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Considerations Underlying Technology and Engineering Vocational School Teachers in Choosing Problem-Based Learning Strategies

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Abstract:
This study aims to determine the considerations that underlie Vocational High School (SMK) technology and engineering teachers in choosing the Problem Based Learning (PBL) strategy. The survey measured teachers' perceptions in practicing PBL, the value of PBL implementation for teachers, the value of PBL implementation for students, PBL implementation costs, perceptions of teacher autonomy in implementing PBL, and perceptions of teacher support for their PBL implementation. A total of 94 teachers have confidence in their professional development with PBL strategies, compared to 24 teachers who do not have the competence and confidence in implementing PBL strategies. The findings in this study are the need for the development of formal PBL strategy pedagogical competencies in building understanding and confidence of technology and engineering vocational school teachers. It is recommended that teachers who have experience share their experiences in implementing PBL strategies to encourage student learning achievement.

Keywods: problem-based learning, expectation value theory, self-determination theory

INTRODUCTION

More than 7 years of technology and engineering Vocational High School (SMK) teachers have implemented PBL strategies in managing their learning. The lack of professional competency development for teachers in implementing the PBL strategy causes the low quality of learning interactions (Rusmono & Suyitno, 2016). PBL strategies are effective in forming positive attitudes of students (Demirel, Miray and Dagyar, 2016). To increase the level of adaptation of students in the learning process with PBL strategies, teachers need to take ideas from students and PBL tutors (Uygulama, Ates, and Eryilmaz, 2015). With the PBL strategy, students can control the nature and frequency of their own learning according to their needs and abilities, and play a role in improving independent learning skills (Kim, Belland, and

Axelrod, 2019). The question is, why the learning outcomes of students are still not significant with the implementation of the PBL strategy, especially at technology and engineering vocational schools in DKI Jakarta? The next question is, what are the considerations of SMK teachers in choosing PBL strategies? Regarding one's judgment in making decisions based on intrinsic motivation and extrinsic motivation as described in Self Determination Theory (SDT) (Ryan, Deci, 2000). assumes that humans are, in essence, motivated to develop "an increasingly complex and unified sense of self" (Ryan, Deci, 2000).

Apart from SDT, humans are also motivated to participate in certain tasks if the individual is interested in carrying out an activity, or views the fulfillment of this task as important (achievement value) or useful (utility value) for him (Eccles at.all, 1983), this is what known as Expectancy Value Theory (EVT). This study aims to determine the considerations underlying the technology and engineering vocational school teachers in DKI Jakarta in choosing the Problem Based Learning (PBL) strategy.

RESEARCH METHODOLOGY

To find a solution to the above problem, the researcher used a quantitative survey research method for technology and engineering vocational school teachers in DKI Jakarta. The research instrument was developed based on SDT theory and EVT theory with 7 dimensions, namely: teachers' perceptions of practicing PBL; the value of PBL implementation for teachers; the value of PBL implementation to students; PBL implementation costs; perceptions of teacher autonomy in implementing PBL; and teachers' perceptions of support for their PBL implementation. The total sample is 118 back teachers from both State and Private Vocational Schools in DKI Jakarta.

RESULT AND DISCUSSION

There are 118 technology and engineering vocational high school (SMK) teachers in DKI Jakarta who are deficient and complete the survey, and their demographics are listed in Table 1. There are two groups defined as “teachers have implemented the PBL strategy” (n = 94; 79.7%) and “teachers have not implemented the PBL strategy” (n = 20; 34%), based on the question of whether or not they have implemented the PBL strategy. Participants were mostly male (66.1%), and age (average 38 years) Most of them have teaching experience over 10 years (56.92%) as teachers of productive subjects

Table 1. Demographic data of Teachers at DKI Jakarta Technology and Engineering Vocational School as of July 1, 2020

