Needs Assessment QR Code Combination with Google Form for Online Cognitive Assessment

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Abstract. This study aims 1) to develop online cognitive assessment instruments that meet instrument criteria such as validity, reliability, level of difficulty, different power, 2) develop online cognitive assessment instrument using a combination of qr code and Google forms. The research method refers to the Borg and gall R&D research method. The research subjects were students who were taking theoretical and practice courses on table tennis physical education and recreation education program IKIP Budi Utomo Malang Class of 2017. The results of the initial research of the needs analysis phase given to students and lecturers were 1) cognitive assessment instruments used were still have not met the eligibility criteria, 2) online media has not been used to conduct cognitive assessments, 3) students and lecturers agree if an online cognitive assessment instrument is developed in accordance with the instrument eligibility criteria and the media used a combination of qr code with Google forms.

Keywords: online cognitive assessment, QR code, google form

1. Introduction

The world of education cannot be separated from the rapid development of technology because it is a large force that has an indirect influence. The world of education must also participate in the use of technology as a support for the educational process itself. One of the supports that technology must support is learning resources. Learning resources are expected to be a driving force of the learning process that is compiled based on the principles of effective, efficient and interesting to attract students' learning interest. This is consistent with Januszeswki and Molenda's statement quoted by [1].

Cognitive assessment instruments are tools used to gather information about the achievement of the learning process on cognitive aspects. This relates to everything they understand and what they can do in their lessons following learning activities. According to Dunham, quoted [2] instruments for assessment in physical education include attitudes, knowledge, and skills. Understanding in knowledge is a very important part According to Gurning quoted [2] knowledge affects changes in good attitude. The importance of knowledge instruments influences skills because with practice-based lessons being referred [3]
Assessment is a systematic and continuous process for gathering information about the learning process and learning outcomes of students in order to make decisions that refer to the specific criteria and considerations of Arifin that are followed [4]. The purpose of the assessment is to obtain level knowledge teacher success when the learning process whose purpose is to do feedback in planning the next learning process Poerwanti inside [3]. Not infrequently in the learning process aspects of the assessment of learning outcomes are ignored [4]. The reason is because the focus of learning is only on the delivery of material so that the learning process can run well and neatly as planned but the tools used to do the assessment no longer see the target to be assessed.

QR Code is a two-dimensional bar code found by a Toyota subsidiary in 1994 called Denso Wave. The use of QR Code can be done freely because the Denso Wave patent is not used. So this means free development is carried out to make QR Code basru varieties and applications in processing of Meydanoglu QR Code inside [5]. Qr Code is formed from a black flat shape whose composition follows a square pattern with white as the background [6]. Qr Code is a fast response code because messages can be sent at high speed and also its reliability is undoubtedly another plus the low cost and high capacity to send [7].

Google Form is a useful tool to help us in planning events, sending surveys, or collecting information easily in an efficient way. Google Form is also the application part of Google that is most often used in internet data search [8]. The use of google form in learning has been used by several studies, namely media for evaluating lecturer performance [9], media assignment of courses [10], Use of Learning 4.0 Assisted by Google Classroom Applications and Google Form [11].

The development of cognitive assessment instruments is highly recommended according to the results of research on various subjects that have been carried out including material theory of atomic bohr and quantum mechanics [12] and [13], Material Kingdom Plantae [14], Static Fluid material [15], physics lessons [16] and conducted at elementary school level [17], junior high school [18], senior high school [19], and college level [20] even in high school deaf children [21]. Development of cognitive assessment instruments using various media have been carried out such as using the use of computers combining the game Who Wants To Be A Chemist [22], Ispring Suite 8 [23], based on literasion science available [24].

However, what combines the use of a combination of qr code and Google form has never been done, another problem that often arises is that when compiling assessment instruments do not pay attention to the instrument's standard criteria such as validity, reliability, objectivity, practice, economics, while in the analysis of knowledge problems that need note, namely the level of difficulty, different power, and deception [25] so that it is what makes the background of research carried out to develop cognitive assessment instruments combining qr code and google form as an effort to improve the quality of the learning process. furthermore it is hoped that this research can be used as material for wider study and development for the Table Tennis Theory and Practice course and can be used as a reference for assessment activities.

2. Method

This research uses the development model developed by Borg and Gall in the quotation [26] in full, consisting of ten steps in implementing a research and development strategy. This research is still in the process of need analysis conducted. The first analysis of the questions totaling 50 is done by 30 students using Microsoft Excel by entering the formulas of validity, reliability, difficulty level and distinguishing power, then the criteria are determined while the needs analysis filled out by the lecturer is analyzed using descriptive analysis.

The validity formula of the questions uses Pearson's product moment correlation formula as follows [25]:

\[ r_{XY} = \frac{n\Sigma XY-(\Sigma X)(\Sigma Y)}{\sqrt{[\{(n\Sigma X^2)-(\Sigma X)^2\} \{n\Sigma Y^2-(\Sigma Y)^2\}} \} \] 

Information:
- \( r_{XY} \) = correlation coefficient between variable X and Y variable, two variable onescorrelated
The level of validity of a test is expressed in a validity coefficient. If \( r \) count < rtable, the problem is invalid. If count> rtable, the problem is valid. The coefficient of validity of a test is expressed in a coefficient number between -1.00 to 1.00. The coefficient referred to is as follows:

| Coefficient | Qualification |
|-------------|---------------|
| 0.810 - 1.0 | Very high     |
| 0.610 - 0.8 | High          |
| 0.410 - 0.6 | Enough        |
| 0.210 - 0.4 | Low           |
| 0.0 - 0.2   | Very low      |

