Designing creative problem solving-based student worksheet for higher order thinking skills

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Abstract. This research is descriptive research. The purpose of this study is to produce a Higher Order Thinking Skills (HOTS) design as a creative form of high school students in class XI. In this study, the analysis was carried out first, namely the analysis of students, curriculum analysis, material analysis, analysis of higher-order thinking skills and analysis of creative problem solving and design according to the results of these analyses. The results of this study use the student worksheet design of high thinking ability using the steps of Creative Problem Solving namely problem clarification, brainstorming, evaluation and selection, and implementation.

1. Introduction
The importance of high-level thinking skills in the revised 2013 Curriculum standard assessment section. The agreed international assessment standards focus on Higher Order Thinking Skills HOTS in the assessment of learning outcomes [1]. According to Krathwohl in measuring the ability to think at a higher level, three indicators that analyze, evaluate and create [2-4]. HOTS characteristics are "characteristics of higher-order thinking skills: higher-order thinking skills include critical thinking and creative thinking" in terms of characteristics of higher-order thinking ability divided into critical thinking and creative thinking [5, 6]. For critical thinking skills and creative thinking related to cognitive processes in the blooming taxonomy because critical thinking can be reviewed from the cognitive processes of analyzing and improving, while the ability to think creatively can be reviewed from the cognitive processes of creating. Because the HOTS resolution has been linked to the top three dimensions of cognitive processes in the blooming taxonomy namely analyzing, refining, and creating more operations and has included aspects of critical and creative thinking skills [7].

Encouraged by a previous presentation on the revision of the 2013 curriculum to get a high-level assessment HOTS has begun to be applied to the learning process and assessing in the classroom to practice the development of skills and learning-oriented to the environment and HOTS questions have been applied in the exam national program in 2017 and increasingly developed in the national exam next year and one of them applied to PISA [8]. If seen from the results of PISA 2018 over the past 4 years the decline in the ranking is greater than mathematics which ranks 72 out of 78 countries [9].

Based on the research conducted by Juniati on five students of semester 1 of XII semester 1 at Madrasah Aliyah Negeri 2 Pontianak by giving two questions about the Linear Program material, the answers were obtained that all students could not be completed, indicated manifested, students could not complete the
linear program material. This results in a student's difficulties when confronted with a question given by the teacher and does not represent "understanding", while student planning and creativity are less developed. Learning should not only discuss concepts, theories and facts but also their application in daily life in society [10]. High-order Learning Model Critical thinking skills. Creative Problem Solving (CPS) learning model is one of the learning models that focus when discussing and problem-solving skills, which are followed by improving skills [11]. Also besides, it is very necessary to register student worksheet because student worksheet is needed in learning that enhances learners in the learning process increasing students who are teacher-centered to be student-centered so that encourages students in learning that develops [12]. Based on the background description above, the researcher wants to design the student worksheet which contains high-level questions that are applied by students so that the researcher will discuss more "Designing the student worksheet program material for high-level linear thinking based on CPS".

2. Method
In this study, researchers used a descriptive research method. This study aimed to produce student worksheet design of CPS-based high-level linear thinking program material. In this study, student analysis, curriculum analysis, material analysis, high-level thinking ability analysis, and creative problem-solving analysis were carried out and continued with designing LKPD.

3. Result and Discussion

3.1. Analysis Stage
According to Aldoobie, researchers conduct an analysis phase before making plans, developing, or even implementing in the sense that researchers validate implementation gaps, set learning goals, analyze learners, available resources, and plans [13]. To carry out the analysis phase researchers analyzed five things, namely: curriculum analysis, student analysis, material analysis, analysis of high-level thinking skills (HOTS), and analysis of Creative Problem Solving (CPS).

3.1.1. Student Analysis
Research subjects have an age range of 16 years so that the cognitive development of children with ages ranging from 12 years and over, according to Piaget's theory is at the formal operational stage, which is the final stage of development. At this stage, students can consider the ideas of others and communicate because students have entered the speech phase of language development socialization [14]. Students at this stage can form hypotheses and deduce possible consequences, allowing children to build their mathematics [15].

