DEVELOPMENT OF STUDENT WORKSHEET BY USING CONTEXTUAL TEACHING AND LEARNING APPROACH ON SUBJECT MATTER OF LINEAR PROGRAM FOR STUDENTS OF SMK CLASS X

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ABSTRACT

The learning process that still tends to teacher-centered makes the students less active in the learning process. The use of teaching materials still less facilitates students in the process of learning mathematics. This research aims to develop and test the feasibility of the Student Work Sheet with Contextual Teaching and Learning (CTL) approach to the subject matter of linear program for students of SMK class X. The research of Student Work Sheet development with Contextual Teaching and Learning (CTL) approach to the subject matter of linear program for students of SMK class X follow the steps of Research and Development (R & D) covering: (1) potential and problem, (2) data collection, 3) product design, (4) product validation, (5) design revision, (6) product trial, (7) product revision, (8) trial use, (9) revision of the final product. Research subjects are material experts, media experts, and students of class X SMK. Data analysis using qualitative and quantitative descriptive analysis. Product assessment results by a material expert, media expert, and student responses are included in the excellent category. The results showed that the Student Work Sheet with Contextual Teaching and Learning (CTL) approach to the subject matter of linear program for students of SMK class X is feasible to be used in the learning process.

Keywords: Student Work Sheet, Linear Program, Contextual Teaching and Learning Approach (CTL)

INTRODUCTION

Education has a vital role in supporting the development of life in the formation of a nation. Indonesian people are required to have a quality education system. Through education, a nation can develop its citizens' potential to be able to face all challenges. The purpose of national education, such as this, is contained in the Law of the Republic of Indonesia number 20 the year 2003 about the national education system. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, and skills necessary for themselves, society, nation, and state. To achieve the goal of national education in a better direction, the Government continues to strive to conduct improved quality of education. Based on government regulation No. 19, 2005 Chapter 1, article 1 paragraph 6 Standard of the education process is the national education standards relating to the implementation of learning in one unit of education to achieve graduates' competency standards. Determining the standard of the education process is a very important policy for equitable and improved education quality. Through the standards of education, each teacher can determine how the learning process should be.

According to the Law of the Republic of Indonesia, number 20, the year 2003, about national education System Chapter 1 article 1 paragraph 20 that learning is a process of student interaction with educators and learning resources in a learning environment. According to the Association for Educational Communications and Technology (AECT, 1977) in Depdiknas (2008:5) that: Learning resources are all things or resources that teachers can use, either separately or in a combined form, for the sake of learning to teach to improve the effectiveness and efficiency of learning objectives.

Learning resources contain information used by students to conduct behavioral change processes. Part of the Learning Resource is teaching materials. According to Depdiknas (2008:6), Teaching materials are all forms of materials used to assist teachers in carrying out teaching and learning activities. One of the teaching materials teachers use to support the learning process is the student activity sheet (SAS).

According to the Depdiknas (2008:13), The student worksheet is a sheet of tasks that learners must undertake. The use of SAS in learning activities can encourage students to cultivate materials learned individually and in groups. SAS is a form of teacher effort to guide students structured, where their activities provide appeal to students to learn mathematics.

The weak learning process is one of the problems in the educational world. The learning process is still prone to teacher-centered learning that is teachers-centered so that students become passive. In this case, students are not taught a learning strategy to understand how to learn, think, and motivate themselves. To improve the quality of education, it is necessary to change the learning of teacher centered into student-centered learning-centered. Through these changes, students will be more creative, innovative, active, and independent. The students ' learning process is freed to play an active role because learning will be more meaningful when knowledge is sought and found by the students themselves.

Teachers should be able to develop their teaching materials. SAS is a form of an effort to guide students structured, where the activities give the students the appeal to learn mathematics. The SAS created by the teacher will have many advantages for their students. In addition to being more attractive, SAS can also be adapted to the needs of students ' learning and ability so that they will create active learning. With the creation of active learning, students can find a concept or contract their knowledge and can apply the concepts that have been learned into daily life.

