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FOREWORD

It is our great pleasure to present the new issue (Volume 23, Number 3, May 2017) of *Jurnal Pendidikan Teknologi dan Kejuruan* (JPTK). JPTK is published by Faculty of Engineering, Universitas Negeri Yogyakarta and *Masyarakat Peneliti Pendidikan Indonesia* (MPPI). It provides a platform for lecturers, researchers, students, practitioners and academicians to promote knowledge and credibility on technology and vocational education.

This issue contains eleven high quality theoretical and empirical original research papers on technology and vocational education. We would like to thank the authors who have submitted the articles in this issue. In addition, we would like to thank the members of the editorial board who have contributed to the making of this issue and whose work has increased the quality of articles.

We do hope that JPTK gives significant contribution to the development of technology and vocational education and it will raise the awareness of scientific community members of science, technology, and innovation. Your constructive feedback to give new perspective and insight for the continuing improvement of JPTK will be highly appreciated. We are also inviting papers for Volume 23 Number 4 October 2017. If you want to submit your work to JPTK, the paper may be submitted through the online submission system on: *http://journal.uny.ac.id/index.php/jptk*. All of issues are also available online on the website.

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CHARACTERS-BASED COLLABORATIVE LEARNING MODEL: ITS IMPACTS ON STUDENTS' ATTITUDE AND ACHIEVEMENT

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ABSTRACT

This study determined the impacts of the implementation of characters-based collaborative learning model on the students' attitudes and achievement in the course of machining process. This experimental study was conducted in the fitting and machining workshop at the Department of Mechanical Engineering Education, Faculty of Engineering, Universitas Negeri Yogyakarta. The population consisted of the students who were taking the course of complex machining process totaling 85 students. The samples included 33 students who were determined by purposive sampling technique. The experiment was carried out by the posttest-only control design. The instrument validation was conducted by expert judgment. The data in this study were analyzed using descriptive analysis and t-test with significance level of 0.05. The results revealed that: (1) the attitude of the students in the model class was better than the conventional class, and (2) the students of the model class performed better achievement in the course of machining process.

Keywords: collaborative learning, character, machining processes

INTRODUCTION

The responsibility of educational institutions, particularly vocational education institutions, is to produce competent graduates. Therefore, the learning process must refer to the demanded competences by the industries. One of important and strategic courses taught in vocational schools to create competences is workshops or practice courses thus improving the quality of practice learning process is indeed necessary. Collaborative learning aims to help the students to work collaboratively to mutually develop and change together. On the other hand there is the fact that most students do not have expected characters. The government is now very concerned in this character education. Therefore, it is urgent to do character-based collaborative learning for the students.

Learning should focus on the process of teaching, not simply transfer of knowledge. A learning method which only transfers knowledge is mentioned by Hiltz (1998) as the sage on the stage, it does not give the learners chance to do interaction and transaction. Learning has to provide critical thinking and social interaction practices to learners. Learning process needs to consider some aspects of character building or soft-skills, such as cooperation, respecting opinions, sense of belonging, responsibility, honesty, and willingness to sacrifice. In fact, learning with critical thinking and social interaction practices for students is rarely conducted. As the consequence, it is undeniable that the development of teamwork, appreciating opinions, understanding one self and others are ignored during the process. Therefore, it is necessary to take measures in order to rectify our education process and system, especially the learning process which more focuses on the cognitive, affective, and psychomotor dimension in a balanced way.

Calhoun and Finch (1976: 2) explain that vocational education is an educational program which directly relates to one's preparation for the workforce or supplementary training required in a career. Finch and Crunkilton (1979: 2) also explain that vocational education is an education offering students to work for their sustainable futures. According to the above mentioned opinions, it means that the goal of vocational education is to prepare

students to be involved in the workforce. From those views, it means that vocational education is considered necessary to prepare the students for career both in and outside the social environment. Hence, the main duty of educators and policy makers is to set up a strong foundation in the teaching and learning process for students' mastery and application of academic proficiencies as well as concepts required to face the real works.

