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The Effectiveness Dual System Education Program at 3 and 4 Year Vocational High School on Improving Mechanical Engineering Student Achievement

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Abstract. Reality there are many different models in the Dual System of 3 and 4 years vocational high school, both the implementation time, placement and competence. This research aims to look at the effectiveness of the education system in program vocational high school 3 years and 4 years. Data obtained from the survey of teachers, students and instructors to 3 and 4 years vocational high school. Question form is used to obtain information about the implementation dual system of the education in terms of a reaction, learning, behavior, and results variable. The data obtained were analyzed using factor analysis with software SPSS 20. The results of the analysis of the data suggests that aspects of the reaction, learning, behavior, and results in the implementation of the dual system education in SMK 4 years is effective. Meanwhile, the reactions and results in the implementation of a dual system of education in SMK 3 years of ineffective, only learning and behavioral aspects of an effective.

INTRODUCTION

The types of education in Indonesia is regulated in the Law of the Republic of Indonesia Number 20 Year 2003 about National Education System Article 15; "This type of education includes general education, vocational, academic, professional, vocation, religious and special". While vocational education at the secondary level called Vocational High School (SMK). There are 2 types of SMK in Indonesia namely SMK 3 years and SMK 4 years. The annex to regulation of the Minister of national education of the Republic of Indonesia number 22 in 2006 about the standard contents for the units of primary and secondary education in the vocational education Curriculum Structure mentioned that "old Providence education SMK/MAK of three years, a maximum of four years in accordance with the demands of the program".

Government regulation of the Republic of Indonesia number 17 in 2010 on managing the Organization of Education in the paragraph 2 of article 78 Education Unit form of paragraph 3 States that "SMK and MAK can consist of three (3) levels of classes, i.e. classes 10, 11, and grade 12, or consist of 4 grade levels i.e. classes 10, 11, class 12, and 13 class in accordance with the demands of the world of work ". Regulation of the Minister of education and culture of the Republic of Indonesia Number 70 by 2013 on a basic framework and structure of the SMK/MAK, the structure of the curriculum consists of SMK/MAK 3 year and 4 year SMK/MAK [1].

This legalized the existence of SMK 3 years and SMK 4 years as a system of education which can improve the learning achievements of students. Achievements obtained through evaluation of student learning on the learning process in schools as well as the learning process in the corporate world and the industrial world (DU-DI) either SMK 3 years or SMK 4years. The model of learning in school and DU-DI is a characteristic of vocational education in the skilled childbirth in accordance with their respective areas of expertise.

The existence of 4 years Vocational High School have different features and characteristics with the dual system of education management in Germany and Latvia. In reality there are many different models in the Dual System (PSG) of 3 and 4 years vocational high school, both the implementation time, placement and competence. Implementation of PSG in Indonesia refers to the concept of "Link and Match" and has become the starting point in determining the vocational education system in Indonesia with the dual system education models embraced. [2] States that "mutually adjusting between schools with the world of work which is the concept of link demands and match between the world of school and the world of employment is absolutely

necessary partnership between both the pole". This model was adopted from the system of vocational education in Germany, where education is funded in part time in school and most in the industry.

In the German dual system of vocational education and training (VET) a combination of learning in the enterprise and in a vocational school-the enterprises determine the number of training places and recruit trainees. The public judges how well the system functions by the extent to which the companies provide a sufficient number of apprenticeships for each rising generation[3]. Dual system program in Germany that "the setup of the dual apprenticeship is generally standardized to a two to four year duration, during which the trainee participates in training within the firm and a vocational school, in an alternating matter. While the school-based training provides both general and occupation-specific knowledge, training within the firm contains firm-specific elements[4].

The annex to regulation of the Minister of national education of the Republic of Indonesia number 22 in 2006 about the standard contents for primary and secondary Education Unit mentioned that education SMK/MAK are organized in the form of a dual system of education (PSG). The burden of learning the SMK/MAK learning activities include face-to-face, practice at school and practical work activities in the world of business/industry equivalent to the 36 hours of instruction per week [5].

Wena. [6] Suggests that a dual system education (internships) is a form of organizing professional skills education combines sistematis and synchronous education programs in schools and a mastery of skills gained through direct activities in the world of work, directed to achieve a certain level of professional expertise. Sonhadji. [7] Defines a binary system that education is a form of organizing vocational skills education and training which integrate systematically and in sync between educational programs in schools and the world of work.