The formula used to test reliability is [25]:

\[
r_{11} = \frac{k}{(k-1)} \left( \frac{V_t - \Sigma pq}{V_t} \right)
\]

Information:
- \( r_{11} \): instrument reliability
- \( k \): number of questions
- \( V_t \): total variance
- \( p \): subject answered correctly (score 1)
- \( q \): subject answered wrongly (score 0)

| Reliability coefficient | Qualification |
|-------------------------|---------------|
| 0.81 - 1.0              | very high     |
| 0.61 - 0.8              | high          |
| 0.41 - 0.6              | enough        |
| 0.21 - 0.4              | low           |
| 0.0 - 0.2               | very low      |

How to calculate the level of difficulty in a problem means the process of measuring the degree of difficulty of a problem formula used is [25]:

\[
P = \frac{B}{JS}
\]

Information:
- \( P \): difficulty index
- \( B \): The number of students who answered the question correctly
- \( JS \): The total number of students taking the test

Difficulty level criteria: \( P \) 0.00 < 0.30 difficult, 0.31 < 0.70 moderate, \( P \) 0.71 > 1.00 easy [25].

To calculate the distinguishing power determined by the following formula [25]:

\[
D = P_A - P_B
\]
Information:
D: discrimination index of one item
PA: the number of proportions in the upper group that can correctly answer the question being processed
PB: the total proportion of groups below that can correctly answer the item being processed
BA: Many upper groups can correctly answer the question being processed
BB: the number of groups below who can correctly answer the Problem items processed
JA: top group number
JB: number of groups below

\[ P_A = \frac{B_A}{J_A} \quad P_B = \frac{B_B}{J_B} \]

**Table 3. Different Power Qualifications**

| Value of Interpretation | Score     |
|-------------------------|-----------|
| 0.0 - 0.2               | bad       |
| 0.21 - 0.4              | enough    |
| 0.41 - 0.7              | good      |
| 0.71 - 1.0              | very well |
| negative sign           | very bad  |

3. Results and Discussion

The data obtained in the needs analysis carried out by analyzing 50 questions with the subject of 30 students using Microsoft Excel. The validity of the questions shows that 36 questions (72%) are invalid and only 14 questions (28%) are declared valid. The reliability level of 0.578 in the medium category with a t-test smaller than 0.7 indicates that it is not significant, which means it is not reliable. The difficulty level of questions 42% is in the easy category, 54% is in the medium category, while 4% is in the difficult category. The difference in power about 84% is very bad category, 12% is bad category, 2% is enough category and 2% is good category.

Data obtained in the needs analysis carried out by analyzing as many as 50 questions with the subject of 30 students and the number of questions 60 items using Microsoft Excel. The validity of the questions shows that 36 questions (72%) are invalid and only 14 questions (28%) are declared valid. The reliability level of 0.578 in the medium category with a t-test smaller than 0.7 indicates that it is not significant, which means it is not reliable. The difficulty level of questions 42% is in the easy category, 54% is in the medium category, while 4% is in the difficult category. The difference in power about 84% is very bad category, 12% is bad category, 2% is enough category and 2% is good category.

In developing knowledge instruments must be in the valid category because when the question is declared valid it can be used for assessment while the data obtained in the category is invalid. This is not in accordance with the opinion of [25] which states that validity a measure that is shown based on the

Data needs analysis needs through a questionnaire for lecturer conversion in the form of a percentage with the following formula Sudijono [27]:

\[ P = \frac{f \times 100\%}{N} \]

Information:
F : The calculated frequency
N : Total number of frequencies
P : percentage score
level of validity of an instrument used. High validity must have a valid instrument. The reverse also applies, if the validity is low means the instrument used is not valid.

Test reliability is the consistency of the test results. According to Basuki [2] reliable means trustworthy, a test is said to be trustworthy if the results achieved by the test if consistency or steady and do not show significant changes. Based on the analysis of the items obtained reliability is classified as moderate, namely 0.578. This can be interpreted as an instrument of assessment of knowledge that has instability and reliability when used to measure repeatedly on the same subject the results are more or less the same. This is not in accordance with the opinion of [26] which states the reliability of an instrument means that the instrument has a certainty in the results.

The level of difficulty of the questions is dominated by questions in the medium category. It can be concluded that the knowledge assessment instruments are in the good category because of the equitable distribution of difficulties. According to Nurhasan [4] good questions are problems that are too easy or even too difficult to solve. Problems that are too easy do not provide stimulation to enhance efforts to solve them. On the other hand, the difficult category of questions will cause a sense of hopelessness and loss of enthusiasm to try again because it is beyond the limits of its ability.

According to [25] the power of distinguishing questions is the ability of a problem to categorize between smart students and stupid ones. Based on the results of the analysis of the assessment instruments are dominated by questions with very different categories of power so that it can be interpreted this instrument has not been able to separate or distinguish students who study the material seriously or not.

4. Conclusion

The conclusion that can be drawn up to the needs analysis stage is that the knowledge assessment instrument used is still not feasible to be used as an assessment instrument, so it is necessary to proceed further. Therefore, preparation of a small group trial after the product is revised the first stage by means of the initial instruments that have been formed are validated to 1 subject matter expert, instructional media expert and 1 linguist, revise and improve according to the results at the small and large group test stage, refinement of the instrument, then the last stage of development research is dissemination and implementation.

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