In addition, Wardiman (1998) states that the characteristics of vocational education are (1) preparing students to enter work fields, (2) based on demand-driven (workforce needs), (3) focused on the mastery of knowledge, skills, attitudes, and values required in workforce, (4) assessing students' achievements based on hands-on or work performance, (5) having good linkage to workforce as the success key of vocational education, (6) being responsive and anticipative to technology advancements, (7) emphasizing on learning by doing and hands-on experience, (8) requiring high-end facilities to practice, (9) demanding on a great deal of infestation and operational finance than other standard educations. According to those views, it is obvious that the strain of vocational education is to provide students with skills and competences to be applied in their future works in certain fields or to develop themselves according to their area of expertise. Consequently, the arrangement of standard of competences which is suitable for certain area of skills is highly required as a reflection of the expected competences possessed by all vocational education graduates. In the future, vocational education can give immense contributions to the development of other sectors and put our human resources in reputable positions on the same level as other nations.

Marzano (1993) explains that collaborative learning is a personal philoshopy, not a mere learning technique in classrooms. Furthermore, collaboration is a philosophy of interaction and personal lifestyle whereas cooperation is a structure of interaction designed in that way to facilitate the collective efforts to pursuit a common goal. In this way, collaborative learning can be defined as learning philoshopy which facilitates learners to cooperate, to encourage each other, and also to improve and suceed together.

The stucture of collaborative purpose is characterized by the great number of interdependency between the individual members in groups. In collaborative learning, students say we as well as you and they will reach the goal only if the other members of the group can reach their own learning goals together (Arends, 1998; Heinich et al., 2002; Slavin, 1995; Johnson and Qin, 1995). Collaborative learning calls in the active participation of individuals and minimizes the differences among them. This approach enriches the momentum of formal and informal education from two meeting strengths: (1) practice realization, that collaborative efforts are needed outside the classroom or in real life, and (2) building social interaction awareness in the effort of realizing meaningful learnings. Johnson and Smith (1998) postulates that there are at least five basic principles to create collaborative learning in groups: (a) positive interdependence, (b) face-to-face promotive interactions, (c) individual accountability and personal responsibility, (d) team work and social skills, and (e) effectivity of the group processing.

In order to fortify the implementation of character education in each educational units, there has been identified 18 points of character building values originated from religion, *Pancasila*, culture, and national education purposes, such as: (1) religious, (2) honesty, (3) tolerance, (4) discipline, (5) diligence, (6) creative, (7) independent, (8) democratic, (9) curiosity, (10) patriotic, (11) love for the country, (12) appreciating performance, (13) friendly and communicative, (14) love for peace, (15) reading culture, (16) sensitive to the surrounding environment, (17) social sensitivity, and (18) responsible (*Pusat Kurikulum. Pengembangan dan Pendidikan*

Budaya dan Karakter Bangsa, 2011). However, educational units can determine their priorities to continue the precondition values which have been developed. The implementation of national character values can be initiated from the essential, mere, and applicable ones, such as cleanliness, neatness, comfort, discipline, honesty, and politeness.

Consequently, education industry, vocational education in particular, is responsible to produce graduates equipped with not only high academic competence but also good character. Based on those facts, it is educational world responsibility, notably vocational education to produce graduates with great academic competences and also good character. For that reason, integrating character values into learning processes is an obligation unexceptionally in practice learning. The effort is by developing character- based collaborative learning model in the practice learning of vocational education therefore the aim of this study was to figure out whether a character-based collaborative learning model contributes positive impacts in building the students' character and learning achievement in the course of Machining Process.

METHOD

The implementation of character-based collaborative learning model in the course of Machining Process was designed with posttest-only control. It suited the characteristic of practice learning of which the students' achievement was assessed with the workshop products thus a pretest is unnecessary. Figure 1 and Figure 2 present the framework of character-based collaborative learning model and the research design respectively.