This uniqueness becomes interesting to research Effectiveness Dual System of 3 and 4 years vocational high school Program in Improving Student Achievement in Mechanical Engineering. Thus the implementation of the dual system of 3 or 4 years vocational high school, interest to be further explored because its reality continues to run concurrently without any distinction of both regulation. SMK 3 year or 4 year is a school system that carries out a double system of education that needs to be evaluated. It is appropriate that mandated in legislation RI 20-year 2003 Number of National education system article 57 para 1 and 2 which States that "(1) the evaluation is done to control the quality of national education as a form of accountability education providers; and (2) evaluation of learners, institutions, and educational programs on formal and informal trails for all levels, unit, and the type of education "[8].

Evaluation of vocational education includes the learning process in schools and in DU-DI is to establish and assess the feasibility of the program, the evaluation of vocational training programmes can be regarded as a procedure intended to determine the merit, worth or value these programmes "[9]. Chimote. [10] Revealed that "evaluating the effectiveness of a training program also indicates the significance of how well the training purposes have been attained, and whether the best means for achieving those purposes have been self-employed". Evaluating the effectiveness of educational programs a dual system at SMK 3 years and 4 years to improve learning achievements of students of engineering machining to show how big the achievement of business goals.

Framework I used to evaluate the effectiveness of the program is an adaptation of Kirkpatrick [11, 12, 13] evaluation model four-level education and training. The model focuses on four levels of evaluation to determine the effectiveness of educational programs and training: Level 1 evaluation of the reaction, is designed to determine the favorable or unfavorable reactions to the program participants. Level 2 evaluation study, designed to determine the acquisition of knowledge, skills, attitude and/or behavior of the participants. Level 3 evaluation of behavior, designed to determine how what they have learned in the training to use back on the job. Level 4 evaluation results, designed to determine how effective this program in meeting the desired result stakeholder.

Clarke and Winch. [3] Define that the "vocational education is confined to preparing young people and adults for working life, a process often regarded as of a rather technical and practical nature". Henry dan Thompson mengatakan bahwa "Vocational education is learning how to work, vocational education has been an effort to improve technical competences and to raise an individual's position in society through mastering his environment with technology. Additionally, vocational education is geared to the needs of the job market and thus is often seen as contributing to national economic strength" [14].

Evaluating Reaction is doing the evaluation of the student's reaction against the process of the implementation of the PSG by measuring the satisfaction of participants (customer satisfaction). Advantages of vocational education is the ability to provide opportunities for students to get the process of learning at school and learning at DU-DI. In increasing student learning achievement, then have to go through the learning process effective. RI Law Number 20 in 2003 about education standards Chapter 1 verse 20 say that learning is a process of interactions with educators and learners learning resources in an environment of learning [8].

The effectiveness of the implementation of the PSG to SMK 3 years and 4 years, when the learning process in schools is reasonably fun and gratifying achievements in improving student learning. Student

satisfaction towards the learning process in schools can be examined from several aspects, namely learning materials and infrastructure, a learning model that is used by teachers and instructional media.

Evaluating learning be defined as the extend to which participans change attitudes, improving knowledge, and/or increase skill as a result of attending the program. Standards of competence of graduate students of SMK 3 years or 4 years can be measured ketercapaian from three (3) competence, i.e. the knowledge, attitudes or skills. Competency attainment of knowledge, attitudes, and skills is an indicator of student learning achievement. Government Regulation Number 32 RI 2013 about changes to the regulation of the Government of Indonesia number 19 in 2005 about education standards Chapter 1 verse 4 says that "competence is a set of attitudes, knowledge, and skills that must be owned, we appreciate it, and mastered by learners after studying a charge, finishing a course of study, or complete certain educational unit" [15].

The effectiveness of PSG in SMK 3 years and PSG in SMK 4 years with the learning process in schools and DU-DI measured from the third competence i.e. the knowledge, attitudes and skills. Evaluating learning is student learning outcomes assessment (output) from the knowledge that has been studied, the attitude in the form the application of occupational health and safety has changed and what skills that have been developed at school and DU-DI. The third evaluation competence have an impact on the effectiveness of SMK 3 years and SMK 4 years are recommended to improve the learning achievements of students.

Evaluating Behavior is different from the evaluation of the attitude towards the application of occupational health and safety, but the attitude assessment is focused on the student's behavior changes after doing the process of learning (apprenticeship) at DU-DI. The change of attitude of students more external in nature and is the evaluation of outcomes of learning activities (internships) in DU-DI. This evaluation can be either students feel happy after following the process of learning (apprenticeship) at DU-DI and challenged to develop the knowledge, attitudes and skills acquired during the internship to be implemented in schools and the world of work. The effectiveness of PSG good SMK 3 years and SMK 4 years also looks at the level of satisfaction of students during the learning process (internship) in DU-DI. This needs to be done the evaluation of behavior change (outcomes) as students of SMK 3 years internship over 3 months at DU-DI and while students of SMK 4 years internship during the 7 month DU-DI.

