Development of authentic assessment maintenance motorcycle chassis system

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Abstract. The development of transportation in the 4.0 industry is growing rapidly, especially the development of automotive transportation. One of the developing automotive transportation is a motorcycle. Motorcycle has several systems, one system on a motorcycle transportation, namely: the chassis system. The chassis system (frame) on a vehicle is one of the most important components in a vehicle. Simple maintenance can be one of the causes of damage or corrosion of the framework of the chassis system. How to properly care for a motorcycle can be obtained through training or learning. Training and learning can be obtained by attending a vocational school majoring in Motorcycle Business Engineering. The Department of Motorcycle Business Engineering provides learning in various fields of both maintenance and repair. Learning in schools cannot be separated from the grading system so it needs an appropriate grading system. One of the assessments that are suitable for learning the care of the chassis system is authentic assessment. Authentic assessment in schools needs to be developed so that graduates can meet the demands of the business world and the industrial world. Authentic assessment is an assessment of real of cognitive, psychomotor and affective aspects. The development of authentic assessment of the care of the chassis system through stages: the preparation of a grid of questions that are adjusted to competence in the cognitive aspects, the preparation of worksheets and assessment rubrics on the psychomotor aspects.

1. Introduction
Education has a role in the development of thinking skills in order to become quality human resources. The 21st century, improvement of all paths at the level of education to prepare quality human resources [1]. Twenty-first century learning is about the process of integrating and using knowledge, not just the acquisition of fact and procedures. Hence, educators need to build assessment for learning rather than solely of learning” [2].

Nowadays, the rapid increase in the technological innovations and the changes in social construct have made it essential to look for different qualities in individuals [3]. Assessment is a part of education. Authentic assessment is one of the assessment systems used in the vocational learning process. Authentic assessment is a direct assessment and direct measurement [4]. Vocational education has different characteristics from general education. Mueller describes authentic assessment as a form of assessment in which students are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills [5].
This suggest that authentic assessment encourages students develop analytical skills; have the ability to integrate what is learnt; to be creative; be able to work collaboratively; and develop written and oral expression skills [6]. Teachers assess student learning through varied procedures such as structured and informal observations, projects, tests, presentations, performances and exhibitions, audio and videotapes, experiments, portfolios, and journals. It is highly recommended by some scholars that today’s student assessment should be authentic [5,6]. The teacher can determine whether students succeed or not through assessment. Assessment can be a reflection of the teacher who is successful in teaching students.

Assessment serves as an aid for teachers in developing students into certain groups, improving teaching methods and providing guidance [7]. There are several types of authentic assessment which include; performance assessment, portfolio assessment, self-assessment, face-to-face interviews, writing articles, story retelling, demonstrations, projects/presentations and observations. The most commonly used authentic assessments are performance assessment, portfolio assessment and self-assessment [5,6]. The NMC Horizon Report: 2018 Higher Education Edition describes authentic learning as an ‘umbrella term for several important pedagogical strategies that seek to immerse learners in environments where they can gain highly practical, lifelong learning skills’ [8].

Authentic assessment is a new idea as an alternative to traditional assessment [9]. This assessment is a process that facilitates student learning, not only to evaluate the teaching and learning process. Based on the research note that the implementation of authentic assessment in any classroom atmosphere changing role of stakeholders, especially the role of teachers and students. Student assessment provides crucial information on how well students are learning and how to improve students’ learning. Student assessment can be based on writing assignments, group presentations, portfolios, examinations or project work Mavis [10]. If teachers can get past these initial concerns, there is much to be gained from student portfolios. Portfolios have been touted as one of the most innovative learning tools in the last two decades because they offer both learning and assessment advantages by encouraging learners to study regularly, promoting learner self-awareness, and producing positive affective learning outcomes [11].

After analyzing students at a small tertiary educational institution, McDonald found that students reported learning much from portfolio assessment and felt an integral part of the assessment process; portfolio assessment appeared to empower students and provide them with the self-respect they desired [12]. Hence, rather than individuals who can memorize information, the importance of those who can use it, question and discuss, and solve problems with this information has gained significant value [13-15]. As a result of this, one of the main purposes of today’s education is to raise individuals who have the ability to solve problems [3,16-18].

Whilst there are different national traditions in assessment practices, we are witnessing a paradigm change [19]. This change in assessment relates to the emergence of the Assessment for Learning (AFL) movement, where all assessment contributes to helping students learn [20]. From this perspective, assessment, teaching and learning are closely related, with each one being part of the pedagogical process, and where feedback is used to adjust the learning cycle. Within this paradigm, authenticity has been identified as a key characteristic of assessment design which promotes learning and employability [20,21].

2. Method
This study was designed to develop an authentic assessment instrument on the periodic maintenance competency of the chassis system. Form of design in this study to produce a measuring instrument that is tested. Qualitative methods are used to analyze needs and make designs, while to test and develop products using quantitative methods. This study uses a mixed method, which aims to design valid and reliable authentic assessment instruments.

This Paper is a development research to develop products in the form of authentic assessments using the 4-D (Four D) model. The 4-D model was developed by Thiagarajan and consists of four steps namely defining, designing, developing, and dissemination [22,23].
3. Result and discussion

3.1. Results

3.1.1. Define. The author at this stage makes a grid of questions that will be developed and then adjusted to basic competencies, for cognitive aspects. Development on the psychomotor aspects of the writer compiled a grid of student worksheets complete with an assessment rubric.

3.1.2. Design. At this stage the authors designed item 66 which will be validated by experts. This stage also the authors develop 26 steps of work on student worksheets that will be validated by experts.