In its capacity as an educator, teachers are expected to provide an alternative learning model that is interesting and supports the growth of student-centered learning activities (Depdiknas: 2008). One model that can meet these demands is Contextual Teaching and Learning (CTL). Contextual Teaching and Learning (CTL) is a learning approach that emphasizes the full process of students ' involvement in finding materials learned and linking to real-life situations, encouraging them to apply them in their lives (Sanjaya, Vienna: 2006).

In Contextual Teaching and Learning (CTL) Learning, there are seven components of constructivism, discovering, questioning, learning society, modeling, reflection, and authentic judgment (Saefuddin and Ika, 2015:24). With these seven components will encourage students to be active in learning and through the application of the material in the daily life of students will feel the importance of learning so that it has a profound meaning to what he learns So that the material will be firmly embedded in the student's memory.

Based on the interview results on October 25, 2016, with Mr. Ganis Yoga Purnama, S. Pd, the mathematics teacher at SMK Muhammadiyah 1 Yogyakarta, obtained information in the learning of mathematics in class, students do not use the SAS. Mr. Ganis Yoga Purnama, S. Pd, has never developed his teaching materials so that in the learning activities, the material conveyed by the methods of lectures and questions given are only written on the board so that the learning activities are still is centered on teachers and most students are less active in the learning process.

The interview was also conducted with a mathematics teacher at Piri 1 Yogyakarta Vocational School, Mrs. Erlin Subardiyati, S.Pd, M.Pd, on November 28, 2016. Information obtained from the interview revealed that in learning mathematics in class, students use student worksheets that are traded to school and made by themselves by Mrs. Erlin. Worksheets still tend to be the only summary and do not contain steps that students need to take to construct their knowledge. In the interview, Ms. Erlin supported SAS's creation with the Contextual Teaching and Learning (CTL) approach. According to him, the SAS Contextual Teaching and Learning (CTL) approach can facilitate students because the material presented is related to student life. Especially for vocational students, because vocational students need to know the relationship of the material delivered with their expertise program.

From the interviews with the two mathematics teachers, the researcher also got information that students find it challenging to understand and solve questions in the form of stories related to daily life. In the matter of stories, students have difficulty in changing verbal language into mathematical language. Class X material that uses many questions in the form of stories is a linear program. Therefore, a worksheet is needed with a Contextual Teaching and Learning (CTL) approach that can enable students in the learning process, namely linking learning with the initial knowledge they have, linking learning

with students' environmental situations, motivating students by providing mathematical activities or mathematical tasks related to daily life. Also, this worksheet can help students to find a concept or construct their knowledge. It can apply the concepts that have been learned into daily life through a learning activity, especially in Linear Program material. Johnson and Rising said that mathematics is a mindset, a pattern of organizing, a proof of logic. Mathematics is a language that uses terms that are defined carefully, clearly, and accurately, its representation with dense symbols, more of a symbolic language about ideas than about sound (Suherman, Erman: 2013).

According to the Ministry of National Education (2008: 6), Teaching materials are all forms of material used to assist teachers/instructors in carrying out teaching and learning activities. Student worksheets are sheets containing assignments that must be done by students. The activity sheet is usually in the form of instructions, steps to complete a task. A task ordered in the activity sheet must be clear the basic competencies (BC) to be achieved. Activity sheets can be used for any subject. The tasks of an activity sheet will not be able to be done properly by students if it is not equipped with other books or other references related to the assignment material. (Ministry of National Education: 2008).Contextual Teaching and Learning (CTL) is a learning strategy that emphasizes the full process of student's involvement to find the materials they learn and contact them in real-life situations, encouraging students to be able to apply them in their lives (Sanjaya, Vienna:2013).

The research aims to: 1) develop a student activity sheet (SAS) with a Contextual Teaching and Learning (CTL) approach to the linear course material for SMK students X. 2) Knowing the feasibility of the student activity sheet (SAS) with Contextual Teaching and Learning (CTL) approach to linear program subject matter for SMK grade X students.

