The Development of Computer-Based Personality and Social Competency Test Questions for Teacher Professional Education (TPE) Participants Automotive Engineering

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Abstract. The purpose of this study is to develop a computer-based personality and social competency test questions. This research was carried out with a research and development approach to the Borg and Gall model by simplifying the steps according to the needs and situations that affect the timing of this research, especially the occurrence of the Covid-19 pandemic outbreak. To analyze the quality of the results of this development, the Anates 4.0 program was used, and validity analysis was also carried out using the product-moment correlation coefficient test statistical technique, while the reliability of the items was tested by calculating the Cronbach Alpha correlation coefficient. The results of this study are: (1) the development of computer-based personality and social competency test questions for TPE participants with automotive engineering expertise is carried out through five stages, (2) the main steps in the process of creating a computer program for this personality and social competency in general consist of four stages, (3) the items of the personality and social competency test items have met the requirements, either through rational analysis of the material, construction and language aspects as well as empirical analysis which includes validity, reliability, difficulty level and distinguishing power, although there are still some items that need to be improved.

1. Introduction
Teachers have an important role in the educational issue. It is because they bring significant effects to the achievement of the students [1]. The qualified teacher will bring up qualified teaching and learning activities and eventually they could give positive effects to the students’ achievement [2]–[7]. Especially in vocational education, a vocational teacher is a person who teaches special expertise or profession [8] so that delivering knowledge is not enough because of the importance of required skills. Therefore, the improvement of teachers’ quality is indispensable to produce qualified students.

To respond to the Minister of Research, Technology and Higher Education who urged all teacher education institutions namely LPTK to immediately reform the TPE Program and improve the quality of the education and learning process by the National Higher Education Standards namely SN-Dikti and the Higher Education Standards, with the hope that in turn, it can produce graduate prospective teachers who are ready to face challenges. and life opportunities that are increasingly complex in the 21st century and ready to compete in the era of the ASEAN Economic Community (AEC) [9], and the era of the Industrial Revolution 4.0 [10], and the era of Society 5.0 [11]. This is also given the fact that so far the TPE National Written Examination namely UTN implementation model is always a computer-based test (CBT) and the achievement of TPE participants' graduation is largely determined...
by their competence in this field, especially if we look at the curriculum which shows that the proportion of fields personality and society is quite dominant.

Government Regulation Number 19 of 2005 concerning the National Education Standards state that professional teachers must have four competencies, namely: pedagogical competence, personal competence, social competence, and professional competence which can be obtained through education. profession [12]. Personality competence is a competency related to the personal behavior of a teacher himself, which must have high values so that it is reflected in the behavior in his daily life. This in itself is closely related to the philosophy of life, which expects teachers to become human models with noble values.

Personality competence is the ability of a teacher to behave like a teacher. Personality competence is the ability of a personality that is solid, has a noble character, is wise, and has dignity, and is a role model for students. According to the Government Regulation of the Republic of Indonesia Number 74 of 2008 concerning Teacher [13], the minimum personality competence includes personalities who: (1) have faith and piety, (2) have a noble character, (3) wise and wise, (4) democratic, (5) steady, (6) authoritative, (7) stable, (8) adults, (9) honest, (10) sportsmanship, (11) be a role model for students and society, (12) objectively evaluating their performance, and (13) develop yourself independently and sustainably.

Meanwhile, in the attachment to the Regulation of the Minister of National Education No. 16 of 2007 concerning Academic Qualifications and Teacher Competencies describes personality competencies for classroom teachers and subject teachers [14], at all levels of primary and secondary education including: (1) acting by the religious, legal, social and national cultural norms of Indonesia, (2) presenting oneself as an honest, noble character, and role model for students and society, (3) presenting a person who is stable, mature, wise, and authoritative, (4) shows a work ethic, high responsibility, a sense of pride in being a teacher, and self-confidence, and (5) upholding the professional code of ethics for teachers.

There are two forms of written test questions that are commonly used to assess aspects of knowledge including personality and social competency tests, namely: (1) multiple-choice written test, (2) written test in description form. Multiple-choice items consist of a stem and an option. There are several rules for writing multiple-choice questions which include (a) Substance/Material aspects, (b) Construction aspects, and (c) language aspects. Furthermore, to determine the quality of a written test, it is known that there are 2 (two) types of item analysis, namely (1) Rational Analysis: namely an analysis of the items based only on ratio considerations and without testing, and (2) Empirical Analysis: namely the analysis of the items based on statistical measures of the test results of the questions in question.

This study aims to: (1) obtain documentation of computer-based personality and social competency test questions for TPE participants with automotive engineering expertise, (2) to provide computer programs for personality and social competency tests for TPE participants with automotive engineering expertise, (3) to find the validity and reliability of computer-based personality and social competency test items for TPE participants with Automotive Engineering expertise. The development of computer-based Personality and Social competency test questions, bring the hope that the participants of TPE will be trained to answer problems in this field effectively so that it is expected that the maximum pass rate will be achieved.

