning implementation suitability can be observed in detail in introduction aspect, core activity, and closing seen from Table 5 to Table 8.

TABLE 5. LEARNING IMPLEMENTATION WITH 2013 CURRICULUM DEMANDS SUITABILITY INTRODUCTION ASPECT

No	Statement	Averages	Score Achievement (%)
1	Presenting the benefits of learning materials	3,32	83
2	Presenting the abilities the students will achieve	3,27	82
3	Presenting the activity plans, such as individual, teamwork, and observation.	3,22	81
4	Relating the current learning materials with previous experience of the students	3,22	81
5	Demonstrating something related to the theme	3,19	80
6	Asking a challenging question	3,02	76

TABLE 6. TOP 10 SUITABILITY ASPECTS OF LEARNING IMPLEMENTATION WITH HIGH SCORES

No	Statement	Averages	Score Achievement (%)
1	Adjusting materials with the learning goals	3,26	82
2	Encouraging students to ask questions	3,26	82
3	Facilitating the students to ask questions	3,26	82
4	Facilitating the students to observe	3,26	82
5	Showing an open attitude toward the students' response	3,26	82
6	Executing the learning suitable to the competence to be achieved	3,23	81
7	Motivating the students' active participation	3,23	81
8	Responding positively to students' active participation	3,23	81
9	Showing a conducive interpersonal relation	3,23	81
10	Motivating a joy or enthusiasm of students in learning	3,23	81

No	Statement	Averages	Score Achievement (%)
1	Applying project-based learning	2.85	71
2	Facilitating students to synthesize	2.85	71
3	Applying discovery learning	2.85	71
4	Facilitating students to interpret	2.97	74
5	Applying scientific approach	2.99	75
6	Facilitating students to assess	2.99	75
7	Facilitating activities that has exploration, elaboration, and confirmation components	3.05	76
8	Using projects / activities as media	3.05	76
9	Giving problems to give the students a chance to do a problem-solving process	3.05	76
10	Using various learning medias	3.05	76

TABLE 8. LEARNING IMPLEMENTATION WITH 2013 CURRICULUM DEMANDS SUITABILITY CLOSING ASPECT

No.	Statement	Averages	Score Achievement (%)
1	Giving oral or written examinations	3.18	80
2	Accumulating work results as portfolio materials	3.15	79
3	Reflecting or creating a summary involving the students	3.12	78
4	Applying authentic assessment	3.06	77
5	Doing a followup with giving directions to the upcoming activity and enrichment assignments	3.06	77

Based on the data from Table 5 to Table 8 above, it was seen that the learning implementation in introduction and closing aspect has a high suitability, while on the core activity, the unsuitability generally stems from the lack of application of scientific, project-based, discovery learnings, and authentic assessment.

2) The Potential of Problem-Based Learning in 2013 Curriculum Implementation

The potential of problem-based learning in 2013 curriculum implementation in vocational high schools was obtained through 14 items questionnaire. The complete result is shown below:

a) Understanding of Problem-Based Learning
- 8 persons or 8% teachers stated that they understand PBL thoroughly
- 75 persons or 75% teachers stated that they understand PBL mostly
- 17 persons or 17% teachers stated that they don't really understand PBL

b) Implementation of Problem-Based Learning
- 4 persons or 4% teachers stated that they never implemented PBL before
- 41 persons or 41% teachers stated that they are trying to implement PBL
- 5 persons or 5% teachers stated that they have implemented PBL once
- 34 persons or 34% teachers stated that they have implemented PBL more than once
- 16 persons or 16% teachers stated that they have felt the benefit of PBL implementation

c) Understanding about Problem-Based Learning Principles
- 55 persons or 55% teachers stated that they understand PBL principles mostly
- 45 persons or 45% teachers stated that they haven't understood PBL principles

d) Information about Problem-Based Learning
- 8 persons or 8% teachers stated that they never get socializations about PBL
- 84 persons or 84% teachers stated that they received socializations about PBL held by school or other institutes.
- 8 persons or 8% teachers stated that they get PBL information from literatures.

e) Information Delivery about Problem-Based Learning in a Training
- 63 persons or 63% teachers stated that PBL was presented in 2013 curriculum training
- 37 persons or 37% teachers stated that PBL was not presented in 2013 curriculum training

f) Implementation of Problem-Based Learning in Vocational School
- 13 persons or 13% teachers stated that they are still learning the PBL implementation
- 44 persons or 44% teachers stated that some teachers have implemented PBL
- 23 persons or 23% teachers stated that they implemented PBL effectively
- 20 persons or 20 % teachers stated that they implemented PBL continuously

g) Suitability with Scientific Approach
- 90 persons or 90% teachers stated that PBL is suitable with scientific approach in 2013 curriculum implementation

- 10 persons or 10% teachers stated that PBL is unsuitable with scientific approach in 2013 curriculum implementation

h) *Possibility of Problem-Based Learning Implementation*
- 94 persons or 94% teachers stated that PBL is highly possible to be implemented in 2013 curriculum
- 6 persons or 6% teachers stated that PBL is impossible to be implemented in 2013 curriculum

i) *Suitable lessons to implement Problem-Based Learning*
- 48 persons or 48% teachers stated that PBL is suitable to be implemented in all kind of lessons
- 51 persons or 51% teachers stated that PBL is suitable for productive lessons
- 5 persons or 5% teachers stated that PBL is suitable for theoretical lessons

j) *Feasibility of Problem-Based Learning Implementation*
- 58 persons or 58% teachers stated that PBL can be implemented across all levels
- 9 persons or 9% teachers stated that PBL is feasible to be implemented to level I students
- 27 persons or 27% teachers stated that PBL is feasible to be implemented to level II students
- 9 persons or 9% teachers stated that PBL is feasible to be implemented to level III students

k) *Required Programs in Problem-Based Learning Implementation*
- Most teachers stated that in implementing PBL, socialization, means assembly, learning plan, and learning evaluation are needed.

l) *Required Means in Problem-Based Learning Implementation*
- Most teachers stated that in implementing PBL, RPP, teaching book, modules, teaching materials, media, and evaluation tools are needed.
- Benefits of Problem-Based Learning
- 42 persons or 42% teachers stated that they haven't felt the benefit of PBL
- 58 persons or 58% teachers stated that they have felt the benefit of PBL

Based on the data above, it can be observed that PBL have a high potential to be implemented in 2013 curriculum. Most teachers stated that PBL is feasible to be applied for students on all levels. The important steps needed to be done are socialization, training, creating guidelines and learning means.

REFERENCES

[1] 21st Century Student Outcome and Support System. Taken from www.21stcenturyskills.org., on 23rd April 2011.

[2] Sukamto. *Perubahan karakteristik dunia kerja dan revitalisasi pembelajaran dalam curriculum pendidikan kejuruan*. Fakultas Teknik UNY, 5th May 2001

[3] Problem-based Learning, especially in the context of large classes. Website: http://chemeng.mcmaster.ca/pbl/pbl.htm

[4] _____, Problem-Based Learning: An Introduction. *Website:* www.ntlf.com/html

[5] _____, The Advantages of PBL. Website: :http://edweb.sdsu.edu/clrit/learningtree/PBL/PBLadvantages.html

[6] Trilling B & Fadel C. *21 st Century Skills. Learning for Life in Our Times.* San Fransisco: Jhon Willey & Son. 2009.