Development of affective authentic assessment instruments for automotive engineering expertise in vocational school

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Abstracts. Many factors influence Students' low abilities in the affective domain, especially at the level of vocational schools (VHS). The lack of ability of teachers to develop affective authentic assessment instruments be one of the factors that influence it. Besides, designing authentic assessment instruments is not as easy affective cognitive assessment. This research uses ADDIE development model as a reference in developing affective authentic assessment instruments. There are five stages of ADDIE models, include analysis; (2) design; (3) development; (4) implementations; and (5) evaluation. Based on data analysis is known that instruments developed are valid, reliable, and practical to use in the learning process. This is evidenced from (1) the results of the validation by 4, 50 with a valid category; (2) the reliability test results amounted to 0.985 with a special category; and (3) test results practicality of 3.06 with a practical category.

Keywords: affective authentic assessment instruments, ADDIE.

Introduction

Indicators of the success of vocational education graduates include three domains: cognitive abilities, affective, and psychomotor. Schools are considered to be successful if they can help students improve all three realms, but of course, each student will be at different levels.

In Indonesia, the three domains of the learning outcomes become an essential part of the standard 2013 curriculum implementation. Each teacher is required to help the students to improve their ability in terms of both cognitive and psychomotor. Also, teachers are also required to be able to hone students' affective [1].

Assessing affective abilities is an important thing that must be done by the teacher. However, its implementation in schools, especially in Vocational High Schools (VHS) is still in the low category. Of course, designing an affective domain assessment instrument is not as easy as assessing the cognitive domain. In the affective domain, the assessment is carried out authentically based on students' attitudes during the learning process [2].

According to [3] the learning process is considered as good if they do not only pay attention to the cognitive and psychomotor domains. However, it also considers the affective domain as a part that influences student success. Students will get the learning outcomes in the cognitive and psychomotor domains optimally if they have high affective domain abilities [4].

Therefore, the applied educational system should be designed to give more attention to the
affective domain. Achievement of cognitive and psychomotor domains in the automotive field will not be beneficial if students' affective skills do not match it. Besides, with particular attention related to the affective domain in schools, it will undoubtedly have a positive impact on student life both at home and the environment at large [5].

In this study, the research problem which will then be examined include: (1) how is the validity of affective authentic instruments developed based on expert validation?; (2) how is the reliability of affective authentic instruments developed based on the test results?; (3) how affective authentic assessment instruments developed by the test results?

Research Methods

This research is development research that refers to the ADDIE model. In the ADDIE models there are five stages of development, including: (1) analysis; (2) design; (3) development; (4) implementations; and (5) evaluation [6]. Subjects tested in this study were two lecturers which experts in automotive engineering. Also, this study involved 32 students of XI TKR class that accept material brake system course in SMKN 1 Labang Bangkalan. The data obtained in this study, namely: instrument validation data from experts, the reliability and practicality data based on the results of testing instruments. Data were analyzed to determine the level of validity, reliability, and practicality affective authentic assessment instruments that are being developed.

Results and Discussion

Result

The results of this research are the implementation of each phase in ADDIE models as shown in Figure 1.

teachers to develop affective assessment instruments because of too much teaching hour.

The next stage is the study of literature, conducting in-depth study activities related to the relevant theories related to the affective ratings to do authentically [8]. Based on the results of the needs analysis has been done, then the solution offered was to develop affective authentic learning instruments outcomes that are tested for its validity and reliability, so that can be used in the learning process.

Design

The activities carried out in the design phase include: (1) designing a concept or blueprint for a new affective authentic assessment instruments that are being developed; (2) identify indicators of affective authentic assessment in accordance with the characteristics of students and brake systems learning; and (3) designing an assessment rubric [9]. In the design phase of the planning activity is still in a conceptual form and will be used as a basis in the development stage.

In this stage, the researchers also formulated grating instruments that will be used by the experts to do the validation. Details of the categories in the validation instrument can be seen in Table 1 as follows.
Table 1. Details Category Instrument Validation

<table>
<thead>
<tr>
<th>No</th>
<th>Rated Aspect</th>
<th>Number Item Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Material</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Construction</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Language or culture</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Instruction</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Total Rating item</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

Develop

Development activities are the realization of a concept that has been designed in the design phase. In this stage, the concept is realized to be an instrument product. The procedures performed during developing phase, namely: (1) generate the initial product; and (2) carry out validation to the experts [10].

The initial products of the development of the draft instrument are advanced from the design stage. In the first stage, the draft prepared in the form of affective authentic assessment instruments in accordance with the characteristics of students and brake systems learning process. Once the instrument is completed, then design an assessment rubric. The goal of designing an assessment rubric allows teachers to assess students' ability to authentically affective.

The second phase, doing product's validity testing towards experts. Validity testing is conducted to measure the accuracy stage of the developed instruments in implementing its function. Besides, the validity testing also conducted to examine the properness of instruments if it used in the learning process. To make it clear, the result of validity testing of the experts can be seen in Table 2.

