Development of Authentic Affective Assessment Instrument in High School Physics Learning

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Abstract: The aim of this research is to develop an authentic instrument of affective domain in high school physics, to produce an effective, practical and feasible authentic assessment instrument in High School Physics learning and to improve teachers' ability to designing qualified assessment to support graduate quality assurance. This research method uses four-D model approach which is tested in education unit of State Senior High School 3 of Gorontalo city. The results obtained are: First, the validity of the instrument through expert validation obtained the average coefficient of 0.75, it is meant in high validity with reliability of 0.99, and the feasibility of affective assessment instrument developed in percentage reached 86.46%. Secondly, the validity of the instrument's validity is 0.84, this is referred to in high validity with the reliability of 0.98. The practicality of development result instrument assessed by the teacher, get the average percentage of 88.19%, this percentage accumulated response from six physics teachers in State Senior High School 3 of Gorontalo city. Third, On the level of effectiveness is based on the validation grains, with a significant level of 5% on a sample of 30 respondents. Level of validity reached 83.33% with the reliability of the instrument reached 0.86, or very good. Furthermore, to test the effectiveness based on student responses then obtained a percentage of 86.83%, so the instrument concluded feasible, practical and effective to use.

1. Introduction

Through Affective assessment is the responsibility of all teachers in the school. Therefore, teachers should provide representative, comprehensive, and comprehensive assessment tools and tools for potential attitudes and behaviors that support children's learning achievement. Affective problems are felt important by everyone, but the implementation is still lacking. This is because designing the achievement of affective learning goals is not as easy as cognitive and psychomotor learning [1]. The educational unit should design the right learning activities for the purpose of affective learning can be achieved. The success of educators implementing affective learning and the success of learners achieving affective competencies needs to be assessed. Therefore, it is necessary to develop a reference for the development of an affective domain appraisal tool and the interpretation of the measurement results. Based on the assessment standards in the 2013 curriculum, Affective Assessment becomes an important assessment component that educators (teachers) must undertake [2]. Although one of the components of the assessment, but based on observations that have been done, teachers do not know how to pass affective assessment so that the implementation of affective assessment is still
rarely done. Assessments by the teacher include more cognitive assessment. For Religion and Civics Lessons, teachers easily perform affective judgments, ie by looking at morals and students ahlak. [3]

But unlike the case with Physics lessons, in Physics Assessment affective assessment can be done by using rating scale (rating scale) which in this case better known by the name of Likert scale. By using this scale of assessment, teachers can reveal the attitudes and interests of students to the subjects, teachers, learning atmosphere, school conditions and many other things. This research seeks to develop an affective assessment instrument in the 2013 curriculum so that teachers are expected to conduct an in-depth assessment of students' attitudes [3].

Affective domain is one of the taxonomic instructional goals related to a person's psychological condition or feelings. There are five important affective characteristics: "attitudes, interests, self-concept, values and morals." According to Krathwohl the affective sphere in taxonomy is detailed in five levels: receiving / attending, responding, valuing, organization, and characterization by a value or value complex [5].

At a glance, it can be seen that the structure of the affective domain is not as clear as the structure of the cognitive domain. The elements of the cognitive domain can be said hierarchical, meaning that one element is the absolute requirement for other elements, while the elements of the affective domain overlap, therefore it is not surprising that education is more oriented towards the cognitive domain because it is more easily formulated and assessed. Looking at the stages proposed Kratwohl then to measure affective span requires a relatively longer time. This is because the affective domain is not merely concerned with the mastery of the material of cognition or skill, but also wants the internalization of values that have been taught in the everyday life of the learners [5].

Allport states that attitudes are states of mental and nervous readiness, organized through experience, giving a direct or effective influence on the individual's response to all objects and situations associated with it. In the same book, Aiken states Attitudes can be conceptualized as predispositions learned to respond positively or negatively to a particular object, situation, concept, or person [6]. Thus, they have cognitive components (beliefs or knowledge), affective components (emotional, motivational), and performance (behavior or action). Whereas Wgner arouses that Attitude is an appropriate affective, cognitive, and behavioral component, in accordance with knowledge evaluation, and a person's predicate to act on an object. Meanwhile Triandis states that Attitude is an idea imposed on emotions that predispose action to a particular class of social institutions [7].