METHODS

The study used R&D methods with measures, according to Sugiyono (2016:409). The steps to use the R&D method are shown in the following figure I:

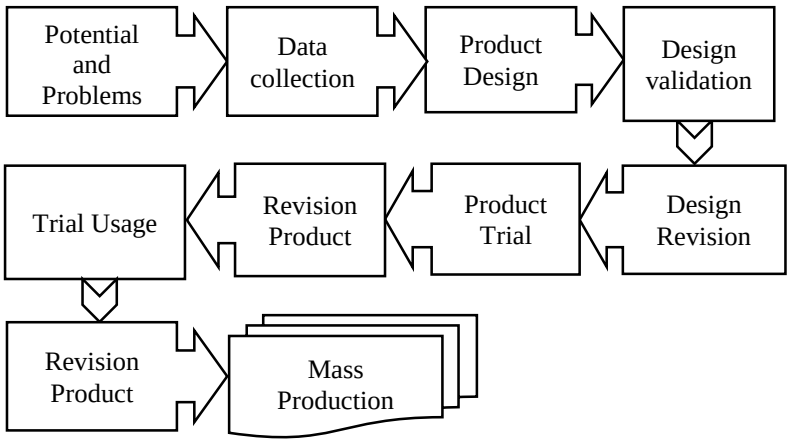

Figure I. Steps to use the Research and Development method (R&D)

The subject of this development study is: 1) Material experts are mathematics education lecturer in the field of the linear program, Mr. Drs. Uus Kusdinar, M. Pd, mathematics teacher of SMK Muhammadiyah 1 Yogyakarta, Mr. Ganis Yoga Purnama, S. Pd, and the teacher The mathematics of SMK Piri 1 Yogyakarta namely Mrs. Erlin Subardiyati, S. Pd, M. Pd. 2) The media experts are lecturers of mathematics education in the field of media, Mr. Drs. Sunaryo, M. Pd. 3) Students of Grade X SMK Muhammadiyah 1 Yogyakarta and SMK Piri 1 Yogyakarta.

There are two types of data in this study, namely: 1) qualitative data obtained from interviews to X-grade mathematics teachers and input or advice from expert materials and media obtained from validation results. 2) Quantitative data in the form of score results of expert assessment poll, media expert,

and results in a score of student response to a developed product. The instruments used to collect data on this development research are interview and poll guidelines.

For the assessment conducted by the material experts, media experts, and student responses used instruments in the form of a poll where the calculation is done using the criteria according to table 1 below.

Table 1. Criteria for Assessment of SAS

Score Range	Qualitative Criteria
$\bar{X} > (M_i + 1{,}8SBi)$	Very Good
$(M_i + 0{,}6SBi) < \bar{X} \leq (M_i + 1.8SBi)$	Good
$(M_i - 0.6SBi) < \bar{X} \leq (M_i + 0.6SBi)$	Passably
$(M_i - 1.8SBi) < \bar{X} \leq (M_i - 0.6SBi)$	Less
$\bar{X} \leq (M_i - 1.8SBi)$	Very Less

Information:

$\bar{X}$: average score

M_i: ideal average

M_i $= \frac{1}{2} \times$ (ideal maximum score + ideal minimum score)

SBi: ideal standard deviation

SBi $= \frac{1}{6} \times$ (ideal maximum score $-$ ideal minimum score)

ideal maximum score = $\sum$ criteria items $\times$ highest score

ideal minimum score = $\sum$ criteria items $\times$ lowest score

(Sukarjo: 2006)

The results of the analysis of the data obtained are used to know the quality of the products produced. SAS products with the Contextual Teaching and Learning (CTL) approach on the subject matter of linear programs for Grade X vocational students are said to be suitable for use in the learning process if the overall quality of the SAS is in the minimum good category.

RESULTS AND DISCUSSION

The initial stage in making a product in the form of SAS is the Contextual Teaching and Learning (CTL) approach is to prepare Software to make it easier to make. In this case, the researchers used Microsoft Word 2013 to type the worksheet contents and used Corel Draw X6 to make the cover. After everything is finished, both the contents of the worksheet and the cover are made, then all the files are converted to pdf format. The goal is that in printing, the contents of the file will not change or be damaged. The results of applying the product design can be described in general as follows.