Demographics		Total Technology and Engineering Vocational School Teachers (N = 118)	Teachers who are able to implement the PBL strategy (n = 94)	Teachers who have not been able to implement the PBL strategy (n = 24)
Gender	Male	78 (66,1%)	58 (61,7%)	16 (66,67%)
	Female	40 (33,9%)	36 (38,3%)	8 (33,33%)
Age	23 - 30	29 (24,58%)	24 (25,53%)	2 (8,33%)
	31 - 40	28 (23,73%)	27 (28,72%)	6 (25%)
	41 - 50	26 (22,03%)	22 (23,4%)	7 (29,17%)
	51 - 60	35 (29,66%)	21 (22,34%)	9 (37,5%)
Teaching Time	Less than 10 years			
	10 - 20 years	19 (16,1%)	15 (16,1%)	2 (8,33%)
	20 - 30 years	34 (28,81%)	30 (31,91%)	5 (20,83%)
	30 - 40 years	32 (27,11%)	29 (30,9%)	8 (33,33%)
	40 years	33 (28,1%)	20 (21,28%)	9 (37,5%)
		-	-	-

Half of the teachers who are competent and confident that they can implement the PBL strategy (50%) attend formal and informal training, and make lesson plans with PBL for one or two subjects, the obstacles faced (10.64%) have difficulty developing assessments for individuals. A quarter of teachers who are not yet competent in implementing PBL strategies (25%) attended formal and informal training, a third of them made lesson plans with PBL but did not have a perception of competence for themselves and benefits for students. Teacher training and implementation of the PBL strategy are summarized in Table 2. Half of the teachers who are competent and confident that they can implement the PBL strategy (50%) attend formal and informal training, and make lesson plans with PBL for one or two subjects, the obstacles faced (10.64%) have difficulty developing assessments for individuals. A quarter of teachers who are not yet competent in implementing PBL strategies (25%) attended formal and informal training, a third of them made lesson plans with PBL but did not have a perception of competence for themselves and benefits for students. Teacher training and implementation of the PBL strategy are summarized in Table 2.

Table 2. Teachers at DKI Jakarta Technology and Engineering Vocational Schools Who Have Attended Training and Implemented PBL Strategies

Teachers who have attended training and implemented PBL strategies	Total number of teachers (N = 118)	Competent teachers to implement the PBL Strategy (n = 94)	Teachers who are not yet competent to implement the PBL Strategy (n = 24)
Teacher training for PBL			
1.No training	4 (3,39 %)	-	4 (16,67 %)
2.Only informal training	20 (16,95 %)	11 (11,70 %)	6 (25,00 %)
3.Only formal training	44 (37,29 %)	36 (38,30 %)	8 (33,33 %)
4.Informal and formal training	50 (42,37 %)	47 (50,00 %)	6 (25,00 %)
1.The cost of implementing the PBL strategy is borne by the SMK Management	32 (27,12 %)	29 (30,85 %)	9 (37,50 %)
2.Prepare RPP with PBL strategy	47 (39,83 %)	42 (44,68 %)	8 (33,33 %)
3.Individual assessment	22 (18,64 %)	13 (13,83 %)	5 (20,83 %)
4.Group assessment	17 (14,40 %)	10 (10,64 %)	2 (8,33 %)

There are differences in teachers who are competent and believe the data apply PBL strategies (teachers with PBL experience) and teachers who are not competent in implementing PBL (teachers who have no PBL experience) in terms of their perceptions of PBL, preparation, perceptions of ability, and motivation to implement PBL strategies. There is a significant difference between teachers with PBL experience and teachers without PBL experience for the 7 (seven) dimensions in the instrument that measure teacher expectations for success in implementing PBL strategies. SMK teachers who have experience in implementing PBL strategies feel competent and are expected to succeed when implementing PBL. Conversely, teachers who have no experience implementing PBL strategies question their ability to solve problems such as the difficulties of students with this PBL strategy. About 20.33% of teachers who had no experience implementing PBL strategies said they did not implement PBL strategies because of a lack of competency perceptions. These findings are consistent with theoretical motivation models, expectation value theory and self-determination theory, which state that individuals are more motivated to engage in certain activities if they feel themselves competent and likely to succeed in the endeavor (Eccles at.all, 1983), (Ryan, Deci, 2000)

Neither teachers with PBL experience nor teachers with PBL experience agree that implementing PBL strategies requires more time than direct learning. The results of this study are summarized in Table 3.