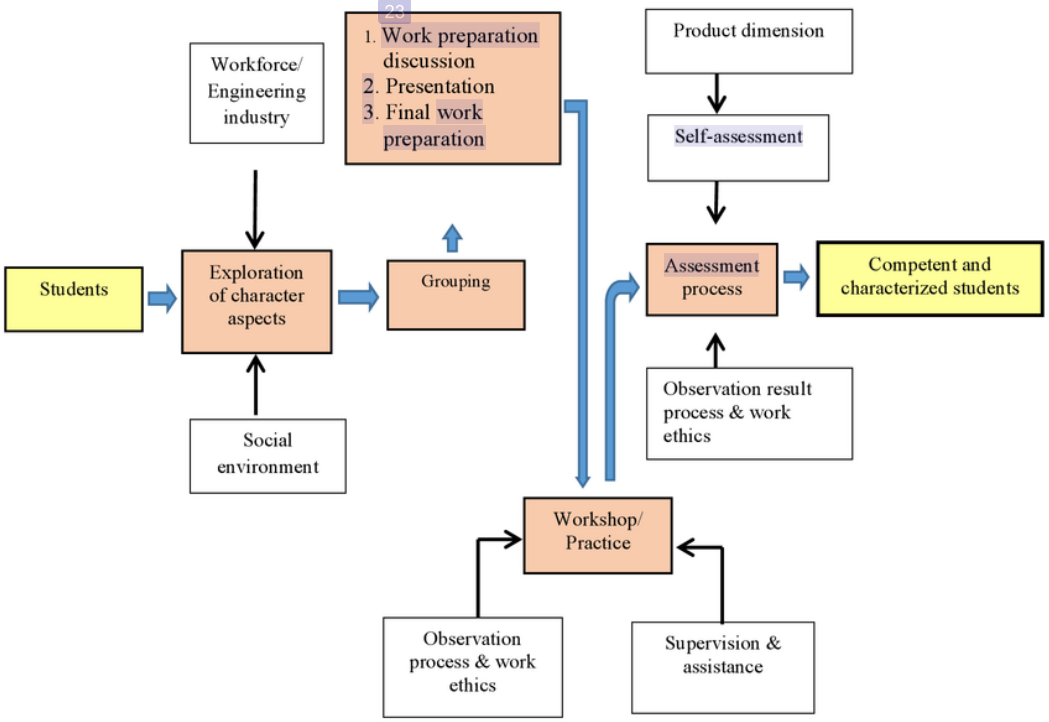

Figure 1. Character Based Collaborative Learning Model

R	X	O2
R		O4

Notes:
R = control group and experimental group who are purposively taken
O2 = posttest experimental group
O4 = posttest control group

Figure 2. Posttest-Only Control Design

This study was conducted in a workshop in Department of Mechanical Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta. The population was the students taking the course of Complex Machining Process consisted of 85 students. The samples included 31 students determined by purposive sampling technique. The data were collected using observation sheets, documentation, and learning evaluation. The research instrument was validated by expert judgment. The results of the research were then analyzed qualitatively and quantitatively. T-test was also utilized to analyze the effectiveness of the developed model which is compared to the initial one.

RESULTS AND DISCUSSION

This study was carried out in eight meetings. The first and second meeting of this study focused on elaboration and preparation, while the third up to eighth meetings were the main activities of this study. Starting from the third meeting, the aspects of students' work manner and learning achievement needed to be carefully observed. In accordance with the characteristic of the course of Machining Process, some work manners that should be concerned were honesty, discipline, diligence, carefulness, independent, hard working, and sensitivity. In the other hand, the students' learning achievement aspect was reflected on the job-sheet execution in the course of Complex Machining Process. The material was producing drilling-vice which consisted of three main components: *batang pemutar/ulir*, *rahang*, and *rumah ragum*. Data collection on students' attitudes consisted of seven manners, namely honesty, discipline, diligence, carefulness, independent, hardworking, and sensitivity. The result data of the research on those aspects from both experimental and control groups are displayed in Table 1.

Table 1. Students' attitudes of Experimental Group (T1) and Control Group (T2)

Aspect Attitude	Number of students in meetings												Average		Percentage	
	III		IV		V		VI		VII		VIII					
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Honesty	8	5	12	6	12	9	14	9	14	12	16	12	13.0	8.8	0.81	0.74
Discipline	13	7	15	10	15	9	15	12	15	10	16	12	15.0	10.0	0.94	0.83
Diligence	7	4	11	5	12	6	12	6	12	8	16	10	12.0	6.5	0.75	0.54
Carefulness	7	5	11	6	12	6	11	4	11	7	15	9	11.7	6.2	0.74	0.52
Independent	6	5	12	6	13	5	14	7	14	7	16	9	12.5	6.5	0.78	0.54
Hardworking	5	6	10	5	12	7	15	5	15	5	14	7	11.7	5.8	0.73	0.49
Sensitivity	12	4	13	6	14	6	15	8	15	11	15	12	13.8	7.8	0.86	0.65
Total average													12.81	7.38	0.81	0.63

Note: T1= experimental group, T2= control group

Table 1 shows that in the 8th meeting almost all students in T1 acquired the expected attitudes or manners. Further, if it was seen from meeting 3 to 8, it revealed that there were more than 80% students in T1 possessed the aspects of discipline, honesty, and caring. It meant that collaborative learning model had positive impacts to build up students' attitude in

work performance process, notably machining process training.