Individual interest refers to a person's relatively long-term preoccupied psychological predisposition (preference) to re-engage in a specific class of objects, events, or ideas over time and is specific [8]. In essence, individual interests grow slowly and tend to last long and are considered relatively stable. Furthermore, individual interest develops in combination with individual knowledge and value [9]. With the above characteristics, individual interest plays a major role in the preference of learners to engage in tasks or activities over time and in predicting future motivations. Meanwhile interest in learning is restored to the conceptual definition of interest is a desire that is formed through experience.

2. Method

Furthermore, theoretical validation through the examination stage by experts. Experts in question are those who are involved in the field of assessment and measurement in education. The researcher chose two major validators after the instrument was examined by the counselor in the study. Furthermore the validators provide input and suggestions related to the lack of instrument design. Departing from the suggestions that researchers improve and make changes in accordance with the intended direction. The key to this validation is reviewed from element 1) the feasibility of graphic design and layout, 2) The feasibility of instrument construction 3) Language feasibility and 4) content feasibility. In the final stages, the validator provides an assessment of the instruments that have been developed.
Table 1: Instrument Development Base

| No. | Indicator      | No. Item | Affective Division |
|-----|----------------|----------|--------------------|
| 1   | Moral          | 1        | Spiritual          |
| 2   | Value          |          |                    |
| 3   | Attitude       | 11       |                    |
| 4   | Moral          | 3        | Politeness         |
| 5   | Self concept   | 14       |                    |
| 6   | Interest       | 18       |                    |

| AFEKTIF SPIRITUAL |
|-------------------|
| No. | Indicator          | No. Item | Affective Division |
| 1   | Moral              | 1        | Spiritual          |
| 2   | Peace and Tolerance|         |                    |
| 3   | Mutual cooperation |         |                    |
| 4   | Freedom and Confidence |     |                    |
| 5   | Empathy and Love   |         |                    |
| 6   | Responsible        |         |                    |
| 7   | Simplicity         |         |                    |
| 8   | Discipline         |         |                    |
| 9   | Honest             |         |                    |
| 10  | Feeling            |         |                    |
| 11  | Thought            |         |                    |
| 12  | Action             |         |                    |

| AFFICIENT SOCIAL |
|------------------|
| No. | Indicator | No. Item | Affective Division |
| 2   | Value     | 2        |                    |
| 3   | Attitude  | 11       |                    |
| 4   | Moral     | 3        |                    |
| 5   | Self concept | 15 | Ideal Self        |
| 6   | Interest  | 18       |                    |
| 7   |            | 19       | Attention          |
| 8   |            | 20       | Involvement        |
| 9   |            |          |                    |
| 10  |            |          |                    |
| 11  |            |          |                    |
| 12  |            |          |                    |
| 13  |            |          |                    |
| 14  |            |          |                    |
| 15  |            |          |                    |
| 16  |            |          |                    |
| 17  |            |          |                    |
| 18  |            |          |                    |
| 19  |            |          |                    |
| 20  |            |          |                    |

Number of Items 20

Source: Development Data 2017

3. Result

In this study using two experts to provide input and assessment of the developed instrument. Further validation results are analyzed to see the consistency of the panelists, from the validation analysis obtained the level of validity ranges from 0.66 to 1, with this figure feeding instrument validity in high category. While the reliability obtained coefficient of 0.99. When the expert judgment results in the conversion in the form of percentage then the result count is summarized in the following table

Table 2: Percentage Of Affective Instrument Feasibility

| Eligibility Criteria    | Feasibility Percentage (%) |
|-------------------------|---------------------------|
| Graphic Design and Layout | 83.33                   |
| Construction Instruments | 84.38                   |
| Language                | 87.50                    |
| Contents                | 90.63                    |