Evaluating Result focussed on the end result (final result) students who have followed a course of PSG. PSG implemented SMK 3 years and SMK 4 years aimed at meningkatkan the achievements of student learning and making skilled who are ready to work in accordance with their respective competencies. The effectiveness of PSG in both SMK can be seen from the increase of good quality through theoretical exams and in practice through competency exams.

RESEARCH METHOD

This research aims to look at the effectiveness of the education system in program SMK 3 years and SMK 4 years. Kirkpatrick's training evaluation model is suitable for use in the Research Program of the dual system as it includes aspects that are important in the process of implementation of the PSG. Kirkpatrick evaluation methods which consists of evaluating reaction, evaluating learning, evaluating behavior, evaluating result can be used to measure the effectiveness of the program. Data obtained from the survey of teachers, students and instructors to 3 or 4 years vocational high school. Question form is used to obtain information about the implementation dual system of the education in terms of a reaction, learning, behavior, and resultsvariable. The data obtained were analyzed using factor analysis with software SPSS 20.

RESULTS

Analysis of factors konfirmatori is done for the purpose of investigating the dimensions of indicators that describes a factor. Analysis of konfirmatori in this research was done twice to invalid constructs a double system education effectiveness at SMK 3 years consisting of variable reaction, learning, behavior, and results. Kemudian for invalid constructs the effectiveness of education of dual system in SMK 4 years consisting of variable reaction, learning, behavior, and results. Konfirmatori factor analysis results for invalid constructs a double system education effectiveness at SMK 4 years are presented in Table 1 and Table 2.

TABLE 1. Standardized loading factor in the effectiveness of the PSG SMK 4 years

Konstruk	Standardized Loading Factor
Reaction	,765
Learning	,744
Behavior	,711
Results	,829

Factor analysis results in Table 1, shows that the charge factor or component loading factor (λ) of a variable reaction, learning, behavior, and results in a 4 year program SMK is 0.765., 0.744., 0.711., and 0.829. The value of the charge factor on all variables meet the acceptance criteria because the value $\lambda \geq 0.70$ so it is inferred that the valid variables in explaining the execution of invalid constructs PSG.

TABLE 2. The value of the communalities effectiveness of PSG at SMK 4 years

Konstruk	Initial	Extraction
Reaction	1,000	,586
Learning	1,000	,553
Behavior	1,000	,506
Results	1,000	,687

The value of the communalities each variable as shown in table 2 are 0.586., 0.553., 0.506., and 0.687. The value of the variable that indicates the communalities reaction, learning, behavior, and the resulting effective contributions each of 58.6%, 55.3%, 68.7% and 50.6% in explaining the implementation of a dual system of education. Based on the current percentage of greater than 50% can be concluded that aspects of the reaction, learning, behavior, and results in the implementation of the dual system education in SMK 4 years is effective.

Meanwhile, the results of the analysis of the confirmatory factors for invalid constructs the effectiveness of education systems in double SMK 3 years are presented in Table 3 and Table 4.

TABLE 3. Standardized loading factor in the effectiveness of the PSG SMK 3 years

Konstruk	Standardized Loading Factor
Reaction	,280
Learning	,839
Behavior	,881
Results	,068

Based on the results of the analysis of the data in table 3, obtained the data that the charge factor or component loading factor (λ) of a variable reaction, learning, behavior, and the result is 0.280., 0.839., 0.881., and 0.068. The value of the charge factor to aspects of the reaction and the results do not meet the criteria because the value of $\lambda \leq 0.70$. The learning and behavioural aspects, meet the acceptance criteria with the value $\lambda \geq 0.70$.

TABLE 4. The value of the communalities effectiveness of PSG at SMK 3 years

Konstruk	Initial	Extraction
Reaction	1,000	,078
Learning	1,000	,704
Behavior	1,000	,776
Results	1,000	,068

The value of each variable communalities at SMK 3 years as in Table 4 is 0.078., 0.704., 0.776., and 0.068. The value of the variable that indicates the communalities reaction, learning, behavior, and the resulting effective contributions each amounting to 7.8%, 70.4%, 77.6% 6.8%, and in explaining the implementation of a dual system of education. Based on the percentage of donations can be concluded that aspects of the affective reactions and results in the implementation of a dual system of education in SMK 3 years are not effective. While that aspect of learning and behavior including effective.

CONCLUSION

Based on the analysis of the data can be noted that aspects of the reaction, learning, behavior, and results in the implementation of the dual system education in SMK 4 years is the effective value of the percentage of greater than 50%. Meanwhile, the reactions and results in the implementation of a dual system of education in SMK 3 years are not effective because the value of the percentage of donations effectively less than 50%, the only aspect of learning and effective behavior.

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