Table 2. The Result of Affective Authentic Assessment Instrument Validity

<table>
<thead>
<tr>
<th>No</th>
<th>Aspect</th>
<th>The Average Value</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Material</td>
<td>4,35</td>
<td>Valid</td>
</tr>
<tr>
<td>2.</td>
<td>Construction</td>
<td>4,55</td>
<td>Very Valid</td>
</tr>
<tr>
<td>3.</td>
<td>Language or culture</td>
<td>4,69</td>
<td>Very Valid</td>
</tr>
<tr>
<td>4.</td>
<td>Instruction</td>
<td>4,50</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td><strong>Total Average</strong></td>
<td><strong>4,50</strong></td>
<td></td>
</tr>
</tbody>
</table>

Implement

In this phase, affective authentic assessment instruments are implemented or tested towards a real situation, especially in XI TKR 1 class. The class implementation involves two teachers and a friend as the observer (affective authentic assessment instrument user) [8]. This phase is carried out to the test of reliability level of the instrument. Reliability test results processed using Cronbach's Alpha technique with SPSS 24, according to the results in Table 3.

Table 3. Reliability Test Results Instrument Affective authentic

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,895</td>
<td>3</td>
</tr>
</tbody>
</table>

Besides, to test the reliability of instruments, this stage also examines the practicality of the instrument. The purpose of the practicality test is as an evaluation of the practicality towards the use of affective authentic assessment instruments.

Table 4. Details Practicality Test Results Instrument Affective Authentic

<table>
<thead>
<tr>
<th>Item Observations</th>
<th>Observer 1</th>
<th>Observer 2</th>
<th>Observer 3</th>
<th>Average Item Observation</th>
<th>Overall Average</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2.68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluation

Evaluation in this study was divided into two, the evaluation of each stage and the final evaluation. Evaluation of each stage is performed to determine whether the instrument being developed is able to fulfill the requirements in each stage of the ADDIE model [11].
Then the final evaluation is performed to determine whether the instruments developed has been able to be used to assess the ability of their students’ affective so can be achieved by teachers.

**Discussion**

Based on the explanation above then the researchers get the results as follows.

**Instrument Validity**

An instrument is considered to be suitable to use if entering a category. According to Bryma and Bell (2011), The validity testing refers to the issue of whether the indicator on an instrument capable of measuring the concept measured. The validity test of this research is done with an instrument of affective authentic assessments that have been prepared to the experts.

As shown in Table 2, to test the validity of this affective authentic assessment instrument is divided into four sections, (1) the material; (2) construction; (3) the language or culture; and (4) instructions. From the test results showed the validity of the material to seize the average ratings of 4.35 with a valid category. The results show that in terms of material instruments developed in accordance with the needs of the curriculum and affective domain.

In the construction aspect of validation showed an average of 4.55 with a very valid category. The construction referred to this validity test such as (1) statements within the instrument briefly and clearly defined; (2) sentence in the acquitted instruments of irrelevant statements, negative, referring to the past, and (3) sentence in the instrument are free from such uncertain statement always, sometimes, none, never.

In the aspect of language or cultural validation showed an average of 4.69 with a very valid category. These results suggest that affective authentic assessment instruments have qualified the use of language or culture, such as (1) communicative language; (2) using Indonesian standard; and (3) do not use a language that is taboo. While the manual aspect of validation instrument showed an average of 4.50 with a valid category, this indicates that the instrument has been facilitated with clear instructions so that the observer is easier to use instruments developed.

Based on the average validation results in four aspect, the assessment of those three validator of affective authentic assessment instruments get validation results by an average of 4.50 with a valid category. It indicates that the instruments developed by the needs of the curriculum and fit for use in the learning process.

**Instrument Reliability**

Reliability refers to the extent to which the results obtained in the measurement can be replicated. Generally, the lack of reliability of the instrument can arise from differences between the observer and the instability of the attributes to be measured [13]. The instrument reliability test was carried out through direct observation in class XI TKR 1 SMKN 1 Labang Bangkalan.

From the test results in Table 3 above, it is known that the affective learning outcomes instrument gain the coefficient reliability of 0.895. The value when adapted to the Cronbach's Alpha technique classification category, it can be stated, instruments included in the special category. It shows that affective authentic assessment instruments used are suitable for use and trustworthy.

**Practicality of Instruments**

The practicality test was conducted in order to determine the ease level towards the use of the instrument based on the instrument user's observation [14]. In this study the practicality test is performed by applying instruments that have been validated in class XI TKR 1 SMKN 1 Labang Bangkalan.

In the practicality test of the instrument, there are some indicators that are used. According to Kadir, Zaim, and Refnaldi (2019) there are four indicators that are user to measure the practicality of the instruments such as (1) time; (2) assessment directive; (3) assessment indicator; dan (4) score. In this research, those four indicators are explained 11 sub-indicator or observation items.

The practicality test of instrument is conducted through the field test and involved three observer or instrument users. Based on the test, it gains the average value of three observers as 3.06, includes in practice category. That score indicates that the instruments used are practice and suitable for use in measuring student's affective ability because it has a clear
Directive and indicator so the observer easy to do the assessment.

Conclusion

The results of the validation by experts showed that the affective authentic assessment instruments are eligible for use in the learning process of the brake system. It evidenced from the ratings given by the validator that in the valid category. The trial results also showed that the instruments developed is suitable to use. The results are evident from the acquisition of a reliability value of 0.985 with a special category. In addition to the practical use of instruments developed in the learning process. This is evidenced by the acquisition value of 3.06 and a sign on the practical category.

References