1) SAS Front Cover View

The SAS front cover display contains the name of the product composer, SAS heading Contextual Teaching and Learning (CTL) approach, supporting images for linear program material, SAS user identity. The SAS front cover display with Contextual Teaching and Learning (CTL) approach can be seen in Figure 2 below.

Figure 2. Front Cover Display

2) Display SAS Identity
   The purpose of making SAS identity is to facilitate the search for information about the administration of SAS. SAS identity consists of Identity page, Foreword, table of contents, Competency Standards, Basic Competencies, and Indicators of Achieving Basic Competencies, Study Instructions, and Concept Maps.
3) Content section: Material Title, Problem, Let us construct knowledge, Let us find, Let us ask, Let us model. Let us a discussion. Let us reflect and Let us practice.
4) Closing Display, This concluding view consists of bibliography and answers. Explanation of the cover appearance as follows: References and The answer
5) Back Cover SAS appearance.
6) The back cover display of the worksheet contains information about the compiler. The back cover display of the SAS with the Contextual Teaching and Learning (CTL) approach can be seen in Figure 3 below.

Figure 3. Display of Back Cover

The product trials were conducted at SMK Muhammadiyah 1 Yogyakarta grade X MM 1 on June 8, 2017, and implemented at SMK Piri 1 Yogyakarta grade X TITL 2 on June 9, 2017, each school consists of 5 students. Trials of this large class of researchers conducted trials in class X MM 1 SMK Muhammadiyah 1 Yogyakarta on June 10, 2017, with a total of 29 respondents students.

The calculation results of the expert assessment of the material can be seen in table 2.

Table 2. The calculation result of the expert assessment

No.	Assessment	Mean Score
1.	Drs. Uus Kusdinar, M.Pd	109
	Ganis Yoga Purnama, S.Pd	82
	Erlin Subardiyati, S.Pd, M.Pd	110
	Total	301
	Mean	100,33
	Quantitative Data Criteria (positive statement)	Very Good

Based on the results of the product quality assessment, it shows that the product produced in the form of worksheets using the Contextual Teaching and Learning (CTL) approach on the subject matter of the linear program for class X vocational students is assessed from the material aspects included in the criteria very well.

The results of the calculation of the media expert assessment questionnaire can be seen in Table 3.

Table 3. Results of Calculation of Questionnaire for Media Expert Rating

No.	Assessment	Mean Score
1.	Drs. Sunaryo, M.Pd.	100
	Total	100
	Mean	100

	Quantitative Data Criteria (positive statement)	Very Good

Based on the results of the product quality assessment, it shows that the products produced by the worksheet using contextual teaching and learning (CTL) on the subject matter of the linear program for class X vocational high school students are discussing from the aspect of the media that suits very well considerations.

The results of the expert magazine questionnaire calculations can be seen in Table 4.

Table 4. Results of Calculation of Student Response Questionnaire

No.	Activity	Mean Score
1.	Product Trial at SMK Muhammadiyah 1 Yogyakarta and SMK Piri 1 Yogyakarta	76,60
2.	Trial use at SMK Muhammadiyah 1 Yogyakarta and SMK Piri 1 Yogyakarta	73,63
	Average student response score	75,12
	Quantitative Data criteria (positive statement)	Very Good

The results of the calculation of student response poll obtained from both trials indicate that the product developed in the form of SAS using the approach Contextual Teaching and Learning (CTL) in the linear program subject matter for SMK students Class X included in very good criteria.

After the results of the material and media aspects and the student's response are known, then be able to know the eligibility of the SAS that has been developed. The results of the scoring poll and the student response questionnaire to the SAS can be seen in table 5.