Learning carried out by implementing collaborative model is believed to be successful in rising students' learning achievements. This is in line with a reseach study conducted by Zainur Rofiq, et al., (2014) showing that students experiencing collaborative learning gained higher learning outcomes in reading techique drawing than those who were given a direct learning strategy. Data on students' achievements were drawn based on work products from three workshops. The complete data of students' learning outcomes in the course of Complex Machining Process are presented in Table 2.

Table 2. Students' Workshop Achievement

Student	Workshop						Average	
	I		II		III			
	T1	T2	T1	T2	T1	T2	T1	T2
1	80	65	81	65	82	72	81.00	67.33
2	85	60	76	72	80	68	80.33	66.67
3	78	71	86	65	80	60	81.33	64.33
4	81	65	82	70	82	65	81.67	64.67
5	80	60	82	65	85	65	82.33	63.33
6	75	70	85	66	80	60	80.00	65.33
7	82	72	80	63	85	60	82.33	65.00
8	80	65	85	66	86	70	83.67	67.00
9	79	60	85	65	87	65	83.67	63.33
10	80	70	79	68	83	68	80.67	68.67
11	79	72	85	70	87	70	83.67	67.33
12	78	68	80	70	85	66	81.00	67.67
13	80	72	80	60	85	60	81.67	61.67
14	82	68	87	62	82	65	83.67	65.00
15	80	70	80	65	84	62	81.33	64.00
16	81	70	80	62	82	66	81.00	66.00
17		70		72		69		70.33
Total achievement average							81.83	65.75

Notes:
T1= experimental group, T2= control group
Job I: Thread; Job II: Jaw (permanent and acquitted); Job III: Vice-house

Table 2 explains that learning achievement represented by assessment on the product increased significantly in T1 than that in T2. This attainment was influenced by the positive change of students' attitude during the workshop as shown in Table 2. To prove that result, the data were analyzed using t-test, normality test and homogeneity test.The analysis condition test was suited with the type of analysis used, which was a t-test, namely normality tests and homogeneity tests. To examine whether the result data have normal distribution, skewness and kurtosis ratio value method were applied. Data are said to have normal distribution if the value of skewness and kurtosis ratio lies on the range of -2 to +2. The result of normality test concluded that data for both control and experimental groups had normal distribution. For experimental group data, the value of skewness ratio was (-1.648) and kurtosis ratio was (0.273), while for the control group data the value of skewness ratio was (0.842) and kurtosis ratio was (-0.370).

The homogeneity test of this study used levene statistic technique. According to the test on students' learning achievement, it obtained significance level of 0.169 on the higher Based on Mean of 0.05. This was also applied to the test on students' activities which obtained significance level of 0.172 on the higher Based on Mean of 0.05. This conveyed the research data were said to be homogenous. Based on the

analysis condition test, the t-test can be carried out with a parametric test.

The average of students' learning practice outcome in T1 was 82.31 and that in T2 was 65.28. According to *t-test* output, it was acknowledged that t-value=8.473 with p=0.000. It proved that there was a significant difference between the students' achievement in the experimental group and the control group. The students' achievement in the experimental group was better than the control group ($X_{experimental}$= 81.83 > $X_{control}$= 65.75).

The result on learning activities showed that 80% students in T1 and 62% students in T2 had good work manner. Based on the t-test result, it was revealed that t-value=7.521; p=0.000. Therefore, that proved that there was significant difference on work manner between the students in T1 and T2. In this case, 81% of experimental group students possessed good work manner, while in the control group it only reached 63%.

Based on the result of the implementation of the character-based collaborative learning model which had been carried out, it quantitatively confirmed that this model was able to integrate the aspects of attitudes to shape students' character which were manifested from the activities performed during the practice learning process. In the same words, those were observable during the process of the learning model implementation.