Feasibility Percentage 86.46

Source: Primary Data 2017

The feasibility of the developed affective appraisal instrument is measured by four main indicators namely, the feasibility of graphic design, construction, language and content feasibility. Each of these indicators is described with sub indicators. On the feasibility of graphic design, obtained a percentage of 83.33%, which is supported by the clarity of letters, layouts and the location of sentences and words
in the paper. On the feasibility of the construction obtained score of 84.38%, in this indicator is supported by three sub indicators that is the suitability of the curriculum, clarity division of indicators, conformity of the statement with indicators and conformance indicators with measured aspects. In the language feasibility indicator, a percentage of 87.5% is obtained, in the Language eligibility, which is an assessment item is the use of the correct Language code, Language simplicity, ease of interpretation and full meaning. With the percentage obtained, then this instrument is considered feasible in terms of the language used. In the last indicator is the content feasibility, this indicator becomes the main indicator in validation of instrument development, on the indicator get percentage of 90.6%, this value indicates the feasibility of the instrument is high enough. The average feasibility of this instrument is 86.46% with this percentage, then the developed valuation instrument is said to be feasible to use.

The instrument design results obtained in this study require the assessment of some practitioners to obtain responses to the convenience (practicality) in the use of affective instruments and responses from users to provide feedback on the accuracy (effectiveness) of the instrument in measuring the indicators measured.

After the results of the developed Appraisal Instrument were validated, the school trial was conducted, this trial to analyze the level of practicality and effectiveness of the instrument in its use. The practicality of the instrument is assessed by physics teachers as users of instruments and practitioners who understand how these instruments are used. From the results of validation and reliabilitas validity coefficient obtained ranged from the range 0.611 to 1, this coefficient shows a high level of validity. While for reliability analysis got the number 0.98. When converted in percentage form, the effectiveness of an affective valuation instrument looks like the following table:

| Criteria of Practicality                  | Percentage of Practicality% |
|------------------------------------------|-----------------------------|
| Administering                            | 84.72                       |
| Assessment Time                          | 88.89                       |
| Cost and Implementation                  | 79.17                       |
| Scoring                                  | 95.83                       |
| Interpretation and application            | 93.06                       |
| Response Against Instruments             | 87.50                       |
| Percentage of Practicality                | 88.19                       |

Source: Researcher Priority Data, 2017

The practicality of this instrument first begins with the ease of administration that gets the percentage of 84.75% this percentage is taken from three sub-main indicators of ease of processing the results of assessment, ease of documentation and ease of conversion reporting. Next to the second indicator is the ease of assessment time to get a percentage of 88.89%, this percentage shows the level of ease of assessment time is high enough. In this indicator there are speed points of the appraisal process, conformity with study time and flexibility of assessment execution. In the third indicator is the ease of cost and implementation, on this indicator get a percentage of 79.17%. This percentage indicates the lowest percentage of other indicators, after a follow-up communication with the assessment teacher, they see that this implementation costs inconvenience for teachers and students even the school. Although the teacher assisted with the design of applications that use Microsoft excel in the note book. On the other hand there is the ease of filling in the affective score sheets that require only low thought and teachers can also easily assess affectives. The percentage of these three sub indicators gives a score of 79.17%. On the fourth indicator, the ease of scoring that gets a percentage of 95.83%. this percentage is an accumulation of three sub indicators namely, ease of scoring, clarity of score description and ease in understanding the scoring. From the technique of scoring that is designed, the teacher feel comfortable with the rubric checking technique, because the teacher only see which indicators are achieved and not. In the indicator Five, namely the interpretation and application
utility with the percentage of practicality of 93.06%. This percentage is the average of three sub indicators, the use of assessment output as a media decision-making, the validity of the application of school instruments and the carrying capacity of the instrument in facilitating the learning process. The teacher commented that the affective assessment results become the basis for teachers to organize strategies in the methods used in teaching to arouse students' interest in learning. Master acknowledges that formal affective judgment is sometimes troublesome in learning activities, but they realize that it is important to support the perfect of three shutter in the learning process. In the responses to the assessment instrument get respos of 87.50%, in this section more detail is built on three statements namely interest in using the instrument, interest to complete the deficiencies and other teachers' recommendations to use the developed instrument

The developed affective appraisal instrument needs an effectiveness assessment to see how well the instrument measures affectively and comfortably used by students. Measurement of this effectiveness using two approaches that is using validation test from student's questionnaire (Self-examination) and questionnaire of appraisal questionnaire. Test validity questionnaire affective assessment in the form of self-assessment validated grains, with reliability coefficient obtained for 0.968. This figure is generated by SPSS program.