Table 3. Comparison of competent and non-competent teachers in implementing PBL strategies in the context of EVT and SDT

Construction & Items	Competent Teachers to Implement PBL Strategies	Teachers Not Competent in Implementing PBL Strategies
Expectation-based beliefs (Expectation-Value-Theory / EVT theory)	Having confidence that he will be successful in implementing the PBL strategy	Do not have confidence in being successful in implementing PBL strategies and helping learners
Motivation for performance improvement (Self Determination Theory/ SDT) Item F.1, F.2, and F.3	Be confident in implementing the PBL strategy	Lack of confidence in implementing PBL strategies
Perceptions of teacher competence in implementing PBL Item B.5 and B.8	Interested in implementing PBL for himself and his students	Less importance is considered, so there is less preparation to implement PBL strategy
Intrinsic Value (EVT theory) and Intrinsic Motivation (SDT theory)	The efforts made will not be in vain	Low interest in implementing PBL strategies even though they know the benefits for students
Item D.1 and D.2	Some anxiety that can be overcome in implementing PBL strategy	Anxious will increase the workload as a teacher
PBL implementation costs Item E.1 and E.2	The perceived cost support from SMK Management and colleagues	Demands extra work but results are not balanced
Item G.1, G.2, and G.3	Policy support from SMK Management and collaboration with fellow teachers	Know the support of SMK Management but not ready to collaborate with fellow teachers

A total of 94 teachers have confidence in their professional development with PBL strategies (dimensions 1, 2, 3, and 4), and at lower costs (dimensions 5, 6, and 7). Meanwhile, 24 teachers still do not have the competence and confidence in implementing the PBL strategy (dimensions 1,2, 3, 4, 5, 6, and 7). The findings of this study are the need for the development of pedagogical competence, especially in implementing the PBL strategy formally in building understanding and confidence of technology and engineering vocational school teachers in DKI Jakarta

DISCUSSION

Based on the research results, it appears that 94 SMK Teknologi dan Rekayasa teachers in DKI Jakarta are competent in implementing PBL strategy in their teaching. From the data obtained in the survey, it shows that 94 teachers, have confidence in their professional development with PBL strategies, because they understand the concept of PBL strategy well, have the perception of support from school management in implementing PBL strategies. This condition, according to (Eccles, at.all, 1983) the teacher-uru views the fulfillment of the task of implementing PBL strategies in his subjects as important (achievement value) or useful (utility value) for him, which in turn is manifested as an increase in performance (Hayenga, Corpus, 2010).

The results of (Collie, Shapka, and Perry, 2012), showed that the level of collaboration among teachers has a positive relationship with sense of teaching and job satisfaction,

suggesting that teachers' welfare and motivation are influenced by their perceptions of their school environment. It is possible that 24 teachers who have not implemented the PBL strategy in their subjects are caused by two things, namely: internally lack of confidence in professional development so that they do not consider the importance of implementing PBL strategies that can improve performance; and externally the work environment in SMK has not encouraged collaboration among teachers.

According to (Chian, Bridges, and Lo, 2019) the competence of teachers in implementing PBL strategies must be seen from 4 factors, namely: (a) the assessment design process as a collaborative and collective effort; (b) identify whether the assessment design process is dependent on schools or learners' understanding of learning, teaching, and assessment; (c) ensuring the validity and reliability of the assessment instruments; and (d) whether the assessment is prioritized in the student learning process. This is supported by the results of research (Kelly, at.all, 2019) that the assessment in PBL strategy is a challenge, so that the next assessment can focus on how (a) designing unstructured problems, (b) aligning the assessment with the PBL curriculum, and (c) how to hold accountability. students in improving their learning outcomes.4.

CONCLUSIONS

Of the 118 technology and engineering vocational school teachers, only 79.7% have the competence in implementing the PBL strategy. This means that 20.3% of the technology and engineering vocational school teachers in DKI Jakarta still need formal training in order to have pedagogical competence, especially in implementing the PBL strategy. The findings of this study are the need for the development of pedagogical competence, especially in implementing the PBL strategy formally in building understanding and confidence of technology and engineering vocational school teachers in DKI Jakarta.

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