In the stage of work manner exploration it was proved that the character-based collaborative learning model was effective in evoking students' awareness in relation to work ethics. In this stage students were insisted to deliver their opinions towards the expected attitudes, especially in performing the practice learning process. As for the aim of the stage, it was to make students realize theoretically on work manners or ethics. In this way, students would be likely at ease and guided in putting the perceived manners into practice in the learning process of machining practice or workshop. That was proven by the observation result toward students' activities during the on-going process, with enthusiasm and high awareness, students carried out the work ethics aspects appropriately. As a result, this model of character-based collaborative learning was indeed effective in integrating character aspects in the process of learning practices.

In the stage of composing work preparation sheets, the students' activities were also observed very positive. Here, the students were assigned to learn collaboratively. Collaborative learning process habituated the students to convey ideas bravely, to appreciate others, and to cooperate well. This is in line with Hill & Hill (1993) who state that there lies some merits gained from collaborative learning, such as: (1) promoting higher learning achievement, (2) providing deeper understanding; (3) experiencing fun learning, (4) developing leadership, (5) upgrading positive attitude, (6) boosting self-esteem, (7) learning inclusively, (8) sense of belonging , and (9) developing prospective skills. Students are stipulated to collaborate and also to respect their teammates and others' at the same time. Johnson and Johnson (1995) also point out empirical evidence that both collaborative and cooperative learning experiences are able to improve academic achievement higher than individual and competitive ones.

Another stage in the process of character integration was in the assessment process of workshop product. Before the product was assessed by teachers, self-assessment by students was done in the very first place. In this process, students were obliged to hold independent measurement on their own products of which the result was filled up on the given sheets. Data of self-assessment were then cross-checked by the teachers. From this activity, students' honesty in conducting self-assessment could be observed.

Based on the implementation of the learning model, there were differences on the aspects of students' work attitudes between T1 and T2. This was reflected on the students' activities during the learning process. The students in T1 were more active and better than

those in T2. Results on students' learning achievement signified that the result on the observation of learning activity was equivalent to the learning achievement. This was in line with the result data showing that the high frequency level of the student activities in the learning process of Machining Process in T1 was followed by the high attainment of the students' achievement. Berkowitz (2000) revealed that there was an increase of students' motivation in gaining academic achievements in schools which implement character building.

Character education is placed as a foundation for realizing the national development visions that are to realize good-character, moral, ethical, cultured, and civilized society under the philosophy of *Pancasila* (Balitbang Pusat Kurikulum dan Perbukuan 2010). It holds a crucial role to overcome the national problems, such as the shift of ethical values in life as a nation, the weakening of cultural norms awareness, the thread of national disintegration, the weakening of national sovereignty. Character education does not only teach what is right or wrong. Furthermore, it is an endeavor to internalize good habits (habituation) so that students are capable to behave and act in accordance with the values or principles they have possessed as their characters. Good character education should take account of moral knowing, moral feeling and moral behavior (Lickona, 1991:51).

Character-Based Collaborative Learning Model presents as the development of CBT learning model in which the learning process combines or integrates the aspects of behavior or character in the process of practice learning all at once. The integrated behavioral aspects are synchronized with the work natures of Machining Process Practice Course. The improvement of students' learning achievement on Machining Process Practice has been researched by Purnomo (2009) of which the result indicated that Self - Evaluation model could improve machining learning quality showed by the enhancement of activities, self-reliance, attention, and learning outcomes. Paryanto and Sudiyatno (2011) stated that the implementation of the learning model of assessment for learning on machining practice process was effective to improve the learning quality, behavior and personal attitude and learning outcomes with the percentages of 33.08%, 29.5%, and 29.9% respectively. This research finding also revealed the same result as there was an improvement on the students' achievements in the course of Machining Process Practice in which collaborative learning was applied.

The character-based collaborative learning model had been proved to improve students' work manner and learning achievement. For that reason, this learning model needs to be tried out for other practice courses. The implementation of character-based collaborative learning model emphasizes more on the students' activities during the teaching and learning process, thus teachers or lecturers' role should pay more attention to the process of supervision and assistance.

CONCLUSION

Based on the research findings, several conclusions were drawn as follows: (a) there was significant difference between the students taught with and without the implementation of character-based collaborative learning model ($t = 7.211$; $p = 0.000$). The students' activities of which character-based collaborative learning model was implemented increased 50%, (b) there was significant difference on students' achievement of Machining Process taught with and without the model ($t=10.573$; $p= 0.000$). The average of students' learning achievement by applying Character- Based Collaborative Learning Model was considered higher

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