3.1.2. Curriculum Analysis
In the analysis phase, the researcher's curriculum makes observations to see the curriculum used at the high school that is the place of research. The curriculum used at SMA Negeri 5 Palembang is the 2013 curriculum. Analysis of the curriculum is to identify by looking at core competencies, basic competencies and selecting materials that are by following per under the curriculum at the research site contained in the Regulation of the Minister of Education and Culture Republic of Indonesia No. 37 of 2016.

3.1.3. Material Analysis
The material as outlined in the student worksheet questions using the Creative Problem Solving (CPS) stage for class XI of high school is a linear program. Student worksheet about CPS-based high-level thinking skills to see students' high-level thinking skills with creative and critical thinking. Linear program material is selected based on the results of discussions with the supervisor, so that the development of student worksheet questions based on Creative Problem Solving is expected to be able to train students in solving problems in higher-order thinking skills using steps from Creative Problem Solving.
3.1.4. Analysis of Higher-order Thinking Skills
The goal of high-order thinking skills in learning in the 2013 curriculum is to make students think critically, logically and systematically and have higher-order thinking skills. Higher-order thinking occurs when students acquire and apply new knowledge and store it so that students make students think deeply, then this knowledge correlates with prior knowledge to achieve certain goals [16-18]. The importance of high-level capabilities is also noted by the revision of the 2013 Curriculum on assessment standards. Based on these objectives, the researchers think to believe that student worksheet with high-level thinking ability is very suitable to be applied in the 2013 curriculum.

3.1.5. Creative Problem Solving (CPS) Analysis
The creative problem-solving learning model makes students able to improve thinking problem-solving skills by selecting and developing responses and problem-solving skills can expand the thinking process so that students are more skilled at realizing goals [11, 19-21]. So based on the statement above, the Creative Problem solving model can help in increasing high-level and creative thinking so that the linear programming material can facilitate in making models. According to Pepkin there are 4 steps in implementing the CPS method [11], namely:

- Clarification of Problems, aims to ensure students' understanding of the problems given.
- Brainstorming (expressing opinions), students discuss and express their opinions about various strategies that can be used in solving problems.
- Evaluation and Selection, in this stage students, discuss while sorting and choosing the right strategy to solve the problem.
- Implementation, applying the strategy chosen so that it gets the right solution.

3.2. Design Stage
At the design stage, the researcher conducted an assessment by the researcher himself on the design of the CPS-based student worksheet which had been developed from a variety of content, constructs, and languages. This student worksheet contains open issues related to University entrance assessment scores and calculation of healthy food content in accordance with the 2013 curriculum in high school. In the design stage, researchers design student worksheet questions about high-level ability based on creative problem solving on linear program material. The activities carried out by researchers are formulating the problems that will be outlined in the student worksheet questions and designing the student worksheet forms. At the stage of formulating the problem, the researcher chooses the context that is suitable for class XI students as research respondents. The researcher chooses the context of university entrance scores because of the context students will encounter in class XII.

The Design Stage follows the analysis, which is carried out at the design stage are:

- Adjust the proposed learning product into the 2013 curriculum.
- Describe the proposed learning product, at this stage it is divided into several sections:
  a) Opening part. In this section, there is a cover from student worksheet which contains the learning objectives contained in Figure 1.
b) The content section is based on material analysis, analysis of high-level thinking skills and based on the analysis of creative problem solving, which consists of the problems in Figure 2, the steps of creative problem-solving in Figure 3.
4. Conclusion
This research resulted in a high-level student worksheet thinking design based on Creative Problem Solving on linear program material that was appropriate to the characteristics, curriculum, and assignments of students. Student worksheets are designed to improve higher-order thinking skills. The student worksheet component consists of three parts: a) The opening part, consisting of a cover; b) The content section, which contains problems and stages of creative problem solving; and c) The concluding part, consisting of the conclusion of the answer. Indicators of high-level thinking ability are also included in the stages of creative problem solving that exists in this student worksheet section.

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