Furthermore, to assess the effectiveness of students 'self-assessment instruments, students' responses are also related to the effectiveness of the instruments according to their responses. Here are the results of the assessment of 20 students on the effectiveness of self-assessment instruments.

| Criteria of Effectiveness         | Percentage of Effectiveness (%) |
|-----------------------------------|---------------------------------|
| Graphic design                    | 91.67                           |
| Language                          | 88.75                           |
| Assessment time                   | 82.50                           |
| Cost and Implementation           | 87.08                           |
| Scoring                           | 84.17                           |
| Response                          | Against                         |
| Instruments                       | 85.42                           |
| Average effectiveness             | 86.83                           |

Source: Primary Data 2017

The first point is warnah and layout get a score of 91.67%, this score shows a positive response of students large enough to the layout and warnah that supports the display of instruments. In the second point of language effectiveness, getting a score of 88.75%, this score is also considered to indicate the effectiveness of the instrument in terms of Language according to the students, as sub indicators of this point include the use of the correct Indonesian language, the simplicity of Language and the equanimity in understanding the language of the instrument, of this indicator raises a variety of student opinions on the effectiveness of the instrument language, so that it can be accumulated a high average. On the third point of the effectiveness of the assessment time, at this point get a score of 82.50%, this score was included in the category masi effectively because he was above 80% score. Sub indicators in this point are the speed of implementation of the assessment, the suitability of the learning time and the flexibility of the execution of the assessment, so that it can be accumulated according to the average earned. On the fourth point, cost effectiveness and implementation get score of 87.08% this score is an accumulation of three sub indicators that is the ease of the cost of the implementation of the assessment, the use of thinking and the comfort of students with the statement in the instrument. At point Five, there is a point of scoring effectiveness with an average score of 84.17%. This score is an accumulation of three items that focus on the ease and effectiveness of scoring. The final point is the student's response to the instrument, the total responses obtained are at a percentage of 85.42%, this score is a combination of student responses to the accuracy of the instrument in measuring student
affective, the effect of instrument use and improving affective quality, and recommendations on the use of school instruments.

Factor analysis is used to test hypotheses about the existence of constructs or to find constructs in variables. Through the factor analysis can be seen whether the construct specification developed in theory has been in accordance with the concept of the underlying construct after field testing. Grains that have elements together (common factor) combined into a new factor. Through factor analysis it is hoped that strong dimensions, indicators and items will be found to form the constructs of the tested variables. As for the steps of the researcher in performing the factor analysis, ie (1) calculate all correlation matrices for each variable, (2) perform factor extraction, (3) rotate, and (4) name each factor.

Disseminate stage, implemented by way of socialization in the form of workshop / workshop by involving teachers of Physics study subject in the Subject Teacher Consultation (MGMP) and related institutions.

4. Conclusion
Development The validity of the instrument through expert validation is found in the mean of the coefficient of 0.75, it is meant in high validity with the reliability of 0.99, and the feasibility of the affective appraisal instrument developed in percentage reaches 86.46%. The validity of the practicality of the instrument is found to be in the mean of 0.84, this is meant in high validity with reliability of 0.98. The practicality of the development result instrument assessed by the teacher, earned an average percentage of 88.19%, this percentage accumulated response from the physics teacher. At the level of effectiveness is based on the vallidiadi grains, When punctuated the level of validity reached 83.33% with the reliability of the instrument reached 0.86, or very good. Furthermore, to test the effectiveness when based on student responses then got the percentage 86.83%.

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