Table 5. Student response questionnaire and assessment results

No.	Aspect Assessment	Mean Score	Quantitative Data criteria
1.	Material experts	100,33	Very Good
2.	Media experts	100	Very Good
3.	Student response	75,12	Very Good

Based on the results of the evaluation poll and the student response poll, indicating that the product developed in the form of SAS using the approach of Contextual Teaching and Learning (CTL) in the linear program subject matter for SMK students class X Included in the criteria are excellent and well worth using in the learning process in class.

CONCLUSION

Based on the results of the development of student activity sheet (SAS) with Contextual Teaching and Learning (CTL) approach on linear program subject matter for SMK class X students, the following conclusions are obtained:

1. With regards to developing the student activity sheet (SAS) with a Contextual Teaching and Learning (CTL) approach to linear courses for VOCATIONAL students in class X. This development research is done based on the potential and problems that have been collected. Problems found include learning activities are still centered on teachers so that students are still less active in the process of learning mathematics, the use of existing teaching materials less facilitate students in the learning process of mathematics and students. It is still difficult to learn math subjects, especially faced with the story. Collecting reference books relating to linear program materials, SAS development materials, and Contextual Teaching and Learning (CTL) approaches to address mathematical learning problems. Product design is done after sufficient information is obtained. At this stage, the researcher performs several steps as the next:
    1) Determining competency Standards (SK), basic competence (KD), and achievement indicators to be presented in the SAS.
    2) Design and compile SAS

3) Develop research instruments that include a material expert questionnaire, media questionnaire, and student response questionnaire. Before using the assessment instruments, all three questionnaires were validated by the validator first.

The products that have been arranged in the form of initial products are validated by material experts and media experts, namely by filling out the questionnaire assessment of material experts and media experts. Revisions were made to improve the product based on input or suggestions provided by the validator.

2. Regarding the feasibility of student activity sheet (SAS) with a Contextual Teaching and Learning (CTL) approach to linear program subject matter for SMK grade X students. The product trials were conducted in two schools, namely SMK Muhammadiyah 1 Yogyakarta and SMK Piri 1 Yogyakarta, taken by 5 class X students, by completing the student response to the product test. Furthermore, this trial consists of 29 students from SMK Muhammadiyah 1 Yogyakarta and 13 students from SMK Piri 1 Yogyakarta. Student Activity Sheet (SAS) product eligibility with Contextual Teaching and Learning (CTL) approach to the linear course material for SMK tudents class X developed in a very good category based on average score calculation results A combined material expert of 100.33 and a very good category of media experts of 100 and a very good category of average student response score of 75.12. So that SAS with the approach of Contextual Teaching and Learning (CTL) in linear course subject matter for SMK students class X deserves to be used in the learning process.

REFERENCES

Departemen Pendidikan Nasional (Depdiknas). 2008. *Panduan Pengembangan Bahan Ajar*. Jakarta: Departemen Pendidikan Nasional Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah Direktorat Pembinaan Sekolah Atas.

Peraturan Pemerintah No. 19 Tahun 2005 Bab 1 Pasal 1 Ayat 6 tentang Standar Proses Pendidikan.

Prastowo, Andi. 2015. *Panduan Kreatif Membuat Bahan Ajar Inovatif Menciptakan Metode Pembelajaran yang Menarik dan Menyenangkan*. Yogyakarta: Diva Press.

Saefuddin, Asis dan Ika Berdiati. 2015. *Pembelajaran Efektif*. Bandung: PT Remaja Rosdakarya.

Sanjaya, Wina. 2006. Strategi Pembelajaran Berorientasi Standar Proses Pendidikan. Jakarta: Kencana.

Sugiyono. 2016. *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R&D*. Bandung: ALFABETA.

Suherman, Erman, dkk. 2003. *Strategi Pembelajaran Matematika Kontemporer*. Bandung: Jurusan Pendidikan Matematika Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam Universitas Pendidikan Indonesia.

Sukarjo 2006. *Kumpulan Materi Evaluasi Pembelajaran*. Yogyakarta: Universitas Negeri Yogyakarta.

Undang-undang Nomor 20 Tahun 2003 tentang *Sistem Pendidikan Nasional.*