3.1.3. Development. This stage the authors get the results in the form of products that were developed as many as 35 problems and 26 work steps which were declared valid.

3.1.4. Dissemination. This stage is the stage of distribution in the form of a product that has been developed

3.2. Discussion

Researchers at the planning stage distributed questionnaires based on needs to 5 teachers. The questionnaire was previously arranged by researchers based on observations of researchers when pre-research where, researchers asked for input and suggestions from teachers about the difficulties in conducting authentic assessment. This questionnaire researchers arranged based on the advice and input given to researchers. Where the teacher's needs for the authentic assessment of researchers for based on 3 categories, namely: the understanding of authentic assessment, the need for authentic assessment of cognitive aspects, and the need for authentic assessment of psychomotor aspects.

Based on these three categories, researchers obtain the results of teacher needs for authentic assessment. The results of the questionnaire data were obtained that 40% of teachers did not understand authentic assessment, the teacher assumed that authentic assessment was the same as assessment in general. The presentation of the need for multiple choice questions by the teacher is 60%, where the teacher believes that multiple choice questions can be categorized as authentic assessment if the questions are complex and the questions are adjusted to the needs in the field. The percentage of teachers' understanding of the process of evaluating psychomotor aspects is 60%, where the teacher already understands the assessment rubrics, jobsheets and skills assessment manuals. Teacher understanding is not fully implemented in the learning and teaching process, some teachers still find it difficult to make assessment rubrics and jobsheets.

The initial analysis stage of the authentic assessment. The instrument is carried out in the steps of analysis problems and needs. Problem analysis is done for determine the problem in the form of teacher needs for evaluation tools. Based on the analysis of the problem some teachers do not understand authentic assessment. The teacher in making question items is not in accordance with the rules of item making. The teacher also does not fully use the assessment rubric when assessing skills.

Teacher's understanding of authentic assessment and the rules of making question items. The author develops 66 items that will be analyzed the suitability of the items with basic competencies. wherein the validation process valid items total 35 items.

The difficulty of the teacher in making multiple choice questions, where the teacher only makes multiple choice questions without analyzing the difference in power, the deception index and the level of difficulty. The assessment rubric made by the teacher seems simple where one uses the 1-0 system,
or yes-no, and also the grading system 4, 3, 2, 1 but is not clearly detailed in the scoring system given in the rubric.

Researchers try to develop by designing authentic assessments that can be more easily understood by the teacher. Planning multiple choice questions and assessment rubrics researchers try to adjust to the suggestions and input from experts.

At the design stage the researcher develops an authentic assessment product. The development of products that are designed on the cognitive aspects begins with the preparation of the lattice questions, which are adjusted to the basic competencies of the chassis system's regular maintenance. The researcher compiled the question lattice by choosing periodic maintenance competencies that were studied by grade XI students. Researchers make 66 items that will be validated by experts. Where the design of these 66 items researchers adjust to the basic competencies of periodic maintenance.

The researcher will present an example of planning an authentic chassis periodic maintenance development system, as follows:

- The researcher chooses the basic competencies to be developed, for example the researcher chooses the basic competencies to understand the working principle of a hydraulic system.
- Researchers compile a grid of questions that are adjusted to basic competencies.
- Researchers create multiple question and answer key questions about multiple choices.

The author also conducts construct validation for 34 students who will be validated according to the difference in power, difficulty level, and the deception index. After construct validation, the writer performs reliability on the items that have been valid. The whole work step that has been done by the writer in the development process, finally the writer does the spreading stage where the writer spreads or notifies the product items that have been developed, with the calculated reliability value.

Product design on the psychomotor aspect of the researcher developed an authentic assessment product beginning with the making of an assessment rubric with a score system of 4, 3, 2, 1. The researcher then proceeded with the creation of a worksheet and an assessment manual. Researchers made 26 steps in the work of maintaining a chassis system. Making assessment rubrics, jobsheets, and assessment manuals in accordance with the basic competencies that will be developed. Next, the researcher will explain the steps for making authentic assessment of psychomotor aspects.

- Choosing the basic competencies to be developed as an example the researcher chooses the competency to take care of the tires periodically.
- Arranging assessment rubrics, jobsheets, and assessment manuals.

Analysis of the assessment rubric needs aspects of the authors' skills developing 26 steps of work on the worksheet, assessment rubrics and assessment guidelines. Each of these instruments the researcher validates by calculating the CVR value at each step of the work. The assessment rubric that the researcher made illustrates the assessment score 4-3-2-1. Where the teacher will give a score of 4 when doing all the work steps in the jobsheet. The teacher will give a score of 3 if the student visits point 5, which means the student does not take steps to remove the disk break. Students can take off the front wheels without taking the work steps of removing the disk break, but it is a good step if the students remove the disk break in order to facilitate the steps of removing the front wheels and in accordance with standard operating procedures. The teacher will give a value of 2 which means students visit 2 steps of work so that the front wheel cannot be removed. Finally the teacher will give a value of 1 if the student skips more than 2 steps of work in which the student cannot take the front wheel release step.

In the process of developing this aspect of the skill set the same as developing the cognitive aspects, where the product is valid, the authors calculate the reliability of the product. The calculation of the value of reliability is done so that the evaluation tool made has a good reliability value, so that it can be used continuously. The product that has been validated is then carried out by the process of dissemination to teachers at school. The development of the skills aspect is also in the form of a student worksheet grid adapted from one of the motorcycle chassis maintenance manuals.
4. Conclusion
This research resulted in products developed by questions and rubrics. Grades to be used by teachers.
On questions around multiple choice, student worksheets and practice assessment manuals.

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