2. Methods
This research is research and development which is often abbreviated as R & D. In this case the researcher chose the R & D research model developed by Borg & Gall [15] because this model is used to develop and validating educational products. The research steps are in the form of a cycle which includes: reviewing research findings, developing products based on these findings, testing in the field with a setting according to the place where this product will be applied, and revising it based on field test results [15]. This process is repeated until the product being developed meets the stated objectives.
The trial subjects in the study were participants of the TPE in the Automotive Engineering expertise program in 2020 that consist of 23 people in the 2nd stage and 27 people in the 3rd stage. Therefore, the total number of trial subjects was 50 participants. The first data analysis technique used is descriptive analysis techniques, both quantitatively and qualitatively to describe research data in general.

3. Result and Discussion

3.1. Development Methods of Computer-Based Personality and Social Competency Test Questions

The process of developing the personality and social competency test questions for TPE automotive engineering expertise can be broadly said that they have followed the procedure developed by Borg & Gall, but with several simplifications. This is mainly due to limited time and possible readiness of trial subjects considering that this development time interval was during the Covid-19 Pandemic and also the trial subjects were still in their respective assignments and were scattered in many schools. In general, this development procedure includes the following steps: the preparation stage, the implementation stage, the trial phase, and the product revision stage.

3.2. Implementation Stage of Computer Program Development

Three steps need to be done during the development of computer-based test questions. First, the stage of adjusting the question format to a format that is acceptable to the system. At this stage, the questions from the MS Word format are adjusted to the format requested by the system, namely the Aiken format. Second, the upload stage of questions that have been formatted. At this stage, it begins with creating a course name on the “Besmart” Learning Management System (LMS) system provided by the university institution followed by making various settings including giving the quiz name and password so that this computer program is easily accessible to its users. Thirdly, the assessment setting stage for each answer option. At this stage all answer options need to be scored because all answers have a score starting from a score of 1 (20%), a score of 2 (40%), a score of 3 (60%), a score of 4 (80%) and a score of 5 (100%). Lastly, the testing phase of the question, which is using the preview quiz menu with the procedure for accessing “Besmart” LMS with various stages. When opening the preview of the quiz, we are checking whether all the questions have been written properly, so that it can also be used to evaluate whether the editorial team is following the original as planned.

3.3. Quality of Personality and Social Competency Test Questions

3.3.1. Based on Rational Analysis

Referring to the results of the rational analysis, it turns out that the quality of the developed personality and social competency test items has all met the quality as a good question in terms of material, construction, and language aspects.

3.3.2. Based on Empirical Analysis

From the results of empirical analysis, the quality of the questions as a product of this research development is given the following discussion and explanation.

3.3.2.1. Difficulty Level

The results of the analysis show that the ratio of the number of questions with Easy: Medium: Hard difficulty is 35%: 35%: 30%. This comparison is not ideal enough or not following the requirements as a good question, because theoretically and also the provisions that are often issued by the Ministry of Research, Technology and Higher Education comparison of difficulty level are good questions, namely; Easy: Medium: Hard = 25%: 50%: 25%

Based on these results, it is necessary to shift or change the difficulty level status, which is to reduce the number of easy questions by 10% (4 questions) and 5% difficult questions (2 questions) to be revised into questions that have moderate difficulty level so easy and difficult ones are 25% (10 questions) and 50% (20 questions) respectively.
3.3.2.2. *Distinguishing Power (DP)*

Based on the results of the empirical analysis on Distinguishing Power (DP), it turns out that not all items have sufficient, good, or very good DP. There are still 11 items with a Bad “DP” and 5 items with a Very Bad “DP”. All of these questions still need to be revised so that they can reach a “DP” that has at least a sufficient category.

3.3.2.3. *The validity of Question Items*

Based on the results of the analysis, it can be seen that the value of the validity of each item has the smallest value of -0.112 and the largest is 0.722 and if the average is calculated, the value of $r = 0.318$ is obtained. As for the table for $n = 50$ with an error of 0.05, the price of $r$ table = 0.279 so that in general the items on the personality and social competency test have the validity of fulfilling the requirements, even though there are some questions whose “$r$ value” is less than 0.279. This incident may be caused by some test takers who could not completely answer all the questions due to running out of time because they entered the system late.

3.3.2.4. *Reliability of Question Items*

The results of the calculation of reliability if observed have the smallest value of -0.744 and the largest is 0.780. As for the table for $n = 50$ with an error of 0.05 the price of $r$ table = 0.279, which means that all the items on the personality and social competency test are all reliable because $r$ count > $r$ table so that they qualify as good questions.

4. **Conclusion**

It can be concluded that the development methods consist of 4 stages which are; the preparation stage, the implementation stage, the trial phase, and the product revision stage. Then, there are three main steps during the development of computer-based test questions which are; formatting the question form, uploading to the LMS “Besamart”, and the last one is adjusting the score in every option.

In general, the items of the personality and social competency test have the validity of the requirements. Besides, based on a rational analysis of all the items met the requirements, both in terms of material aspects, construction aspects: and language aspects. On the other hand, the empirical analysis said that the level of difficulty still needs to be revised because of the comparison that has not suitable for the regulation. Besides, the amount of distinguishing power (DP) for computer-based personality and social competency test questions needs to be corrected again.

5. **References**

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